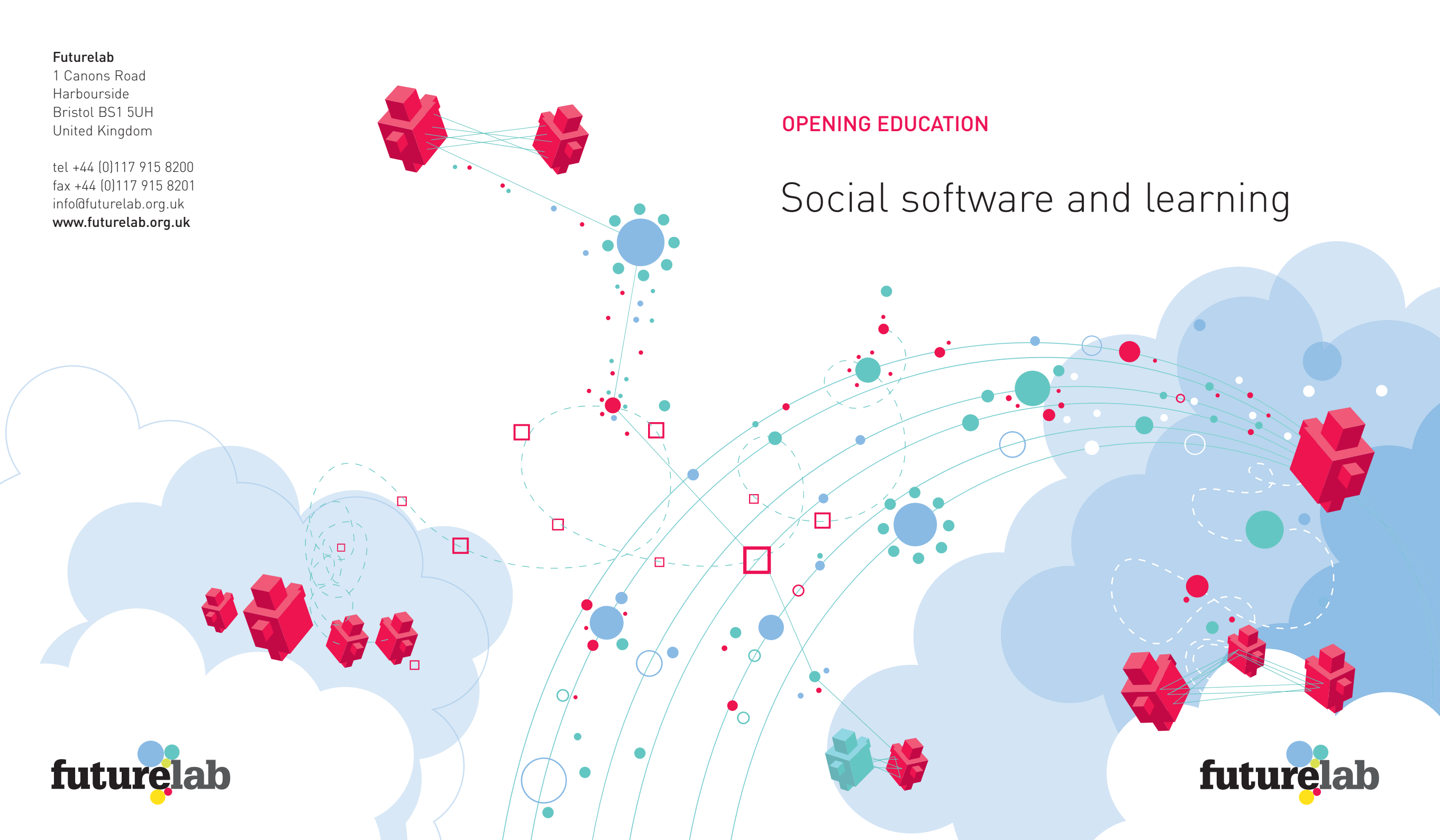**Futurelab**
1 Canons Road
Harbourside
Bristol BS1 5UH
United Kingdom

tel +44 (0)117 915 8200
fax +44 (0)117 915 8201
info@futurelab.org.uk
www.futurelab.org.uk

OPENING EDUCATION

Social software and learning

futurelab

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Martin Owen, Lyndsay Grant, Steve Sayers and Keri Facer

Futurelab 2006

Foreword

Opening Education is a new series of publications from Futurelab. As its name suggests, in this series we hope to open up areas for debate, to provoke, to challenge, to stimulate new visions for education. At the same time, we hope to literally 'open up' education, to not only bring together ideas from educational practice and research but also to draw on the fields of creative arts, media and technical innovation. Finally, in the ideas we present we hope to 'open up' the walls of the educational institution – to present models of learning that show how we can create connections between learners in different settings, how we can enable collaboration between different organisations and institutions, how we can make links between different approaches to and forms of learning.

The publications in this series are intended to act as a complement to our existing resources. Where our literature reviews provide a survey of existing research in the field and our handbooks provide practical overviews and guidance on implementing new approaches, these Opening Education publications offer a space to think, to challenge, to open up new ideas that may not yet be ready for 'implementation' or rigorous research. They are the early warning systems, the 'canaries' down the mine of educational strategies and practice.

Research into innovation in industry and commerce suggests that having a superfluity of ideas is essential for growth and development – education is no different. We need to have a surplus of ideas and strategies and visions and plans so that we have enough to draw on when we face the serious challenges for education that social, economic and technical change presents us with. Not all ideas will become a reality, not all ideas will survive in the form in which they were presented, but what cannot be denied is that education and educators need to know that there is scope to dream, to think about new approaches and different ways of doing things; to know that the ways we do things now will not be always and forever the same.

So, we're sending these ideas out to see if they live or die in the light of wider debate. They are experimental and exploratory, both in their ideas and, in subsequent publications, in the forms in which we publish – they won't all look the same, feel the same, say the same thing. They will all, however, attempt to open up a new area for debate and for action and we look forward to hearing from you and working with you to determine their fate.

Keri Facer
Research Director

Executive summary

This paper is focused on exploring the inter-relationship between two key trends in the field of educational technologies.

In the educational arena, we are increasingly witnessing a change in the view of what education is for, with a growing emphasis on the need to support young people not only to acquire knowledge and information, but to develop the resources and skills necessary to engage with social and technical change, and to continue learning throughout the rest of their lives.

In the technological arena, we are witnessing the rapid proliferation of technologies which are less about 'narrowcasting' to individuals, than the creation of communities and resources in which individuals come together to learn, collaborate and build knowledge (social software).

It is the intersection of these two trends which, we believe, offers significant potential for the development of new approaches to education.

At the heart of agendas for change in education are a number of key themes which relate to questions of how knowledge, creativity and innovation are generated in the practices of the 'information society'.

Recent commentators have argued that our relationship with knowledge is changing, from one in which knowledge is organised in strictly classified 'disciplines' and 'subjects', to a more fluid and responsive practice which allows us to organise knowledge in ways that are significant to us at different times and in different places. At the same time, we see changes in the 'spaces' of knowledge, from its emergence within discrete institutional boundaries, to its generation in virtual and cross-institutional settings.

Moreover, the ways in which we engage with knowledge are increasingly characterised by 'multi-tasking', engaging with multiple and overlapping knowledge streams. There are also changes in our understanding of practices of creativity and innovation – from the idea of the isolated individual 'genius' to the concept of 'communities of practice', where reflection and feedback are important collaborative processes.

In this context, educational agendas are shifting to address ideas about how we can create personalised and collaborative knowledge spaces, where learners can access people and knowledge in ways that encourage creative and reflective learning practices that extend beyond the boundaries of the school, and beyond the limits of formal education.

It is in the light of these new educational agendas that we are interested in the emerging practices of social software. Social software can be broadly characterised as 'software that supports group interaction'. The most familiar types are likely to be internet discussion forums, social networking and dating sites. However, applications like massively multiplayer online games and internet messaging can also be seen as social software, as could group e-mails and tele-conferencing. Applications such as weblogs, wikis and social bookmarking have seen a recent increase in popularity and growing mainstream interest. At the same time, there are other technologies which enrich and enhance these practices, like syndication systems that bring information in a well organised way from one source to another.

New forms of collaboration tools are also emerging, where people can work together to build new documents or products. We are also seeing a shift in the 'modality' of communication away from text alone: podcasting or audio publishing via the net is a growing movement, and it will be a relatively short time before there is also good support for video publication on the net. Locative and geographically mediated activity via mobile phones is also a likely area for growth, seeing people collaborate around different spaces and places.

It is the combination of the technological affordances of social software, with new educational agendas and priorities, that offers the potential for radical and transformational shifts in educational practice.

