ICT and E-learning

Alan Clarke and Ewa Luger

With additional support from Alastair Clark, Linda Faulkner and Mary Moss
Preface

Overview

This paper considers the relationship between ICT and e-learning and adult education. It covers the needs of individuals to acquire technological skills and also the use of technology to deliver and support learning. It discusses government strategy, policy, trends and developments, skills for life, digital inclusion and the information society.

Emerging Issues

Technology is a major force for change. It is a dynamic subject that is continuously producing new ideas and development. However, the adoption and effective use of technology in learning operates to a different timeline. As young people enter adult education they will expect technology to be both available and employed to assist their learning. However, adult education includes a wide range of learners with other expectations and a workforce with varying skills not only in ICT but also in e-learning pedagogy. A large part of the population does not have access to or the skills to use ICT (approximately 17 million adults). Digital inclusion is not simply about access to technology it involves meaningful access, technical skills and information literacy. There is considerable interest in the potential for individuals to become independent learners through the use of technology but this assumes a sophisticated learner and at the moment probably only a tiny proportion of learners have the required skills, knowledge and attitudes.

Future Challenges

ICT and e-learning provide a wide range of challenges including:

1. Staff training – the need to ensure the educational workforce has the e-learning and technical skills to employ technology effectively.
2. Equality of opportunity – the need for the whole of adult education to be able to offer access to, support with and effective use of ICT. At the moment there are major differences across the different sectors that make up adult education.
3. Learners skills – for individuals to benefit from the potential of technology they require not only technical but also learning skills and information and media literacy. These are often not considered in policies or strategic developments.
4. Dynamic – the rapid and continuous change means that policy must be reviewed regularly and programmes sustained. Time limited initiatives are likely to be insufficient to realise the full benefit of technology.
5. Trends – ICT and e-learning are difficult areas to predict beyond the immediate future except that change is inevitable and is likely to impact on where, when and how education is provided.
Summary

Introduction

1. Information and communication technology (ICT) and e-learning are separate but connected subjects. In simple terms, to benefit from e-learning an individual needs to have a reasonable degree of ICT skills and confidence in using technology. Tutors seeking to use e-learning methods need both technical and pedagogical skills.

2. ICT and e-learning are dynamic, complex and rapidly changing subjects. They are global subjects and developments come from across the world. In comparison, change in education and training operates to different pressures so that we have two timelines. These are significant factors for any consideration of ICT and e-learning.

3. The expectations of young people entering the post-school world are increasingly more demanding about access to and use of ICT within their education and training.

4. Learning skills have been widely agreed as essential for success in education and training. It has been suggested that for e-learning, and specifically online learning, the mix of skills is different from more traditional forms of learning (Clarke, 2004).

Strategy

5. There is a long history of government interest and initiatives in relation to ICT and e-learning. However, these have often been focused on specific areas of the education and training sector so that the different sub-sectors have very different resources, expertise and experience. Although there are many ICT and E-learning policy documents, in other major policy areas ICT and E-learning are frequently not included.

6. In the United Kingdom and Europe a considerable degree of strategic planning has been undertaken but there are questions as to whether it has e-enabled education and training?

7. The BECTa review (2006) of the use of ICT and e-learning in England concluded that “there is still a high variation in the adoption, deployment and use of technology”. The HMIE (2007) report on the use if ICT in Scottish Education stated that “the overall impact of the adoption of ICT in learning and teaching does not reflect its potential” and that “excellence exists only in isolated pockets”.

Major Areas of Policy

8. Strategies and policy tend to focus on the three areas of infrastructure, content and staff development.

9. There are considerable differences in infrastructure across the post-school sector. It is not a one-off investment but needs to be considered in terms of long-term needs, technical support and learners’ and teachers’ requirements.

10. The ‘market’ for e-learning content is very immature and unstable. Public funds for content development and distribution are often ring-fenced, with access limited to particular parts of the education and training sector (e.g. higher education).

11. The favoured online commercial model is to offer the basic product free and to
charge for a value-added or premium service. The Open Courseware movement exemplifies this in an educational context.

12. ICT provides the means for teacher-, trainer- and learner-produced content to be made widely available. Web 2.0 applications are based on this concept of sharing content.

13. The Government's effort and particularly that of the Learning and Skills Council in the area of e-learning staff development in relation to e-learning have been substantial, effective and long term. However, the need is still substantial. Due to the dynamic nature and the scope of e-learning and ICT it is likely to remain so for many years. The Quality Improvement Agency’s plans to incorporate e-learning within their national teaching and learning change programme is a clear recognition of these facts.

14. The dynamic nature of e-learning and ICT means that there is a need for more than initial training. More advanced training and continuous professional development are both required.

Trends and developments

15. It is difficult to predict the future application of technology. One approach is to consider the use that young people are making of technology. Raymond Martin (Martin, 2006), co-founder of the Future Laboratory, suggests “students are increasingly developing a mindset towards education that skips the boundaries of where lessons can take place, how learning is undertaken and how it is disseminated.”

16. There are predictions (Jennings, 2007; Clark, 2007; Berthelemy, 2007; Hart, 2007) that technology will aid learners to take responsibility for their own learning, utilising online content, learning networks and communities of practice. However, this does assume sophisticated learners with considerable ICT and learning skills, confidence and self-esteem.

17. Some possible areas for future growth are:
   - Participatory learning – essentially the potential of social networking and web 2 technologies (e.g. wikis) to develop collaborative approaches;
   - Creative learning – learners producing their own content through technologies such as blogs, wikis, podcasts and other social network applications;
   - On-demand learning – anytime and anywhere learning;
   - Games and simulation-based learning;
   - Mobile learning – use of hand held devices to support and deliver learning;
   - E-assessment (e.g. e-portfolios).