Today, the use of social software in education is still in its infancy and many actions will be required across policy, practice and developer communities before it becomes widespread and effective. From a policy perspective, we need to encourage the evolution of the National Curriculum to one which takes account of new relationships with knowledge, and we need to develop

assessment practices which respond to new approaches to learning and new competencies we expect learners to develop.

At the same time, from a technical perspective, we need to facilitate the development of open systems that allow different social software resources to communicate with each other, the creation of a centralised resource to allow teachers and children to access these tools, and the integration of a range of small social software tools into the desktop operating environments of learners. Equally, it should be realised that interoperability does not necessarily have to be realised through rigid standards, which may be counter-productive to innovation.

As with all programmes of educational change, however, we need to retain a sensitivity to the potential for such change to exacerbate existing social inequalities – as we see the emergence of social software as a potential tool for the creation of new learning communities, we need to ensure that there are not groups of children excluded from these communities by virtue of lack of access to digital technologies. We also need to ensure that such change does not ossify in a centrally managed programme, but instead retains a sensitivity to the specific and localised needs of different groups of learners and teachers.

In schools, we are already witnessing small-scale experiments with a variety of social software resources. For these to flourish we will need to see support in schools for risk-taking, and for dialogue between schools, teachers, parents and children about new approaches to learning that involve collaboration between young people (and others) across different times and spaces.

1 Introduction: How do we learn in an era of connection and collaboration?

"In the electric age, when our central nervous system is technologically extended to involve us in the whole of mankind and to incorporate the whole of mankind in us, we necessarily participate... in the consequences of our every action." (Marshall McLuhan 1964, p4)

This paper is focused on exploring the inter-relationship between two key trends in the field of educational technologies. In the educational arena, we are increasingly witnessing a change in the view of what education is for, with an ever-growing emphasis upon the need to support young people not only to acquire knowledge and information, but to develop the resources and skills necessary to continue learning throughout the rest of their lives. In the technological arena, we are witnessing the rapid proliferation of technologies which are less about 'narrowcasting' to individuals, than the creation of communities and resources in which individuals come together to learn, collaborate and build knowledge. It is the intersection of these two trends (the increased focus on 'learning to learn' with the emerging affordances of what has become known as 'social software') which, we believe, offers significant potential for the development of new approaches to education.

This paper provides an introduction to the key technologies, resources and thinking in this area, and outlines a series of challenges and questions for educators and developers wishing to pursue this further. It can also be read in conjunction with our partner publication in this Opening Education series: 'The Role of FLOSS Approaches in Education'.

1.1 What's going on?
The following scenarios illustrate instances of social software use that, though fictional, are not only possible, but likely to be happening now.

- A group of four 13 year-old Harry Potter enthusiasts decide to use wiki software to start their encyclopaedia of 'All things Potter'. It grows to 500 entries with worldwide contributors and becomes a definitive reference source for Hogwarts information. It links to fans across the world and includes images from a Japanese fan.

- A 12 year old develops a blog about his local football team. The site is discovered by some other supporters who are retirees. They interact and add their reminiscences of the past triumphs and tears of the club's history, with their own memories, photographs and scanned press cuttings. It becomes a popular independent fan critique of the club's performance.

- A Year 13 student of English literature writes an essay on one of her Jane Austen set readings. Before she submits it for marking by her teachers she decides to submit her essay for peer assessment using a fan fiction web resource. Twenty-four hours later the student has constructive feedback from five other Jane Austen fans and she is able to improve her essay.

- The Wren family are birdwatchers. They visit a hide at a popular site for observing waterfowl. The site's information board has a geometric pattern which interacts with the camera of their mobile phone. This links to information on a phone-website/blog about recent migrant birds which are visiting the site. They observe an osprey on its way to more northerly habitats. They add their latest news to the system. At home, they check the website/blog and see that a photographer has linked to a photograph database site – where images of the osprey she took on the same day are available. Robin Wren as part of his independent studies in school is linking the datasources he has found, like osprey pictures, nesting and site reports, to Google Maps. He is developing a report on how small positive steps in environmental conservation have aided the recovery of osprey populations in the UK.

1.1 How are views of education changing?
In the UK, as in many countries around the world, there is a shift in emphasis at policy level from a focus on the content of what children should be taught, to a concern with how best to enable children to learn. The background of many of these policy initiatives is the recognition that we live in a fast-changing world in which the young people leaving school today cannot expect to remain in the same career or even the same sphere of work for the whole of their lives. At the same time, as manufacturing industry declines in the western world, increasingly these young people will also be expected to compete in a knowledge, rather than an industrial, economy. While some of

the more sweeping claims in this area should be approached with some caution, these two trends have led to an increasing emphasis in education policy upon supporting young people to understand how to learn, in order to enable them and the societies of which they are a part, to compete in the context of a global knowledge economy.

These beliefs can be seen to underpin a number of current UK educational policy initiatives and strategy documents, such as the influential Excellence and Enjoyment paper, the Five Year Strategy for Children and Learners, and the Harnessing Technology strategy (DfES 2005). These documents offer glimpses of radically different approaches to educating young people: educational institutions may be reconfigured from monolithic institutions to resources operating across different domains (eg home, school and community); educational practices may prioritise collaboration and reflection on process rather than the acquisition of content knowledge; and educational goals may be re-imagined as personal and bespoke rather than mass-industrial and one-size-fits-all. At the heart of these visions are the themes of personalisation, collaboration and learning to learn.

Our argument in this paper is that these visions, to be fully achieved, will require the use of digital technologies, and in particular, the exploitation of digital technologies that enable learners to learn together, to collaborate and to build knowledge.

1.3 What is new in web technology?
Although the web may seem increasingly like an advertising brochure, its first use was essentially a form of social software: it was a tool for physicists to share and discuss their experimental findings. In recent years, in a series of developments that have become known as 'Web 2.0', we have witnessed a renaissance of this idea in the emergence of tools, resources and practices that are seen by many as returning the web to its early potential to facilitate collaboration and social interaction. Internet innovators leaving a 2005 conference on this subject described the 'new Web' as follows:

"It's made of people. It's not content." Jeff Jarvis, Buzzmachine

"The interconnected web." Andrew Anker, Six Apart

"Web 2.0 is the two-way web where content finds you."
Ron Rasmussen, KnowNow

"People doing things together on the web."
Mitchell Baker, Mozilla Foundation

"Web 2.0 is about platforms that other people can build on."
Rajat Paharia, Bunchball

The sorts of activities (rather than applications) that Web 2.0 refers to include the growth of web logs, wikis, social bookmarking sites (like del.icio.us), sharing sites, and contact sites. They include ways of helping you keep up to date with what is going on the web by syndication. The activities include sharing things you have written and getting feedback as writers and readers of fan fiction. For some even eBay is a site of social activity.

In the next section of this paper, we will discuss all these activities in more detail, but for now it is worth mentioning that the sorts of interconnected, mobile activities that these resources allow is being heralded by some as 'the next social revolution'. Howard Rheingold, in 'Smart Mobs' (a pun on the ideas of mobility and a mass of people intelligently acting together), argues that:

"Smart mobs emerge when communication and computing technologies amplify human talents for cooperation. The impacts of smart mob technology already appear to be both beneficial and destructive, used by some of its earliest adopters to support democracy and by others to coordinate terrorist attacks."

While the subject of this paper is not social revolution, we do want to raise the question of whether the activities that social software allows may enable educational revolution. In other words, we wonder whether they will allow us to realise the at present tentative visions of education policy around the world. Some have suggested, for example, that Web 2.0 will lead to e-Learning 2.0, to a rethinking of the relationship between technology and learning, to the development of educational practices that place the learner at their heart through the creation of collaborative, community-based learning experiences. To explore this further we touch now on the key theme of the potential shift in thinking from 'e-learning' to 'c-learning'.

1.4 From e-learning to c-learning?

Call it community learning, communicative learning or collaborative learning, at its heart learning is a social process. Jay Lemke, in his consideration of re-engineering education, suggests some ways we 'naturally' learn in a contemporary environment:

- read a book or surf the web for information
- ask a friend or an expert to explain something
- tinker with things and try to figure them out
- get a group together to find an answer or make something happen
- watch other people doing something and try it for yourself
- explore a new territory, alone or in company
- talk to people
- write and make diagrams, drawings, movies, music, multimedia
- invent new things or ideas of your own
- compare different ideas and experiences
- ask why? and how? and how else?
- all of the above, in some combination.

Most of this involves some involvement with other people either through conversation or by engaging with the ways other people have put their thoughts into media. Learning, from this perspective, is a process of rich and diverse encounters and experiences; it suggests that "it takes a village to educate a child" (Lemke 2002).

If learning to learn, if collaboration, and if the personalisation of educational experiences are at the core of current educational agendas, we need to find ways of enabling young people to come into contact with, collaborate with and learn from each other and other people. Social software is about bringing minds and ideas into contact with each other and is already, in the world outside schools, creating what was described by McLuhan as the global village.