18. Open source applications and learning materials are now available for education and training.
Information Society

19. In order for individuals to participate fully in a knowledge/information society, they may need to command a combination of broader literacy, media and technology related skills.

20. Government policy is concerned primarily within technological non-engagement, and user-skills, rather than skills such as analysis of content.

ICT, a Skill for Life

21. In 2004, the government announced that ICT would become the fourth skill for life alongside literacy, language and numeracy in England. This compares with the EU that had identified ICT as a basic skill in 2000.

22. The majority of new (90%) and existing (72%) jobs now require the use of ICT. Technology is increasingly becoming part of everyone’s lives. ICT is now an important aspect of education and training and many government and commercial services are now available online.

23. There are potentially 17.3 million people (COI and MORI, 2005) who may need help in acquiring ICT skills. Non-users are categorised as women, older people, individuals with lower educational attainments and people with lower incomes.

24. The decision to make ICT a new skill for life was not accompanied by the allocation of new budgets on the scale of literacy or numeracy or the identification of national targets. A number of steps have been taken such as establishing standards, agreeing new qualifications, establishing a curriculum and undertaking investigatory projects.

25. There have been a variety of government initiatives to encourage people to use technology. These have often been based on improving access to technology. While some have been successful, they have frequently been isolated and short term initiatives.

Relationships

26. ICT is essentially a set of tools which a user employs to achieve an objective. There is the potential to combine using and learning to use ICT with other subjects.

27. The relationship between the four Skills for Life has been the most discussed and there is clearly potential for learning ICT with the other skills for life. However, to achieve this outcome probably requires subjects to be compared and mapped against each other and additional teacher training to be made available.

Digital Inclusion

28. Digital inclusion is not simply a matter of access to technology. It is a complex issue which combines personal relevance, ICT skills and understanding and meaningful access (e.g. how individuals use technology in the home will be very different from at a public access point).
29. Governments have tended until recently to focus on simple access being the key factor and have undertaken a variety of actions (e.g. UK Online Centres) to address that specific problem. However, single actions are unlikely to succeed and policy needs to address the whole problem (e.g. ICT skills development, relevant use, motivation, self confidence and meaningful access).

Conclusions

30. Technology has already made significant changes to society and education. The pace of change is accelerating and it is very difficult to predict the consequences. Technology needs to be considered in all discussions of education and training policy.

31. ICT and e-learning have the potential to enable learners to learn at any time, any where and at their own pace.

32. In order for learners to benefit fully from e-learning they will need to become confident and competent users of technology, having e-learning skills and be media and information literate.

32. Non-users (i.e. about a quarter of the population) need to realise the relevance of ICT to their lives, develop ICT skills and have meaningful access to technology.
Introduction

Although Information and Communication Technology (ICT) and e-learning are two subjects, there are various factors that connect them. In simple terms in order to benefit from e-learning an individual needs to have a reasonable degree of ICT skills and confidence in using technology. Tutors seeking to use e-learning methods need both technical and pedagogical skills and understanding to use the methods effectively. Both ICT and e-learning are dynamic subjects in which change is a normal feature. Technical changes are continuous and their impact on e-learning is equally ongoing. However, the ability of education and training to take advantage of technological change operates to a different schedule and is frequently slower. This manifests itself in new approaches being heralded while many practitioners are still implementing earlier developments. It is important to address these features and it makes ICT and e-learning different from other issues.

In terms of this paper we will focus on considering policy and developments to achieve ICT competency in order to play an active role in society and employment. This is not a static standard but rather the needs of employers and technology are constantly changing. Gartner and e-skills UK (2004) considered trends in information technology until 2014. They reported that information technology was critical for the success of the UK economy and impacted on more than 20 million employees. However, 40% of users have not received any IT training while employers require everincreasing levels of IT skills.

In the UK population there are 17.3 million people who do not use the internet. This includes almost 3 million adults who are lapsed users (COI and MORI, 2005). The scale of the ICT challenge with 17 million non-users and 20 million users who need to extend their skills is enormous. A connection with e-learning is provided through the possibilities of linking ICT with other subjects such as literacy, language and numeracy. ICT is reported as motivating many adults to participate. The Skills for Life strategy (National Strategy, 2001) reported that half of the adults with poor basic skills would be motivated to improve their skills if it was through computers. This has been interpreted as learning ICT skills and other skills for life together. However, several reports (E-learning Task Force, 2002 and DELG, 2002) have considered that ICT skills are vital in order to benefit from e-learning. The E-learning Task Force (2002) reported that “it is clear that a lack of ICT skills, including not having the skills to learn through ICT, is potentially as great a barrier to employability and social inclusion as a lack of achievement in literacy and numeracy.” Learning skills have been widely agreed as essential for success in education and training. It has been suggested that for e-learning and specifically online learning, the mix of skills (e.g. acceptance of responsibility, collaborative learning, and time management) is different from more traditional forms of learning (Clarke, 2004).

There is increasing discussion of the ICT skills and expectations of young people entering adult education in comparison to the skills of their teachers and technology available in education. The situation is more complex than this straightforward comparison since learners do not all come from a single age cohort. Older learners are also involved and not all young people are digitally skilled. There is also the issue of links between e-learning skills and general digital skills.

The interest of government in e-learning under a variety of names (e.g. Computer-based Learning) has been apparent since the early 1980s. It has taken several forms, from providing a specially designed computer for schools (i.e. BBC B Microcomputer), to supporting training courses for designers of computer-based learning materials (i.e. Project Author, Manpower Service Commission), developing a national network of learning centres (i.e. Ufi, learmdirect), supporting research, teacher training (e.g. e-guides) and many other initiatives. The developments and policy have often been focused on specific objectives although there have been large scale developments aimed at significant parts of the sector (LSC, 2003). In 2005, the Department for Education and Skills published the e-Strategy 'Harnessing Technology: Transforming learning and children's services'. This provided a strategy across
the whole sector covering adults and children. In Wales, an e-learning Strategy was published in 2004 covering all learning in Wales. The European Union produced action plans in 2002 and 2005 aimed at achieving the Lisbon 2010 objectives of “making the European Union the most competitive and dynamic knowledge-based economy in the world” and acknowledging the importance “of providing citizens with the access and skills needed to live and work in the new information society”.

ICT and e-learning are both global phenomena. New developments are often pioneered in one country and rapidly transfer to others. ICT products and services span the globe so that policies need to take into account global developments. In addition, e-learning and ICT have the potential to make education a global commodity with online courses already been offered across the planet.

**Strategy**

ICT and e-learning policies are largely a reaction to the change that technology has already had on economies and society. One expectation is that ICT will have similar effects on education and training. There is already clear evidence that technology is already changing education and training. Computers are now part of many individuals’ learning experience. However, the development of policies and the implementation plans have arrived at different speeds. There is over 25 years of government assistance in using computers in schools but similar support did not arrive in Further Education until the 1990s and in Adult and Community Learning until the new century. The pattern of interest and use has varied across adult education. Blended learning is the dominant feature of the FE and skills sector with only limited use of online learning, the exception being the network of learndirect centres. In higher education, online learning methods have played a significantly larger role, with them rapidly assisting the development of global courses and specialist universities in the USA (e.g. Phoenix University). In the workplace learning centres, online corporate universities and blended learning are all being used.

Resources in the form of content, infrastructure (e.g. computers and connectivity) and trained staff also vary considerably. Becta (2006) reported that 90% of colleges offered some form of support for tutors in using ICT in the classroom (i.e. blended learning) but only 30% offered similar assistance with online learning. Luger (2006) reported that 43% of local authority adult education providers were using or planned to use virtual learning environments compared to only 18% in 2003. There are major differences in the availability of technology for learners in different parts of adult education. Community-based provision often has very little access to computers or the Internet while probably the best access is in a FE college. Becta (2005) reported that in 2005 there was one computer for every five learners in a FE college while Luger et al (2004) reported that the ratio in ACL was 30 to 1.

This complexity of different methods, differing maturity of use and availability of technology makes developing an overarching policy or strategy for e-learning and ICT a major challenge. Any strategy needs to address the very differing needs of component parts of education and training.

Cymru Ar-lein is the Welsh Assembly’s strategic framework for ICT. It intends to maximise the potential of the economy and society through the exploitation of ICT. ELWA (Education and Learning Wales) has developed a national e-learning policy that intends “To demonstrate excellence in Connectivity, Content, Confidence and Competence in application of technology to learning.”

On 15 March 2005, the Department for Education and Skills published the e-Strategy 'Harnessing Technology: Transforming learning and children's services'. This describes the use of digital and interactive technologies to achieve a more personalised approach within all areas of education and children's services. At the same time a Higher education e-learning
strategy was launched with the aim of embedding e-learning over the next ten years. There already existed a strategy and implementation plan for Adult and Community Learning developed on behalf of the LSC aiming to address infrastructure, content and staff development needs of ACL.

In Scotland, e-learning and ICT feature in many policy documents. HM Inspectorate of Education (HMIE) published a report on the use of ICT in learning and teaching (HMIE, 2007) which identified the importance of planning and policy on e-learning and emphasized the importance of agreeing the roles and responsibilities of all stakeholders. The LSC in England has required education and training providers to develop their own e-learning strategies as a condition for receiving funds in support of e-learning, while harnessing technology has emphasized the importance of partnership working.

In March 2000, the Lisbon Council highlighted the need to adapt European education and training systems in order that they meet the needs of the knowledge economy. This was reinforced through the inclusion of ICT as one of the new basic skills. Subsequently, ‘eLearning: designing tomorrow’s education’, was launched in May 2000 and endorsed in June 2000. The ‘eLearning Action Plan’ developed four strands of activity (infrastructure and equipment, training, European quality content and services, and cooperation at all levels). This was reinforced through a series of other resolutions, policy documents and council decisions. These covered teacher training, realising the potential of e-learning, the knowledge economy, the information society and several other areas.

Clearly across the United Kingdom and Europe a considerable degree of strategic planning has been undertaken but has it e-enabled education and training? This is difficult to judge in that many parts of education and training started at different times with different degrees of support so the result is inevitably variable. The BECTa review (2006) of the use of ICT and e-learning in England concluded that “there is still a high variation in the adoption, deployment and use of technology”. The HMIE (2007) report on the use if ICT in Scottish Education stated that “the overall impact of the adoption of ICT in learning and teaching does not reflect its potential” and that “excellence exists only in isolated pockets”. A key issue is to ensure that the potential of e-learning is universally realised.

Although there are many policy documents covering e-learning and ICT they are often specialised ones with a focus on technology while more general papers fail to mention e-learning or ICT. The recent Leitch report (2006) on world-class skills fails to discuss ICT or e-learning which is remarkable, given the wide-spread view that ICT is one of the key driving forces in economy growth and change. This may indicate that e-learning is still not recognised as part of the main stream.