Our question, in this paper, is whether it is possible to draw on the activities emerging through social software to create learning communities which offer young people personalised, collaborative learning experiences such as those that are already emerging in the world outside the school gates.

2 What is social software?

2.1 A broad definition

The term social software came into use in 2002 and is generally attributed to Clay Shirky. Shirky, a writer and teacher on the social implications of internet technology, defines social software simply as "software that supports group interaction" (Shirky 2003).

Stowe Boyd, in Darwin magazine (2003), discusses the nature of sociability and computing and describes some of the attributes of social software. He suggests that at its easiest it is like including a 'cc' line in an e-mail. He suggests three defining characteristics of social software:

- Support for conversational interaction between individuals or groups ranging from real-time instant messaging to asynchronous collaborative teamwork spaces. This category also includes collaborative commenting on and within blog spaces.

- Support for social feedback which allows a group to rate the contributions of others, perhaps implicitly, leading to the creation of digital reputation.

- Support for social networks to explicitly create and manage a digital expression of people's personal relationships, and to help them build new relationships.

However, we would want to extend this definition to include a recognition that social software is also characterised by community gains: that many users benefit from other users acting in sociable and community-oriented ways. This stems from the belief that a whole can be greater than the sum of its parts – that the concerted social actions of strangers benefit us all.

Social software and the changing goals in education seem to be moving in the same direction. Some of the key attributes of social software in relation to education are that it:

- **Delivers communication between groups.** There are implicit mechanisms that allow interest groups to electronically coalesce – to be aware of what each other are doing and to review each others' actions and to allow those actions to benefit each other member of a community.

- **Enables communication between many people.** If the authors wish, all their work is available to the rest of the digital world. Access is available to expert and novice alike and in fact social software provides systems whereby experts and novices can work together.

- **Provides gathering and sharing resources.** It provides a means of gathering and making material available. Simple acts like putting holiday snapshots on a searchable photo site can give others insight into the location, for instance; for other people making available their work in progress can both inform others and prompt critical feedback.

- **Delivers collaborative collecting and indexing of information.** No longer is knowledge limited by historically constructed visions of curricula. There are new ways of organising and finding knowledge objects that are of interest to you and the groups with whom you share interests.

- **Allows syndication and assists personalisation of priorities.** There are mechanisms to be passively active. You can choose what information streams you want to be kept informed about and that information will come to you rather than you having to go and seek it. It will help you both keep abreast with your co-workers' online activity and those other information streams you actually prioritise.

- **Has new tools for knowledge aggregation and creation of new knowledge.** The massive uptake of MP3 music players is indicative of a move to collecting material from many sources and aggregating it for our personal use. There are also tools that allow that content to be modified and incorporated in new formulations: the concept of a mash-up.

- **Delivers to many platforms as is appropriate to the creator, recipient and context.** Creators and users of social software tools and content know their lives are not constrained to desktops, they use many media: mobile phones; PDAs; MP3 players and games consoles. They increasingly expect that the digital part of their life will integrate with them in the context that they are in.

2.2 The range of social software

Social software comprises a wide range of different types of activities. The most familiar are likely to be internet discussion forums, social networking and dating sites. However, applications like massively multiplayer online games and internet messaging can also be seen as social software, as could group e-mails and tele-conferencing. In the education sector, newer applications such as weblogs, wikis and social bookmarking have seen a recent increase in popularity and growing mainstream interest. At the same time, there are other technologies which enrich and enhance these practices, like syndication systems that bring information in a well organised way from one source to another.

New forms of collaboration tools are also emerging, based on collaborative document building rather than individualist blogs. We are also seeing a shift in the 'modality' of communication away from text alone: podcasting or audio publishing via the net is a growing movement and it will be relatively a short time before there is also good support for video publication on the net. Locative and geographically mediated activity is also a likely area for growth. In the first instance the use of locative media on mobile phones has been commercial but the use of the mobile phone to share information as well as communication is likely to grow as more powerful phones become available to learners. Google Earth has also been a significant stimulus to devise ways of sharing information based on maps and locations.

2.3 Mainly text-based social software

Weblogs are easily updatable personal websites, often used as personal journals. The social aspect of weblogs can be seen in the ability for readers to comment on postings, to post links to other blogs and, through using pingback or trackback functions, to keep track of other blogs referencing their posts. This enables bloggers to know who is referring to and building on what they say in their blogs. The Guardian (11 March 2006) reported that there are over 30 million bloggers. It adds "...suddenly the global village is given a voice".

Children and young people are increasingly becoming authors of blogs, and research is only now beginning to catch up with these activities. At present, because they may give out a lot of personal information in their blogs,

including their full name, age, school and location, as well as photos, there are growing concerns about the safety and privacy of young people. Adults worry that by displaying this personal information, young people are putting themselves at risk from predators who may take advantage of the anonymity and unbounded nature of the internet to make contact with young people. While there may be some basis for these concerns (see Observer 11 December 2005) a rapid survey of blogs on LiveJournal or MySpace, two popular blog systems used by young people, would suggest that most of the communication between bloggers appears to be between people who already know each other in the offline world.

A different interpretation of the implications of these activities has been proposed by researchers into children's digital cultures. These researchers suggest that the design and layout of young people's blogs is a display of self-identity. Most of the content is devoted to displaying likes and dislikes, hobbies, friends, current mood and even intimate personal issues. The researchers suggest that what these young people are doing is creating and projecting their emerging identities within a group of friends. Blogs, as with mobile phones and other technologies, facilitate a range of social and emotional work for young people (Ito and Okabe 2003, referenced in Carrington 2005).

www.wikipedia.org   www.writely.com   www.myspace.com

Wiki software allows people to easily upload content to the internet, with the important addition that it is then editable by other readers. One of the most well-known examples is **Wikipedia**, an online encyclopaedia. The principle behind the operation of Wikipedia is that the knowledge of the group is greater than that of an individual, and that the group who use it are also the group who create it. In this way, individuals within the group decide when new

entries should be created and through collaborative editing of entries an article will emerge that satisfies the needs of the group. In the case of Wikipedia, there is a critical mass of users who subscribe to the 'implied constitution', who promptly clean up occasional acts of sabotage, and who are engaged enough to participate in the common endeavour. In examples of wikis with a smaller or less active user base, this may not always be the case, and wikis may be used as a kind of asynchronous social notebook for the specific needs of a small group.

Another text-based format that is evolving in Web 2.0 is collaborative synchronous web-based creation tools such as collaborative word processors (see **Writely**). It seems likely that further collaborative tools will emerge.

Social bookmarking and **tagging** are relatively recent additions to the array of social software available. Fundamentally, social bookmarking is a web-based application that allows users to store bookmarked links to URLs in a format accessible via the internet rather than searching bookmarks stored on a specific computer. It has taken off since the launch in 2003 of one of the early social bookmarking sites, **del.icio.us**.

The point at which this bookmarking activity becomes social is when tagging is added to the functionality. This means that when users add a bookmark to their list, they also add a tag (a keyword) to that link. This means that users can search other people's bookmarks through tags (keywords) defined by users. For example, I may add the tag 'learning' to a URL linking me to an example of the use of social software in schools. Another person searching my bookmarks with the word 'learning' would then pull up that link. The principle here is that searching by keywords assigned by other members of your community means you are searching in a social context. Because you are searching sites tagged by people with whom you may share a perspective rather than simply searching text in a webpage, you will achieve more relevant results than relying on search engines.

This process of organising information through user-generated tags has become known as **'folksonomy'**. It implies a bottom-up mode of organising information as opposed to a hierarchical and top-down taxonomy. Rather

than visualising information as contained within a hierarchical tree structure, it is contained within sets, which may overlap one another, allowing information to be within two categories at the same time.

However, some concerns remain about this fluid way of organising information. The use of synonyms is uncontrolled; for example, if you search for 'blog' you won't get URLs tagged with 'weblog'. Also, different users will use the same keyword for many different categories: a URL tagged 'London' might be about the capital city of the UK, or be about the writer Jack London, or have been found by someone when they were in London. Tags can be categories, descriptions, opinions and comments, and the same person may use a mixture of these tag meanings for any one tagged item depending on their purposes and perceived audience at the time.

www.flickr.com　　　www.citeulike.org　　　del.icio.us
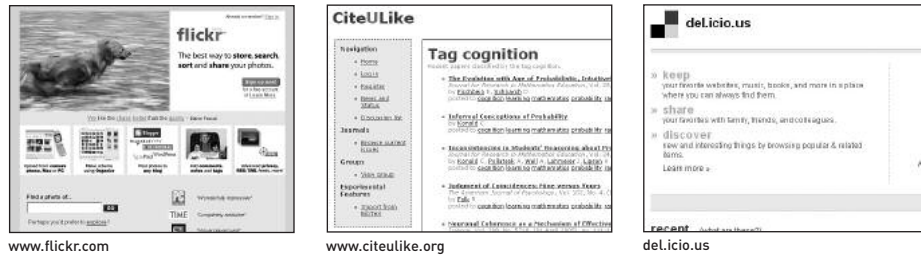
Different social bookmarking sites encourage different uses: some sites encourage more playful and personal tagging, for example **Flickr**, the photo-tagging site; while others afford a more deliberate style of tagging with a very clear idea of a specific audience, such as the academic sites **Connotea** or **CiteULike**. Throughout the development of del.icio.us there have been repeated calls for the user group to agree on what tags should refer to and to define the correct form of tags (eg blogs, blogging or weblogs). There were

also concerns raised about the effect of the user group becoming larger and more diverse, and so the use of tags and the type of content bookmarked becoming less predictable. So far, these calls for greater control have been rejected in favour of maintaining flexibility and fluidity.