**Major Areas of Policy**

Strategies and policy tends to focus on three areas which are:

- Infrastructure
- Content
- Staff Development

**Infrastructure**

This has often been discussed in terms of broadband connectivity and access to computers. These are fundamental issues but perhaps they hide complex differences across the education and training sector such as levels of technical support, staff development (e.g. online moderation) and access to technology across the sector. There are still considerable differences across the post-school sector, with perhaps the most comprehensive
infrastructure being provided in an institutional setting and the least within the community locations.

The dynamic nature of technology has a direct effect in this area with resources needing to be continuously upgraded combined with rising learner expectations. This places an emphasis on an investment and depreciation policy. We need to be able to provide ICT at learning locations as a utility. During the 20th century we equipped our learning spaces with flushing toilets, running water and electric light. We now regard these as natural contributors to a suitable learning environment. In just the same way we need to move to a situation where fully featured and reliable ICT access devices and networks are available at all learning locations. At present the availability of ICT kit is uneven and where it is available it is not always matched to need. Systems are often fragile and treated as ‘new toys just out of the box’ rather than integral to the work of the building like the plumbing and heating systems.

Public access points with ‘just in time’ one-to-one support will continue to be required even as home access rates rise. Their role can be expected to become more specialised, offering high specification equipment (e.g. high resolution colour printers) and just-in-time support with basic IT queries, but also more advanced support on information access and assessment of authenticity of data. Public libraries are uniquely placed to develop this service but other community based access points will continue to be needed as a way of offering support from known and trusted sources.

We need to develop secure and robust online networks that provide access to learning environments. As the next generation of much faster broadband (up to 50 times present speeds) is enabled through the opening of fibre networks and other new technologies, we need to position the learning sector to secure affordable access and to have compatible devices.

Learners have access to a wide range of ICT devices of their own which can play an important part in delivering effective learning. These include portable MP3 Players, Multi functional mobile phones, voice recorders, digital cameras, digital video cameras. A range of wireless and physical connections can be used for this but often fear of data loss or viruses prevent this important functionality. Learners and teachers must be enabled and encouraged to connect their devices to the learning network, accessing digital content and contributing their own digital materials.

In order to develop and be sustainable infrastructure requires:

- funds for ICT infrastructure to be included in formulae for publicly funded learning;
- support for staff and learners to be available at all centres/locations;
- that the interests of adult learners be considered in the planning of infrastructure;
- planning and securing the long term availability of public ICT access points;
- ensuring that the provider’s infrastructure is designed to allow and encourage interfaces with learners’ and teachers’ own devices.

Content

The ‘market’ for e-learning content is very immature and unstable. Government initiatives have distorted the market several times with large-scale programmes to develop content. These have often been ring-fenced, with access limited to particular parts of the education
and training sector (e.g. higher education). It does not make national sense that publicly funded content is not available throughout the public education and training sector. At the moment some higher educational resources are available to FE Colleges but not to Adult and Community providers. Some schools offer access to their technology resources for community learning while others do not.

The nature of the World Wide Web can result in material that one day has a high value, becoming worthless soon after in monetary terms as similar free versions become available. The favoured online commercial model is to offer the basic product free and to charge for a value-added or premium service. The MIT initiative into the Open Courseware movement exemplifies this well in an educational context. All courseware is freely available to use and the university maintains a good enrolment for courses where students get teaching support and, of course, an accredited outcome. This model has been emulated in UK by the Open University but there is clearly momentum to develop this further.

ICT provides the means for teachers and trainers to expand their role as content developers. Many teachers and trainers produce materials for their own use and the Internet provides the means for these resources to be made widely available. At the moment this is largely the initiative of individual teachers and trainers through personal websites but the potential for repositories of material is significant.

The development of Web 2.0 applications (e.g. blogs, wikis, e-portfolios and podcasts) has led to considerable interest in content developed for and by individuals. This is not new in one sense since development projects and exercises are widely used in all forms of learning, but the Internet provides the means to make their content widely available. This is a new development and it is not clear what its implications will be.

**Staff Development**

This is often identified as the critical factor in e-learning. It is a combination of two factors:

1. ICT skills and knowledge
2. Pedagogical skills and knowledge

ICT courses are readily available but are often focused on applications such as word processing, which means they are not directly applicable to teachers and trainers. In addition e-learning covers a very wide range of approaches. For some teachers, only the use of electronic whiteboards and other blended learning methods are needed while others will need the skills of online facilitation and moderation. There is a need to develop a matrix of different training provision to meet the different needs.

E-learning pedagogical courses have become available through a range of providers such as the Open University, which offers masters degree programmes, Sheffield College provides online courses to develop moderation and facilitation skills and NIACE offers, on behalf of the LSC, online and face-to-face programmes. The LSC have prioritised staff development over the last decade with an emphasis on blended learning approaches through the FERL practitioners and NIACE’s E-guides programmes. They are based on a cascade model with trained e-guides acting as a resource for their providers in training, mentoring or coaching their peers. The DFES has, in addition, supported teacher training programmes through the Standards Unit and Skills for Life developments that have included a significant amount of e-learning.

LLUK have recently published their initial teaching training standards that cover e-learning and in addition they have included ICT skills and knowledge in the teacher minimum core. These are both important developments since they recognise the importance of e-learning and ICT in education and training.
The Government’s effort and particularly that of the LSC’s in the area of staff development in relation to e-learning has been substantial, effective and long term. However, the need is still large and due to the dynamic nature and scope of e-learning and ICT, it is likely to remain so for many years. The Quality Improvement Agency’s plans to incorporate e-learning within their national teaching and learning change programme is a clear recognition of these facts.

The dynamic nature of e-learning and ICT means there is a need for more that initial training. More advanced training and continuous professional development are both required. The Learning and Skills Network have, with the support of the LSC, developed a framework for e-learning CPD (Atwere et al, 2007). In all cases training needs to be under continuous review and development to maintain its currency.

The main focus for staff development has been centred on teacher and trainer training, but other staff also require e-learning skills and many organisations have recognised the need for the specialist Learning or Educational Technologist. These are more often found in higher education and commercial organisations than in other parts of the education and training sector. The Association of Learning Technology (ALT) has developed standards for professional staff and the Open University offers a masters programme for individuals developing professional skills. This, though, remains a new and emerging area with many different potential routes (e.g. instructional designers and technologists).

Trends and developments

A key feature of ICT and e-learning is the pace of change and it is critical to consider future trends not simply in terms of technological developments, but also in teachers’ and learners’ skills and expectations. However, it is well established that making predictions in relation to technology is often difficult and frequently inaccurate.

For indicators of future skills, it is sensible to look to the digital engagement and habits of young people today. Raymond Martin (Martin, 2006), co-founder of the Future Laboratory, suggests that young people are becoming “increasingly nomadic, self-sufficient, able to handle the imperatives of modernity and to juggle responsibilities put on them as citizens and consumers”. He feels these abilities transfer to the educational environment, “students are increasingly developing a mindset towards education that skips the boundaries of where lessons can take place, how learning is undertaken and how it is disseminated.” This is a major challenge to education and the Government’s efforts to improve infrastructure through college building programmes and improved online services (e.g. JANET) is certainly attempting to address these trends. However, community based learning which might benefit from a more flexible attitude to learning is probably least prepared. To accommodate these trends requires not only access to technology but probably more significantly, a workforce with confidence and skills in ICT and e-learning pedagogy. The new qualification standards for teachers, tutors and trainers in the lifelong learning sector in England include both ICT and e-learning skills and knowledge (LLUK, 2007). To assist the many teachers, tutors and trainers who are already qualified, the Learning and Skills Council (LSN, 2007) supported the development of an approach to e-learning professional development by the Learning and Skill Network.

Futurelab (Rudd et al,2006) in their report Towards New Learning Networks, argue that “Social, technical and leisure life is increasingly organised around networks.” This networked society therefore requires new and reflective skill-sets in order that the individual is able to operate within such a system. The report questions the ability of current educational systems which are designed to promote ‘individualised acquisition of content and skills’, to stimulate the development of the wider competencies/skills required in order to function within a ‘networked’ society. The paper emphasises the trend towards collaborative learning and highlights the potential of a clash with a more personalised approach which focuses on the individual. In Higher Education, the use of e-learning approaches to develop collaborative
learning is well established and often a key feature of online methods. Other writers (Clarke, 2003) have also suggested that e-learning requires a different mix of learning skills than more traditional education and training forms.

During 2006, the DTI supported a mission to the USA to consider learning technology. The mission identified significant future trends in five areas (Global Watch Mission Report, 2006):

- Participatory learning – essentially the potential of social networking and web 2.0 technologies (e.g. wikis) to develop collaborative approaches;
- Creative learning – learners producing their own content through technologies such as blogs, wikis, podcasts and other social network applications;
- On-demand learning – anytime and anywhere learning;
- Games and simulation-based learning;
- Mobile learning – use of hand-held devices to support and deliver learning.

The group identified a range of challenges which included:

- the ability of formal educational institutions to cope with these developments;
- the capacity of learners to contribute and participate in these e-learning developments and not simply be consumers of their peers’ efforts;
- the quality of learner-generated content;
- ensuring the security of young people online;
- the availability of tools and techniques to locate and navigate suitable learning content;
- judging the quality of learning content;
- the development of a market for games-based education;
- rapid technological change.

Epic (2003) reporting on a survey of online learning professionals supported some of these trends. In particular, the potential of mobile devices to support the delivery of online learning but also games and simulations and open source resources. It also predicted that the workplace and then home were the most likely locations for learners to participate in online learning. The online tutor was identified as key to the success of online collaborative activities.

E-learning has been used in workplace learning for probably three decades. Kyong-Jee Kim and Curtis Bonk (2005), reporting on a survey in the USA covering managers responsible for workplace learning, stated that: “E-learning is becoming a dominant delivery method in workplace-learning settings across organizations of various sectors and of varying sizes.”

Overton (2007) reported on a study of 200 UK companies to investigate why organisations had invested in e-learning and the difference that it made. The investigation showed that there was steady growth model with an anticipation that “organisations expect to spend 30% of their training budget on learning technologies by 2010.”
Several writers (Jennings, 2007; Clark, 2007; Berthelemy, 2007 and Hart, 2007) in the context of workplace learning have predicted that technology will aid learners to take responsibility for their own learning utilising online content, learning networks and communities of practice. They are not alone in showing that e-learning provides considerable potential for empowering learners. However, this does assume sophisticated learners with considerable ICT and learning skills, confidence and self-esteem. Many socially and economically disadvantaged learners who have had poor experiences of education often have little confidence in their ability to learn and this is sometimes associated with little access or understanding of ICT.

E-assessment has grown rapidly over recent years although in the main this has centred on the application of multi-choice questions rather than more sophisticated approaches. However, e-portfolio approaches have attracted attention from governments and educational organisations across the world. Their use is growing across adult education and training (e.g. NVQs to post-graduate). However, there is considerable debate about how best to employ them and experience is still relatively modest. Learners are often very positive about e-assessment in that it often provides on-demand tests and feedback. Twigg (2005), identified a key factor in the success of online/e-learning programmes was on-demand support and assessment.

The development and growth in open source systems and applications is now well established and has spread to include education and training. Currently the most discussed virtual learning environment is Moodle, an open source application. Many universities around the world have followed MIT to offer some of the learning materials to learners free of charge. Within the UK, The Open University is developing an online resource to provide 5% of its materials free to learners. Open source, although free to acquire, does assume that you have the technical skills to employ it and free learning material again assumes independent learners.