Clay Shirky (2005), for example, argues that imposing a defined structure on a social tagging system is not just missing the point, but would be impossible to implement. It is the combination of tags, and access to the context in which they were tagged (by whom, and when) which provides more information, in a human social context, than can ever be the case with a search engine.

In his essay 'Ontology is Overrated', Shirky (2005) makes a case for the organic organisation that emerges from user-generated tagging. It is the fact that it emerges from the user group's actual practices rather than following a pre-determined structure, that makes a folksonomy powerful He quotes Joshua Schachter, creator of del.icio.us:

"Each individual categorization scheme is worth less than a professional categorization scheme. But there are many, many more of them."

The individual and human context in which we make sense of the world can be reflected in this type of organisation. What Shirky does make clear, however, is that, in a similar way to wikis, the scale and activity level of the user base is critical to systems of social tagging. There must be enough people tagging things in order for any individual to be able to find someone who also tags in a similar way. Achieving a critical scale of users also means that URLs and tags can be rated in terms of popularity and so a system of filtering out less relevant URLs and highlighting more favoured ones emerges.

Clipping tools are a compliment to tagging tools. A clipping tool sits on the toolbar of your browser and allows you to either clip the resource you are viewing and add it to your blog and/or add it to your social bookmarks. Whichever way you choose, clipping tools allow you to add annotation to information that you have found and want to keep a reference to, and then to share this information and your added value-tags and annotation with others. Two tools that are available for this kind of activity are BlinkIt and BlogThis. These kinds of activity are relatively new and are clearly under-researched; however the criticisms of social bookmarking would also apply here.

BlogThis! and Blink It! tools

Syndication is a means of having an update on changing content from a given web source sent directly to you, rather than you having to go and check this site on a regular basis. Typical systems for people or organisations wanting to provide these feeds (such as online news agencies in the first instance) include RSS and ATOM 'feeder software'. For individuals wanting to receive these updates, they install an 'aggregator' to select which feeds to pick up, and to show the headline information. Aggregators can be incorporated in your blog pages.

In the first instance, these approaches were picked up mainly by news organisations and news junkies wishing to keep up with changing headlines, but they are now being used by individuals and other organisations. For example, many bloggers are using syndication tools, which means that if I were to point my aggregator at a blog with this resource, the syndication software would send out to me the headlines of any changes made on that blog when it is updated.

From an educational perspective, this might provide an interesting online learning environment without the need for a heavily managed service. Learners and tutors can link to each others' work and view progress over time. For example, when the tutor publishes new materials this update will be sent out to students and similarly the tutor will be able to be notified when the student has updated their response on their blog. In this way, an informal and distributed group of learners may be able to build a collaborative environment. To date, there has been no evaluation of syndication services, although Harresch (2003) suggests it is the next 'killer app' for education.

Fan fiction sites could also be considered to be examples of web-based social software. Fan fiction is fiction material authored by anyone in the style or using characters and settings of another author of whom they are a fan. Free e-publishing of fiction in itself may not be considered that social, however it is the environment in which it takes place that makes fan fiction sociable. Fan fiction sites are communities: people of a like mind gather together and offer each other criticism and support for their endeavours. It is writing within a social context in which work is offered up for comment and criticism and in which dialogue between different fans can be sustained for a significant period of time.

The development of fan sites has also extended to other media. Fans of computer games, for example, are beginning to use the games themselves as a resource for creating new narratives by creating stories based in the games worlds and using games characters (see Futurelab's handbook on 'Games and Learning' for more discussion of this activity).

### 2.4 Audio-visual social software
Most of the activities described above are firmly based in the world of text, although blogs, along with any webpage, can contain a variety of media. It is important to acknowledge, however, that rich digital media (photography, video and audio) also allow for sharing of ideas and collaborative activity. A typical example is Flikr. It allows a user, for example, to keep a blog of moments captured on a camera-phone, to securely and privately share photos of their children with their family across the country, or to have a public gallery for their photographs. It allows people to get photos into and

out of the system in a range of different ways: from the web, from mobile devices, from the users' home computers and from whatever software people might use to manage their photos.

Media sites have innovative social ways of organising media which makes the process of organising photos collaborative. For example, a user can give their friends, family, and other contacts permission to organise their photos; not just to add comments, but also notes and meta-tags. This has the same critical mass effect gained from social bookmarking as all this information accretes around the photos as metadata.

The increasing availability of digital audio players has increased the creation and distribution of shared audio data. Typical is the use of Apple's iPod. At its simplest friends can create playlists of favourite music to give to each other. As the iPod has developed visual as well as audio capabilities the potential of this and other MP3 devices will lead to video podcasting.

In education, Synergy TV's websites **Radiowaves** and **dbass** offer some insight into how these approaches might be appropriated for learning. Radiowaves, for example, is a network of school internet radio stations which provides young people with the tools they need to easily publish radio online within a safe environment. Dbass provides a place for young people to publish their music, connect with other musicians and compete in national music charts within an engaging and safe environment.
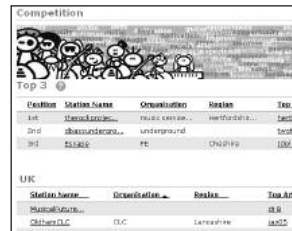
www.dbass.org

www.radiowaves.co.uk

Broadcast Machine at www.getdemocracy.com

Radiowaves won the 2004 BETT Innovation Award. In a research programme (Commerford Boyes 2003) on the Cape UK/Synergy Radiowaves project students' self-reporting showed that:

- 84% learnt about teamwork

- 76% were better at working with others

- 73% were better at decision making/responsibility

- 65% were better at understanding problems

- 59% were better at communicating ideas.

Over the last four years Radiowaves has become the fastest growing global network of school radio stations. dbass is providing perhaps an even more significant platform for socially produced, shared and critiqued music production. To engage with Synergy TV activity you need to use their websites directly and they are not currently integrated by syndication or other tools. As bandwidth becomes more available there is also likely to be the possibility of social and collaborative production and distribution of video. There are a number of examples of software and activities which give some insight into how this as yet fledgling practice might develop.

CoDECK, or Community Deck, for example, is a system for social sharing and critique of video installation art. It is based upon the idea that it is possible to democratise television distribution by combining existing network technology, social software and improved user interfaces (Melinger 2004).

Broadcast Machine is software which enables users to publish video files and create internet TV channels on a website. It is free, open source software which creates a browsable archive of videos on a website, integrates with RSS syndication software and provides a tool for making channels that work with DTV. The ability to create channel guides - effectively a social video software Radio Times - is also an essential part of the process.

2.5 Spatial and geographic social software

Spatial and geographic data is emerging as a significant feature in social software, as Rush (2005) argues:

"Geotagging means the Web is slowly being wedded with real space, enhancing physical places with information that can deepen our experiences of them and making computing into a more 'continuous' part of our real lives." (Toyoma - Microsoft Research website)

There is a new interesting social activity emerging that arises from the availability of Google Earth and MSN Virtual Earth. These are web-based geographic information systems which combine satellite imagery, maps and search facilities to allow you to access a wide range of geographical information. Google has made its system open to allow third parties to develop resources on top of it. Toyama and others at Microsoft (undated publication) describe a service to tag photographs with geographic metadata. This is an important application area where social software is emerging, particularly when image databases like Flikr are integrating with map and location systems. This results in the ability to share your photographs with other visitors to the same locations. There are also cameras becoming available (eg Ricoh Pro G3 GPS camera) which tag photographs with locative information, thereby automating the process.

A number of users are beginning to use the Google Earth system in very diverse ways. Bloggers are increasingly providing location information relating to their posts, for example yachtsmen blogging their journeys (Taylor 2005). There are also systems to share information about where the cheapest petrol is available, and others are tagging the Google Earth maps with the locations of Shakespeare's plays (Seer 2005).