**Information Society**

The importance of ICT skills for citizen participation within political, economic and social communities has been established clearly through European and subsequent national policies. However, there has been little mention of the underpinning skills required to fully meet the needs of the Information Society. The recently defined Adult ICT Skill for Life (QCA, 2007) curriculum, although implicitly acknowledging the need to interpret and make use of texts in a purposeful manner, does not detail the requisite skills in support of this activity, assuming instead their implicit existence.

Government policy is concerned primarily with technological non-engagement, and user-skills, with particular emphasis upon the Internet as a mobilising force for information and society. However, the retrieval and interpretive skills required to make meaningful use of the Internet is often missing. Additionally, most of the academic studies relating to information systems, and research around ICT users, are based upon those who have already identified a need, and are either educationally successful, or are at least already considered learners in some capacity. Lamb and Kling (2003) describe the average individual participating in information systems research as “an atomic individual with well-articulated preferences and the ability to exercise discretion in ICT choice and use, within certain cognitive limits.” This may explain the comparatively low levels of recognition of the importance of underpinning skills within the broader technological skill-set.

Warschauer (2003), agrees that “the ability to access, adapt, and create new knowledge using new information and communication technology is critical to social inclusion in today’s era” and later states that “one common problem is too much emphasis on basic computer literacy in isolation from broader skills of composition, research or analysis.” Of the literacies mentioned, information literacy is the best understood, and Warschauer is clear that information literacy in support of ICT skills is of paramount importance and that ideally the
citizen should be equipped both with computer-specific knowledge and wider critical literacy skills.

However, literature around this subject tends to be focused on information professionals rather than the individual. The pace of change and rapid development of new information sources has brought the importance of a media literate society to the policy foreground and has merited note in the 2003 communications bill (DTI, 2003).

The emphasis on the ability to source digital resources also falls neatly within the definitions of “e-skills” as defined by the government’s Distributed Electronic Learning Group (DELG), illustrating the imperative to make explicit the need for development of abilities beyond user-skills within ICT policy:

“The term e-skills is used here to mean the ability to find and use digital knowledge resources, and includes those e-learning skills that will increasingly be essential for lifelong-learning.”

(DELG Report 2002)

This definition puts the individuals at the centre of their own learning experience, and is reflected in broader educational technology policy, through the current Learning and Skills ICT post-16 e-learning strategy, Harnessing Technology (2005), and a move towards personalisation of the learning process and the responsibility of adult learners for their own learning development.

Krejsler (2004) notes “education rhetoric focuses on the learner’s responsibility for his/her own learning processes.” He further states that this individualisation is galvanised by the opportunities inherent in the rise of ICT within all areas of life, and the idea that ‘cyberspace’ has removed the temporal and geographic restraints previously associated with education. However, this is not only an educational issue. If we are genuinely moving towards a knowledge/information society, then each individual will need to command a combination of broader literacy, media and technology related skills in order to effectively function within civil society:

“One must be able to navigate and communicate within incalculable amounts of information. To a large extent this must take place as self-governed processes where each one of us, individually and in different groups, is capable of formulating and solving problems using the media that at any given time prove to be appropriate to pursue a given purpose.”

(Krejsler, 2004)

**ICT, a Skill for Life**

In 2004, the government announced that ICT would become the fourth skill for life alongside literacy, language and numeracy in England. In comparison, the EU had identified ICT as a basic skill in 2000. The reasons (Clarke, 2005, 2006, 2007) behind this decision were:

1. A majority of new (90%) and existing jobs (72%) now require the use of ICT;
2. Technology was a part of everyone’s lives;
3. Computers were now an important aspect of education and training;
4. Many government and commercial services were now available online.
There are potentially 17.3 million people (COI and MORI, 2005) who may need help in acquiring ICT skills.

The digital divide is more than a simple lack of skills. It also involves access to technology and the cost of paying for services. One measure of the divide is household access to the Internet. The Office for National Statistics (2006) reported that overall household access had improved from 46% in 2002 to 57% in 2006. However, this figure tends to hide the variation across the UK with only 48% of households in Scotland, 50% in Northern Ireland and 52% in Wales compared to 67% in South East England with access. Equally, it does not indicate who uses the Internet in households with access.

Oxford Survey Internet (OxIS, 2007) shows that about two thirds of the population are using the Internet. Non-users are categorised as women, older people, individuals with lower educational attainments and people with lower incomes. About a quarter of the population have never used the Internet and about 5% have used it but have effectively rejected it. The survey showed that a large majority of users select the Internet as their first choice for finding information with almost a quarter of users having participated in online distance learning.

The decision to make ICT a new skill for life was not accompanied by the allocation of new budgets on the scale of literacy or numeracy, or the identification of national targets. A number of steps were taken, such as establishing standards, agreeing new qualifications, establishing a curriculum and undertaking some investigatory projects. In many ways ICT appears to be the Cinderella skill for life. It could perhaps be argued that existing funding and systems are sufficient for ensuring the success of the development. However, even if the whole capacity of publicly funded basic ICT was devoted to addressing the problem of 17 million non-users, it would take over 20 years to solve the problem. It also assumes that the existing system is fit for purpose.

The outcomes of the initial action research project and subsequent research (Luger, 2007) undertaken by NIACE have shown that existing practice tends to be:

- focused on a relatively narrow range of methods (e.g. worksheet);
- concentrated around applications (e.g. word processing, spreadsheets and databases);
- general rather than meeting individual needs.