It is probable that when mobile devices are more easily able to tag geographic information that we will see a significant increase in these sorts of activities, an increase that may see more seamless interaction between the virtual layer of information and the physical world. The current technologies which make this possible include physical markers (a radio or visible tag for example), wireless signals from GPS, or triangulation with radio sources. These tools

allow users to access and create information and activities that are intimately linked to a specific place.

By way of example, Futurelab and Goldsmiths College's Mudlarking in Deptford project changes the nature of making a tour of a particular location. It allows the user to alter and edit or extend a tour with new information or a recollection of their own, and maybe personalise a tour for a community. This system is based on the Mobile Bristol toolkit which is based on GPS-enabled hand-held computers.

Another Mobile Bristol project is an experiment to use mobile phone-readable 'barcodes' sometimes called semacodes or QR tags. These allow printed objects to be placed in the environment that can activate some mobile phones to take particular actions, from merely revealing some hidden message in the barcode to initiating a telephone call or downloading a web page to the phone. Using these technologies one can have asynchronous messaging to other people which is relevant to specific locations.

2.6 Finding like minds

Being sociable obviously requires people to be sociable with. A key role for social software is in putting you in touch with people with shared or complementary interests and concerns as yourself. There are three principle methods for putting people in touch with each other: profile matching, linking personal networks and joining a group to which you have some affinity. The SocialSoftwareBlog (Meskell 2005) lists 380 different websites/services that have different takes on the issue.

Profile matching systems require individuals to enter personal details which are either matched against the profiles of others or searchable by others. This is the typical mechanism for dating websites, but this approach can be mapped onto any need to find people of a particular profile. For example, Timebucks[1] is a skills exchange site where you might look for someone with a particular skill that you need, who is willing to exchange it for a particular skill you might offer.

[1] www.timebucks.org

Personal networks are shared contacts systems - databases of contacts, and contacts of contacts. These are often geared to plain sociability (eg Friendster) or for business contacts (Linkedin).

Affinity systems allow people to register their membership of groups - such as old school friends or work colleagues (eg Friends Reunited). In Friends Reunited you choose to have your current and biographic details in a site that features you and others who left a specific school in a specific year. It allows you to find old school friends.

While these are formalised approaches, social software offers a range of different ways in which, through simply using these resources, you might be able to identify people with shared or similar interests to yourself. For example social bookmarks are tagged with information about the people who use them. So, while knowing you share a tag with 3,000 people may not be much use, if you are one of only eight people who use the specific tag there is a chance you may well have an affinity and reason to contact those people. At the same time, on a practical level, there are a number of blog search engines (Technorati blogfinder, Blogdigger, Google blogsearch, Icerocket) and a blog registry Blogwise. These offer the potential to find people with shared interests, and it is in the nature of blogs that they invite dialogue and therefore the possibility of entering into conversation with those with whom you may have a shared interest.

2.7 Mobile phone software

Finally, it's possible that the telephone is the most significant piece of social technology currently in use, and the mobile phone even more so. The mobile phone is becoming increasingly sophisticated and the range of its uses for social interaction and collaboration are potentially infinite. It is also the technology that is increasingly in everyone's pocket - always there. There are more mobile phones than people in the UK and the lack of access is less of an issue.

Two important words in relation to understanding phone applications are cell and Bluetooth. A cell is the distinct area around a particular aerial mast from which you receive signal. These vary in size; in the centre of a city they may be 50 metre squares, in rural areas they may be 10km or more.

The important issue is that the telephone system can locate which cell your phone is in and thus there is some information about your location. Bluetooth is a short range (say 25 metre) wireless communication system. It was developed for hands-free use – but it can be used for phone-to-phone (ie Bluetooth to Bluetooth) communication. There is also an assumption that in the near future phones will be 'always on' – and the charge rate will not be by the minutes used. These functions are used in social software.

One use of mobile social software is to locate friends. Crowd surfer uses the Bluetooth connection on your mobile to locate friends within 80 feet of your location, and then exchange photos and information. However there are also mobile social softwares that help you locate third parties or strangers in a given location – short range identification of people with an affinity - like Mobiluck which matches the profile you create on your device with that of other phones around you, or Activematch, where you set up networks dependant on your location and your preset preferences for matchmaking. Push to Talk is like a 'walkie-talkie' but with no limit on distance. You can talk instantly with people anywhere in the world with mobile coverage. Soon, instant video messaging will also be a feature thus allowing visual sharing of location with others. It will enable others to share in a location-specific event using in-pocket technology.

Mobile commerce services send information to your mobile phone about facilities in your actual location. For example texting the word "cinema" to a short code would return your nearest cinema with a link to film times. Accessing these could allow you to read a film review or see a video trailer of the movie. It will be possible for affinity groups to populate their own location databases for people to share knowledge. The Wren family will be able to text "birdwatch" and local birdwatchers will have supplied information about avian study in the neighbourhood.

Another technology used with phones is the use of marks on real objects in the environment (like barcodes) which can be decoded through the mobile phone camera. The code can then carry information like a website URL, a phone number or just some text that can trigger the phone into action and have been used, for example, in treasure hunt games in Canada.

2.8 Summary

The range of social software is extensive and it is growing. Social software provides publishing in multimedia, researching and collecting tools. There is major commercial recognition of its importance, with significant internet companies buying smaller social software companies. Current social software allows users to communicate, collaborate and publish in a number of ways, in a variety of media, and it also helps learners act together to build knowledge bases that fit their specific needs.

Significantly, social software is enabling people to do things with internet technology that they clearly want to do themselves - and as they discover more things they want to do the software develops. Social software is therefore satisfying needs that map closely onto educational needs and current agendas. Social software is about personal services on the web, and consequently it is about personalisation. It is inherently social, and the gains of using social software are gains that come from collaboration. The value for education is clear, and in the following section we will discuss the ways that these developments will impact on education.

3 Does learning change in an information society?

As we discussed in the introduction to this publication, there are currently significant calls for new approaches to education that are premised on the notion that we are moving into a new form of information society which is characterised by changes in the use of technologies and the forms of knowledge and learning that are valued in society. This section of the paper outlines some of the key arguments from the research literature that might require us to rethink our approaches to education.

Firstly, there is a shift in the nature of knowledge and how knowledge is created and organised, and secondly there is a cultural shift growing from the use of information and communication technologies, the so-called cyberculture. These two strands mirror the twin concerns of those arguing for a shift in educational processes to align with the perceived demands of a knowledge economy: namely, the concern with developing young people able to act as innovators and creators of knowledge; and the concern with developing young people able to operate effectively within digital and information-rich environments.

Identity, space, attention and creativity are all clearly central to the question of how we learn with digital technologies. These are not marginal questions to be relegated to the 'out of school' world, but are intimately bound up with the ways in which young people may be coming to expect to learn in a digitally rich environment.

3.1 Does the curriculum change?

For most of the 20th century there was a remarkable consensus about what it meant to be educated. There were particular forms of knowledge and knowing that were agreed to form the basis of a common national culture, such as mathematical, scientific, historical and aesthetic knowledge (Hirst 1975; Phenix 1964). This consensus was enshrined in law in the UK through the 1988 formulation of the National Curriculum.

At the same time as we have a strongly defined curriculum, it is also possible to argue that we have an approach to teaching and learning which is also strongly controlled. In Bernstein's (1996) terms, we currently see an education system which is strongly "classified" and strongly "framed". In other words, the boundaries between subjects are clearly maintained and patrolled, there are strong definitions of what 'counts' as, for example, maths, English or science (classification). Equally, the order and manner in which information is presented to students, the stages of assessment one has to pass through and the kinds of discourse appropriate to the subject are tightly defined (framing).

Today, however, as we witness the demand for new ways of working, living and learning outside school, and as we see the emergence of new forms of interaction mediated by digital technologies, we need to ask whether what we teach and the way we teach in schools is still a sound basis for our current common culture, or has the world moved on?

There are, of course, times for structure, there are times for focus. There are times when it is important to know the existing and historic discourse around a body of knowledge. There are times when it is wise to follow the structures laid down by an experienced teacher. However, it is clear that the sorts of learning experiences we are witnessing emerging in new 'knowledge industries', and in the use of social software, suggest that there are also times for more weakly classified and framed approaches to learning. In the remainder of this section we talk through these different approaches as they are currently understood by researchers in the fields of innovation, education and ICT.

3.2 How has ICT changed our perception of knowledge?

Weinberger (2006) uses an analogy for this looser knowledge structure by describing knowledge as no longer being organised as trees but as a pile of leaves. Trees provided externally imposed structures that have historic origins and may not be relevant for modern life. We can now have knowledge available to us organised in the ways we deem significant to us at this moment in time, and have different configurations later. This brings with it other issues; a traditionally derived organisation of knowledge has evolved for a good reasons.

John Seely Brown (1999) has looked at how the ubiquitous use of ICT is leading to changing ways of learning. He puts forward four different ways in which learning is changing.

- There is a new literacy of information navigation - to know how to navigate through confusing and complex information spaces. This is transcending the ability to use a search engine – it is also about the other ways that pointers to knowledge arise in technical and social forms (eg blogs, RSS).

- There is an increasing use of discovery-based or experiential learning, especially using the web. Knowledge in digital form inherently and explicitly links to other sources – widening the boundaries rather than converging to a single source. Information on-demand allows for inquiries to be made as a result of ongoing activity.

- There is a "substantially more subtle shift" pertaining to forms of reasoning. "Reasoning, classically, has been concerned primarily with deductive, abstract types of reasoning. But what I see happening to today's kids as they work in this new digital medium has much more to do with bricolage than abstract logic. Bricolage, a concept originally studied by Levi Strauss many years ago, relates to the concrete. It has to do with the ability to find something - an object, tool, piece of code, document - and to use it in a new way and in a new context."[2]

There is the need to decide whether or not to believe or trust those 'borrowed' things. Navigation is coupled to discovery and discovery is coupled to bricolage but requires judgement concerning quality or trustworthiness.

Young people learn by absorption and trying things or action, rather than attending a training course or consulting a manual. Action, he says, "brings us back into the same loop in which navigation, experiential learning and judgment all come into play in situ." "Learning becomes as much social as cognitive, as much concrete as abstract, and becomes intertwined with judgment and exploration."

There are important issues for education. If knowledge organisation is less standardised then judging the quality and trustworthiness of sources

becomes significant. The quality of your learning community becomes significant if you are relying on the group to provide you with pointers and structures of information. If you are learning from a group – it had better be a good group.

3.3 How do we educate for creativity and innovation in the ICT age?
Ikujiro Nonaka and Hirotaka Takeuchi have explored the creative processes in groups in Japanese industry. This may not seem an obvious domain to consider when thinking about the implications of social software for education. However, there are very clear and applicable ideas in this work about how it is that groups can create and share knowledge, which are of direct relevance to educational settings.

According to Nonaka, "making personal knowledge available to others is the central activity of the knowledge-creating company" (Nonaka 1991, p98). Of primary importance is the recognition that creating new knowledge does not simply mean processing information, but:

"...tapping the tacit and often highly subjective insights, intuitions, and hunches of individual employees and making those insights available for testing and use by the company as whole."

The knowledge-creating process of converting tacit knowledge into explicit knowledge operates:

"First, by linking contradictory things and ideas through metaphor; then, by resolving these contradictions through analogy; and, finally, by crystallizing the created concepts and embodying them in a model, which makes the knowledge available to the rest of the company." (Nonaka 1991, p101)

In attempting to design a new and different car, for example, the project leader of Honda's engineering team charged with the task developed the slogan: 'Theory of Automobile Evolution'. The question was asked "If the automobile were an organism, how should it evolve?" (Nonaka, p100). The analogy required reconciling the differences and similarities of the two ideas expressed in the metaphor 'car' and 'evolution' and in so doing created a

[2] serendip.brynmawr.edu/sci_edu/seelybrown/seelybrown.html

mechanism for externalising individuals' tacit knowledge in ways that could be shared and modelled by the group.

Tacit knowledge is personal, difficult to formalise, subjective, intuitive, and rooted in one's actions and experiences, ideals, values and emotions. More specifically, tacit knowledge can be broken down into two components: informal skills captured in the term 'know-how' (this is the technical dimension), and a cognitive dimension consisting of:

"...schemata, mental models, beliefs, and perceptions so ingrained that we take them for granted. The cognitive dimension of tacit knowledge reflects our image of reality (what is) and our vision for the future (what ought to be)." (ibid p8)

The process of creation is seen as taking place within a spiral, in the following stages:

- sharing ideas with colleagues in half formed and loose ways (sharing current tacit knowledge)

- using others to help you clarify and explain your ideas (moving from tacit to explicit)

- seeing and fitting your ideas into the pattern of ideas generated in the framework around you (moving from individual to new group concepts; a new explicit knowledge)

- working within and developing from that framework (from new explicit to new tacit)

- stimulating a new cycle of knowledge creation at both an intra- and inter-organisational level.

  (p90)

Nonaka and Takeuchi describe five conditions required at the organisational level to create the spiral:

- intention/aspiration to create knowledge

- autonomy of workers

- fluctuation and creative chaos

- redundancy

- requisite variety (an organisation's internal diversity must match the variety and complexity of the environment).

  (ibid pp74-83)

An important step in this process is the ability to cope with the concept of redundancy: having more ideas than you can possibly deal with; not being afraid of generating an idea which at first may seem irrelevant; and having multiple people working on the same challenge, or having the same sorts of conversations at the same time. This requires lot of talk, a lot of changing roles and a lot of working things out as partners (Nonaka and Hirotaka 1995, p12).

Redundancy may sound like waste and duplication in the West, but it promotes dialogue and communication. When members of the organisation share overlapping information people can get a sense of what others are trying to articulate.

Some Japanese companies take this process even further and divide product development teams into competing subgroups, which develop different approaches to the same product; the advantages/disadvantages of each are then argued out, and a best approach is decided upon (Nonaka and Takeuchi 1995, p14).

In this environment, then, innovation and knowledge creation are seen to be dependent upon collaboration, space for dialogue, a shared value system, recognition of the process and belief in knowledge creation.

3.4 How can this understanding of creativity influence practice?

It is a challenge to model the ingredients of Nonaka's innovative workplaces within a UK educational setting. However, there is one clear parallel already in existence in educational practice: 'the crit'. 'The crit' is the central feature of all the teaching of creative practice in art, design and architecture schools. It consists of a critical dialogue between peers where work-in-progress is exposed for developmental discussion. The expression Gestaltung (co-shaping) provides a means of expressing the collegial activity of helping each other to develop in an emergent process. It is an interaction that changes the learner and leads to a better developed outcome and a more reflexive learner.

The crit needs the same qualities that Nonaka describes:

- Intention/aspiration to create knowledge: a passion which needs encouragement to flourish.

- Autonomy of workers: the students should have freedom to create (although constraint or solving given problems is not counter to this autonomy).

- Fluctuation and creative chaos: there should be few boundaries to the resources and the timescales across which students work (creativity is very difficult to fit into a room with bounded resources and a 50-minute period).

- Redundancy: working on only one idea is counter-productive. Learners should not accept their first idea is the only idea.

- Requisite variety: in this context we might mean sources of inspiration, cultural and physical tools, and sources of knowledge and so on. This implies access to a lot of resources.Thus a good writer's workshop or art and design studio is not limited in thought, or by the walls, and should draw on all the world's knowledge.

   (see Ashby 1958)

However, most of all it is that critical community of practice that is essential to 'the crit'. This is a community in which we can trust the judgement of others, a community where there is no fear about presenting ideas.

3.5 How do we learn in a community of practice?

Communities of practice are groups of people who have specific reasons to have an affinity. It can be an informal network or forum where tips are exchanged and ideas generated (Stewart 1996). It can be a group of professionals, informally bound to one another through exposure to a common class of problems, common pursuit of solutions, and in doing that they become a source of a body of knowledge.

Etienne Wenger (Wenger 2000) expands on learning as an inherently social activity. He notes that acquiring knowledge involves an interplay between socially defined knowledge and personal experience which is mediated by membership of a group. Any learning situation has to negotiate both an individual's experience, and the knowledge that the individual either brings to, or takes from, the group. Hence there is a logical reason to engage in social software.

Social software is seen as a descendent of what was known as groupware (eg Lotus Notes or FirstClass) which had a role in knowledge building and exchange among groups. Clearly this relates to the conditions for creative enterprises suggested by Nonaka.

One important benefit from social software is that students can join in or even create communities that they would not otherwise join. The phrase 'boundary crossing' is used. Students can be members of online learning communities that contain other ages, cultures and expertise. They have the opportunity to move beyond their geographic or social community and enter other communities, with the obvious implication that others can move into theirs. Communities can be strengthened where there are weak boundaries because they let newcomers in.

Tim Brighouse (undated web document) suggests:

"When the school goes further, and uses ICT connections in order to facilitate international curriculum development, debate among pupils and reciprocal visits, it is clearly taking 'boundary spanning' seriously. Indeed, the whole development of ICT provides a catalyst to expand horizons. "[3]

[3] www.cybertext.net.au/tct/context/brighouse.htm

3.6 Knowledge building networks and education

A major, long-term development in the use of ICT to build learner knowledge networks has been the work on Knowledge Forum by Scardamalia and Bereiter (2003). They developed software which was specifically aimed at getting learners to pool ideas and develop supportive evidence and argument for their ideas.