Existing practice is probably reasonable if you are a confident learner who prefers to learn as an individual with little collaboration with peers. It is probably not very effective if learners lack confidence and would welcome a more collaborative approach.

The ICT Skill for Life standard and curriculum emphasises learning in a purposeful way, to meet the individual needs of learners. This is a significant change to traditional practice which is often centred on learning to use applications or if a purposeful context is provided, it tends to be work related. This is of course a stereotype of provision but it is supported by the results of the action research project and more recent research (Luger, 2007). The provision of purposeful learning is clearly critical to the success of motivating non-users, but does represent a challenge to teachers to change their approach to teaching ICT.

Over the next few years the ICT Skill for Life will be replaced by ICT functional skills. These are intended to provide both adults and young people with a set of skills which will allow them to play an active and confident role in society. The Qualifications and Curriculum Authority functional skills standards define the role in terms of personal communications, everyday life, work and education. The standard is intended to be flexible enough to allow delivery in a variety of contexts including school, college, community settings and workplace. The ICT Functional Skills standard is very similar to the standard for ICT Skill for Life.
There have been a variety of government initiatives to improve access to technology for socially and economically disadvantaged people. These have included providing computers to ACL and voluntary organisations and more recently to families with school-age children. The largest has been the establishment of the national network of UK Online centres and People's Network in Libraries. The evaluation of all these initiatives has demonstrated that they are effective not simply in access terms but also in cost effectiveness (Clarke et al, 2003; Hall Aitkin, 2002 and 2003). The key limitation has been that they are mainly one-off and capital funding initiatives, which leave the problem of renewing equipment and funding revenue costs with the local organisation.

**Relationships**

ICT is essentially a set of tools which a user employs to achieve an objective so that there is the potential to combine using and learning to use ICT with other subjects. This relationship between subjects has often focused around the skills for life (i.e. literacy, language and numeracy). The Skills for Life strategy (National Strategy, 2001) reported that half of the adults with poor basic skills would be motivated to improve their skills if it was through computers. However, ICT has more to offer than motivation. It has been used with children and adults to help them to develop their skills including (Clarke, 2003):

- writing (e.g. word processing allows writing to be redrafted and corrected);
- reading (e.g. the World Wide Web provides access to large volumes of reading materials in a wide range of subjects to meet the different interests of the learners);
- mathematics (e.g. spreadsheets).

ICT is often employed to motivate adults to attend basic skills programmes. This is often based on the assumption that there is no stigma associated with admitting to poor ICT skills whereas there is considerable stigma associated with the other skills for life. However, this may be a temporary situation since younger people's attitudes to technology are different from older groups.

ICT is a major factor in the changing nature of society and it therefore has an influence on language and literacy. Keyboard skills are now part of everyone's lives (e.g. remote controls, mobile phones, ATMs, video recorders and security locks). The text message has become part of the way people communicate. We describe reading websites as browsing to show it is different (Clarke, 2003). Blogging and wikis along with other forms of social networking are changing the way we present information.

ICT is changing the requirements of what it means to be functionally literate in the information society. The point where a requirement is identified as literacy or ICT is not obvious in many cases and the relationship is complex.

There has been increasing interest in the potential to integrate the teaching of ICT with the other skills for life so that learners would gain skills in both subjects. The DfES has supported the mapping of the different standards against each other to identify potential areas for mutual support. However, this is probably still in the area of the initiative of individual teachers. To integrate the subjects successfully requires teachers or trainers with the skills, confidence and understanding in both subjects. This is likely to mean that only a minority of teachers can undertake these approaches without additional training and support.

**Sustainability**

Many other subjects have strong links with ICT and e-learning. Sustainability is a key issue and relates to ICT and e-learning in four ways:
ICT can be a means of providing learning about sustainability;

as a means for dissemination of information about sustainable development;

e-learning can provide education in the home and workplace so that journeys are reduced;

and finally, ICT has an impact on sustainable development by the nature of its use of natural resources and spreading toxins in the production of equipment.

Digital Inclusion

Since the Prime Minister’s Strategy Unit and Department of Trade and Industry joint report, ‘Connecting the UK: The Digital Strategy’ (2005), UK governmental understanding of the barriers to technology adoption have been, to some extent, transformed. These have evolved from concerns limited to physical access (both in terms of proximity and physically enabling factors), to the inclusion of issues such as confidence, skills, content and (online) trust.

Digital inclusion is a complex issue and research is beginning to show that additional factors such as motivation, relevance and age are equally likely to affect an individual’s relationship with technology (Mawson, 2001, Selwyn, 2002 and Brown, 2005). This has broadened the potential profile of a digitally excluded individual to include characteristics beyond broad socio-economic factors.

Reports from both the recently formed Digital Inclusion Panel (2004) and Cardiff University’s Neil Selwyn (2002) assume the position that there is a much less meaningful relationship between digital inclusion and wealth than was originally thought. It is becoming clear that engagement depends upon individuals creating their own contextual framework and motivation for adoption, which is unlikely to occur without the encouragement of what the Digital Inclusion Panel (2004) have called a “compelling proposition.”

It is widely held that whilst the absence of access to ICT does not cause social exclusion, a lack of access could reinforce disadvantage, potentially worsening the relative situation of those already excluded and “exacerbating existing educational inequalities in the age of ‘e-learning’” and the Information Society. According to Mawson (2001), without intervention, “rapid technological change may lead to the increased exclusion of social groups, because they lack the qualifications to keep up with the changes. Despite this, access doesn’t necessarily translate to use. A study conducted by Neil Selwyn (ed?) found that “Although 92 per cent of the survey sample reported having some form of access to a computer, only 52 per cent had made use of one during the past twelve months.”