The heart of Knowledge Forum is a multimedia community knowledge space. In the form of notes, participants contribute theories, working models, plans, evidence, and reference material to this shared space. The software provides knowledge building support both in the creation of these notes and in the ways they are displayed, linked and made objects of further work. Revisions, elaborations and reorganisations over time provide a record of group advances, in the same way as the accumulation of research advances in a scholarly discipline. Explanations and ideas are developed and shared publicly with a group of peers, who critique the idea offered and may offer alternative or competing explanations. Further activity is then undertaken to refine ideas or address gaps in understanding that become apparent as a new idea develops.

Knowledge Forum is an immensely powerful tool and offers distinct learning advantages over more generic applications. The learner has the ability to see connections between notes (contributions), which allows for rich discourse and a reflective mindset. Knowledge Forum can promote reflection and synthesis by allowing contributions that 'rise above' other notes, ie make comments on groups of comments, as well as the creation of multiple graphical views and perspectives on the same information. In this way, Knowledge Forum has huge potential for supporting collaborative learning and creative problem solving. Scardemalia (2003) states:

"From the start the Knowledge Forum initiative has aimed at revolutionary change: from a focus on carrying out tasks and activities to a focus on the continual improvement of ideas; from an emphasis on individual learning and achievement to the building of knowledge that has social value; from a predominantly teacher-directed discourse to distributed knowledge building discourse."

Knowledge Forum is a very specific application that supports structuring of arguments. This is clearly good for some applications and though the ends can be achieved with other social software, it does embody good practice and is a precursor to other educational social software.

3.7 What is the emerging cyberculture for learners?

As well as examining the emergent forms of learning that are appearing when organisations and educators focus on knowledge creation, collaboration and practice as key goals, it is also important to identify the ways in which the introduction of digital technologies may be offering new approaches to learning and social interaction. Young people are developing new habits and a new culture – hence cyberculture. This section provides a brief overview of some of the key themes which seem to be emerging in this area.

3.7.1 Rethinking creativity

In an informal, social context, researchers and theorists are investigating how digital technology is in some contexts transforming social and cultural exchange. Mizuko Ito (2005) for example, argues that some 'sociotechnical innovations' are changing the way that young people relate to each other and to cultural media. Digital technology allows easy peer-to-peer exchange and amateur cultural production. Consumers can easily become producers. Mass market and user-generated cultural media is appropriated and critiqued, adapted and remixed allowing users and consumers to change the meanings intended by the original producer. This critical culture of consumption and remix blurs the line between consumption and production.

This 'hypersocial exchange' (Ito 2005) is about appropriating and reshaping content to consumers' own desires and meanings, rather than the one-way exchange associated with mass media and mass cultural production. Contemporary creativity may no longer be focused towards creating original content, but is a practice of rip, mix and burn, where content is taken, appropriated, adapted, mixed, and distributed in a way in which consumption of media and information also becomes a productive act. Digital technology can, then, give young people the opportunity to take control of information and media to consume and produce cultures of importance and relevance to

their own lives and identities. Social software adds to the ways one can be creative and it has changed and expanded the audience for personal and social creativity.

3.7.2 Rethinking 'attention'

Linda Stone (2005), a former Microsoft vice president and human-computer interface expert coined a phrase 'continuous partial attention' to refer to a state of mental blurriness induced by information that is constantly pouring in from multiple sources. This state is perceived to be a result of 'always on' connectivity and seems to be manifesting itself in different ways. For example, in meetings of technically competent people (such as technical conferences) the back channel (ie any communication other than that from the podium) is used to enhance the fore channel. Participants are able to look up information that would be too tedious, basic, or digressive to ask about during a Q&A. They communicate with others to find out or let them know. They write the diary (blog) of the event as it is happening. It is almost the technological equivalent of it becoming acceptable to pass notes around the class behind the teacher's back.

At the same time, many conference centres, university and corporate campuses - even entire metropolises - are today being turned into giant Wi-Fi hotspots. Trains, planes, airports and libraries are installing wireless networks to serve customers carrying wireless gadgets. As a result, many businesspeople, students and coffee shop addicts expect cheap, easy access to the internet as a matter of course. Losing it can feel like being stranded. Constant connectivity has changed what it means to participate in life. It also involves a change in social behaviour, 'manners' if you will, for example it is becoming acceptable to be in several information streams rather than focusing on the people you are with - this is also a feature of mobile phone use.

3.7.3 Rethinking 'space'

Since its inception there has always been a notion of being online as being in a space. Web documents are called sites and collections of them are locations and portals. The notion of virtual meeting places is easy to accept in the web culture. We are also moving to a stage were pervasive technologies

actually overlay real space with an augmented reality. The virtual spaces are not all the same: some are shops and some are more personal. Different virtual spaces also allow different types of social interaction and social relations. Sheehy and Leander (2004) suggest that as multiple users populate virtual spaces, others join in and create a richer online location.

As activity increasingly shifts online there is a blurring between what is global and what is local. Who you are friends with and who you play with are not necessarily people from the same physical street – they may be from the same online community. As we move to detailed animated 3D immersive online shared worlds like Second Life these issues may become even more significant.

3.7.4 Rethinking 'identity'

Key to the question of how participation in digitally rich practices may impact on our sense of identity are two themes: the construction of identity through the consumption and production of digital media, and the interplay between virtual and real identities.

As well as the natural identity which comes from what you do, people also define themselves by what they own and what they use. Possessions can be information, practices and media as much as physical possessions. Young people's consumption of media is one way of constructing an identity. By participating in different digital cultures, by using digital resources to represent different aspects of themselves, by linking online and offline worlds, all these resources are brought together (as with non digital activities) in the identity work of young people. Davies' study of Flickr, for example, describes the users' contributions as a representation of themselves in the world (Davies 2005). Davies argues that, as users gain familiarity with the ways that others are using Flickr they are prompted to reflect on and reconfigure their own ways of seeing the world.

In her study of identity in cyberculture, Sherry Turkle argued that a key feature of life on the internet was a postmodern sense of self that could encompass multiple psyches and provide the opportunity to users to be someone other than who they usually are (Turkle 1995). However, this point of

view is contested by some researchers. Tobin (1998), for example, argued that this freedom from age and physical appearance and so on meant that users and those they interact with could be most truly themselves. They could express the essential nature of their identity free from the 'trivial' information that could be gained from seeing someone physically. These two views at opposite ends of the spectrum both focus on the fact that the internet can hide a person's physical appearance, race, class, gender and location. This does not mean however, that these factors do not have any influence on a person's online (or offline) identity. In fact, it was clear from Tobin's study of his son and other users that online interactions were enabling them to construct a coherent and functional class and gender identity (Tobin 1998). As Valentine and Holloway argue, it is a mistake to characterise the online and offline as separate and mutually exclusive worlds, but that the online world is encountered in the context of offline identities and social networks (Valentine 2000; Valentine and Holloway 2001, 2002; Holloway and Valentine 2001).

3.8 Some caveats

Social software is clearly important and people are taking to it. It is a growing phenomenon: one third of young people who have good internet access maintain a blog (Guardian 31 October 2005). However we need to recognise that socio-economic factors are significant in determining access to digital technologies and, by implication, social software.

For example, the OFCOM (2005) Consumer Panel Report noted 56% of all households had internet connectivity but only 33% of low income families. At the same time, in the last quarter of 2005 75% of adults in Classes A/B used the internet compared with only 33% in Classes D/E. As mobile technology grows more sophisticated, incorporates more functionality and becomes more commonplace, it is possible that mobile platforms will begin to offer access to social software to a wider group of people. 93% of adolescents, for example, have access to a mobile phone for their own use. What is certain however, is that without personal connectivity available when you want it, social software cannot be considered fully 'social'.

There is also a note of caution that arises in relation to learning for a 'Knowledge Economy'. There are concerns from some commentators that the shift towards information society practices, and to 'high tech industries' will

not necessarily provide an employment market which enables all young people to enter 'high-tech occupations' (Selwyn 2000; Apple 1997). Our contention, however, would be first, that social software is pervading all areas of everyday life and its use is not restricted solely to the workplace; second, that the practices of collaboration, creativity and reflection are not restricted in their benefits solely to certain occupations.

There are therefore two important caveats we would wish to add to the arguments we are making about the need to change approaches to education in the context of information society debates. The first of these relates to the ongoing question of the digital divide, and the extent to which experience of these new approaches to learning and interaction are universal. The second of these relates more substantially to the discourses of the 'knowledge economy', and the question of whether the demand for knowledge workers is likely, similarly, to be universal or restricted to a selective few. Neither of these caveats fundamentally changes our observations on the ways in which new approaches to learning and identity may be enabled at the present time, but they do require a more sensitive approach to thinking about the implications of educational change and the ways in which different social groups may be more or less affected by these seeming revolutions.