In order to better understand non-engagement, the Cabinet Office publication, ‘Enabling a Digitally United Kingdom’ (2004), was published. The report was the first attempt to offer a snapshot of levels of digital engagement in the UK, and was informed by a panel of representatives from the public, private and voluntary sectors collectively known as the Digital Inclusion Panel. The intention of the group was to ‘identify those at risk of digital exclusion’, suggest future action to encourage take-up, and make recommendations for a coordinated cross-sectoral approach to creating a digitally united UK. The publication shows that digital inclusion is wider than issues of access; rather, it is a multi-dimensional issue that includes degrees of use.

Davis (1989) maintains user acceptance of technology is determined by two factors, perceived usefulness and perceived ease of use, which can be used to predict the likelihood of an individual to accept a new technology. This model, known as the technology adoption model, although useful to some extent, when applied in isolation from the social context does
not fully describe utility, or sufficiently explain why one individual might adopt a technology, and another not. For example, it has been found that differences in an individual's use of technology can be attributed to factors affecting 'usefulness', such as whether or not they suffer from any long-term illness, health problems or disabilities.

Selwyn (2002) notes it is not enough to assume that access to technology and skills development are the only preconditions to digital take-up. Relevance (defined as similar to perceived usefulness) and motivation are also critical when it comes to understanding digital exclusion, since individuals have many and varied reasons for using technology. Selwyn contributes to the argument further by offering the concept of 'meaningful' access. He claims that it is not simply enough to assume that the 6,000 UK online public access points have solved access issues. One cannot compare this type of public access to access at home or at work, which he considers more meaningful.

Selwyn's theory hinges upon the level of choice and the control individuals have over their technology and the environment within which they are able to access it. Therefore, 'access' in itself (the cornerstone of government policy since 1999) is not enough to promote a digitally inclusive society. Meaningful, or functional, access to technology is considered, both anecdotally and empirically, to be critical to engagement. This position is supported by the findings of Wyatt et al (2003) in the summative evaluation of UK online centres, where it was discovered learners considered any new ICT skill to be of "limited use" unless supplemented by home access.

**Conclusion**

A comparison is often made between the development and use of printing in education with the rise of ICT and e-learning. It is useful in demonstrating that the printed resource took many centuries to arrive at its present form while e-learning and ICT in general is only a few decades old. Some applications (e.g. blogs) that are discussed as having the potential to revolutionise education are only a few years old. Technology has already made significant changes to society and education. The pace of change is accelerating and it is very difficult to predict the consequences but they are likely to be significant.

ICT and e-learning are often described as having the potential to enable learners to learn at any time, anywhere and at their own pace. Learners are predicted as being able to take responsibility for their own learning using online content, learning networks and communities of practice. However, achieving these results is not simply about access to technology. It is also about being confident and competent users of technology, having e-learning skills and being media and information literate. These are not simple achievements.

Almost a quarter of the population do not use ICT. This is not simply with regard to access to technology but concerns motivating them to realise the relevance of ICT to their lives and giving them meaningful access. Motivated people will acquire the required ICT skills.

Technology is a major change factor and must therefore be considered in all discussions of education and training policy.
References


Atwere, D, Dennis, A, Foot, G and Jennings, M (2007), A professional development framework for e-learning, Learning and skills Network

BECTa (2005), ICT and E-learning in Further Education, Becta

BECTa (2006), The Becta Review 2006, Becta


Clarke, A (2003), ICT a new basic skill, NIACE

Clarke, A (2004), E-learning Skills, Palgrave MacMillan


Clarke, A (2007), ICT Skill for Life, Hodder Arnold


DELG (2002), Report of the LSC’s Distributed and Electronic Learning Group, Learning and Skills Council


Digital Inclusion Panel (2004), Enabling a Digitally United Kingdom, Cabinet Office


E-learning Task Force (2002) Get on With IT, Department for Education and Skills

Epic (2003), Epic Survey 2003: The future of e-learning, Epic Group plc


Global Watch Mission Report (2006), Beyond eLearning: practical insights from the USA, PERA


HMIE (2007), Improving Scottish Education: ICT in learning and teaching, HM Inspectorate for Education


Learning and Skills Council (2003), The National Learning Network, Adult and Community Learning, Information and Learning Technology Strategy, Coventry, LSC.

Leitch, S (2007), Prosperity for all in the global economy - world class skills, HM Treasury

Lifelong Learning UK (2007), New overarching professional standards for teachers, tutors and trainers in the lifelong learning sector, LLUK

Luger, E (2005), The potential of e-learning in ACL, NIACE


LSN (2007), Effective teaching - transforming teacher training through e-learning, Learning and Skills Network


Office of National Statistics (2006), Internet Access, ONS

The Big Inquiry – ICT and E-learning paper 21
Overton, L (2007), Towards Maturity, e-skills UK

OxIS (2007), The Internet in Britain 2007, Oxford Internet Institution, Oxford University


Rawicka, E, Arkate, M and Hussain, S (2004), The potential of e-learning, NIACE

Rudd, T, Sutch, D and Facer, K (2006), Towards New Learning Networks, Futurelab

Selwyn, N (2002), Rethinking the Digital Divide in Adult Education: Neil Selwyn on a high profile adult education issue, Adults Learning, Volume 13 Issue 10, June 2002 (p.24)

Selwyn, N (2004), At home to adult learning E-learning age, November (p.21)

Selwyn, N, ICT for All? Access and Use of Public ICT Sites in the UK, Information and Communication Society, Volume 6, No.3, pp.350-375

Twigg, C.A (2005), Increasing Success for Underserved Students, National Center for Academic Transformation