There is a third caveat which is epistemological rather than one based on digital divides. It is based on arguments advanced by Weinberger on the new shape of knowledge. Weinberger questions whether our knowledge structure has been determined by the economies of organising things on paper and whether new technologies allow different approaches. He proposes that the organisation of knowledge in a digital form allows for knowledge to have many potential structures which are digitally constructed by many different communities. This contrasts with a view that providing expert generated ontologies and taxonomies for newcomers to a knowledge domain is actually very helpful. There is clearly a role for multiple representations arising from social shaping and use, but equally there are times that it is useful for knowledge to be organised for the learner by others with acknowledged expertise.

3.9 Summary
From Seely Brown, Weinberger and a re-interpretation of Bernstein's work in the light of digital connectivity we get a picture that the way knowledge is organised and made available is being radically altered. This opens up many questions about traditional forms of transmission and the organisation of the transmission of knowledge. For example what is taught and learnt, when and how; who is learning and who is teaching and which knowledge is important. Nonaka and Takeuchi suggest that knowledge is created through open and constructive interaction between groups with free-flowing communication and sharing of knowledge. In Nonaka's writings he uses the Japanese word "ba" - which means a place where meaning is made. Nonaka specifically refers to cyber-ba to describe the digital collaboration supported by social software.

In Western terms, knowledge creating and sharing communities are known as 'communities of practice'. A potential important factor in the use of social software for online communities of practice is the ability to cross boundaries. Learners might be able to join groups in which age, pre-existing knowledge, gender or location are no longer an apparent barrier. There is also no barrier to young learners establishing their own communities and networks. Scardemalia and Berieter's Knowledge Forums are explicit attempts to create educational software support for knowledge-creating communities, and their research demonstrates quantitative success.

Other researchers demonstrate how participation in digital communities produces new habits and behaviour. Ito identifies changes in the way that young people relate to each other and to cultural media – rip-mix-burn creativity. Stone notes how young people often engage in multiple information streams simultaneously and divide their attention between physical and digital presence. Sheehy and Leander point to changing ideas of space and the notion of being in a shared digital location providing another dimension to young learners' thinking. All of the above point to ways in which digital technology is bound up in young people's identities. Turkle suggests that differing digital social activities allow people to try out different psyches. However, Tobin, and Valentine and Holloway would suggest that it is a mistake to characterise the online and offline as separate and mutually exclusive worlds. They would suggest that the new worlds offer new opportunities for the emergence of identity.

4 How do we move towards 'c-learning'?

If we accept that social software has a role to play in education then there are practical steps that we can take to encourage and support its use.

4.1 How does social software support personalisation?

Social software allows us to approach learning in new and collaborative ways, and simultaneously to have greater access to more information- and knowledge-creation processes and more choice. The issue of choice and education is a significant aspect of current educational debate. It is historically significant that the notion of personalisation has arisen at this time. Personalisation is only significant if we have choices, and it is arguable that we are in a time when we can offer better choices because we apply ICT towards that end. One view is that we have enabled "mass customisation" (Anderson 1997).

Futurelab has a publication on personalisation from a learner's point of view, which incorporates a Learner's Charter. It addresses the achievement of personal goals and satisfaction through the education system. In the table below we attempt to map how some of the points in the charter map onto some of the claims that are made for social software.

The charter is accompanied by a Futurelab publication 'Personalisation and Digital Technologies' available on the Futurelab website.

Learner's Charter	Social software
Choices	
• To be considered as an individual with wide reaching potential irrespective of age, gender, disability, ethnicity or socio-economic status.	• Social software starts with an individual and personal set of tools and content which is visible to others.
• To take joint responsibility for and be seen as an active agent in determining my own learning priorities.	

Learner's Charter	Social software
• To develop the personal and social skills and attributes necessary to make these choices and to engage with the people and resources of the education process.	
Skills and knowledge	
• To be supported to co-design my own curriculum and learning goals.	• Social software is specifically designed for people who want to be able to work on their own goals and interests – with their own ontologies and communities of practice.
• To draw upon and make connections between the expertise and competencies I develop across all areas of my life.	• It is about engaging with wider communities and access to and sharing expertise in those communities.
• To develop my expertise and understanding in knowledge domains that are of personal significance to me.	• There are opportunities to develop new knowledge within learning communities – it is accepted that people can be tentative, be experimental and fly kites.
• To be supported to take risks and develop understanding in unfamiliar knowledge domains.	
• To have access to learning which will prepare me well as a member of the adult population.	• Social software use can be blind to age, ethnicity or whatever other status one may have.
Appropriate learning environments	
• To have access to different teaching learning approaches and resources that meet my needs.	• Most of these issues concerning appropriate learning environments are explicitly addressed by social software – choice, access, reuse and authenticity etc.

Learner's Charter	Social software
Appropriate learning environments	
• To have access to people who are able to extend and develop my understanding in my chosen areas. • To have access to learning environments and resources that enable me to develop understanding and experience in authentic and appropriate contexts.	• There may be elements of the toolsets that are missing – however, the model of provision does not inhibit development in those areas.
Feedback	
• To achieve recognition for learning irrespective of the context of my learning (in home, in school, in workplace, in community). • To participate in assessment activities that provide feedback to the education system and are used to improve the learning environments in which I learn.	• Social software thrives on peer evaluation and the evaluation of a real audience. There are explicit feedback mechanisms in social software – the significant difference between a blog and a 1990s homepage is that blog environments support and invite feedback from others.

Extracts from Futurelab's Learner's Charter (2005) (www.futurelab.org.uk)

4.2 Can we design policy and practice for emergent technologies?

One of the headlines in the development of social software and Web 2.0 is that both its development and its use are examples of a collection of small acts achieving great things. Those small things need to be done in great ways – in a way that going the extra centimetre makes small actions benefit everybody. There is no master plan for the ultimate educational software or ultimate school curriculum or ultimate education system. It is an emergent pattern. Social software, and social software use, rather than following an overall blueprint emerges out of use and many smaller developments.

This may sound chaotic. However it is a realistic vision of what is really happens in the world. Nobody could have planned for the expansion of the worldwide web, however it has happened and continues to develop.

One result of this emergent behaviour is that we need to open up education to allow emergent, bottom-up changes because a centralised policy approach cannot react flexibly enough. At present too many managed networks restrict access to many of the functions we describe, and some technologies – like hand-held devices and mobile phones - are banned. We need to de-stigmatise collaboration – it is no longer cheating to find out from or gain the advice of other people or to use information sources not already in your head. There is a need to open up what is legitimate to know and need to know – but without impoverishing the curriculum to self-imposed limited horizons. There is a need to validate and legitimate these new processes of learning by changing what we assess and value.

Cohen and Hill (2002) describe three policy levers: assessment, curriculum and teacher learning, that must be pulled together if change in schools is to be effective. It is optimistic to imagine that social software alone will deliver personalisation of learning by moving these levers. However, there are benefits that can be gained from using social software. It provides ways of doing what we have always done but does add two distinctive advantages: collaboration and access to much more knowledge. Students who pool their research (in a bookmark tool or in a wiki) can clearly help each other do better. Students who peer assess their work can clearly help each other. Students who can work in different media extend the range of their thinking. Students in contact with people outside the school can learn more. Students who have a sense that their work is for a wider audience may be better motivated. This list is not exhaustive nor is it based on empirical research.

The activities in themselves do not need an inordinate amount of professional development for the teachers leading them. They are activities ordinary people who have some knowledge of using computers or mobile phones take up on a regular basis. However it does require access to the resources, the confidence to do it, the support from school leaders to take risks and the development of dialogue between teachers, children, parents about new approaches to learning.

4.3 How do we support the appropriate technology?

There are several ways we can technologically facilitate social software activity in schools and education in general, and we discuss three.

Firstly there is the notion of a portal, built by technically competent people. It would bring together key links to both functions and data sources for a given community. The problem with this approach is that it is produced as a centralised resource, which is in many ways antithetic to the notion of social software. Criticisms of centrally structured publishing is that it is a gate-kept structure, where content is determined by the organisation rather than the user. What goes into an official portal only reflects a tiny proportion of the interesting content generated (only the official edited content is available). Further, maintaining portals has a fairly high cost and is usually based on centralised support.

Futurelab, working with Dudley LEA, has taken this option in a specific project for Key Stage 2, The Learning Journey. The project sets pupils very challenging tasks which require collaboration and communication both between learners and other people who might help or have answers to questions. The portal approach was chosen because it provided pupils on the learning journey the tools they would need alongside the challenges. We anticipated this would be easier for schools to implement. Another Futurelab project, Racing Academy, based on a computer game driven by a sophisticated simulation, was conceived to live within a player collaborative environment. The early prototype included an inter-team communication facility. Future development of this – and other educational activities based on problem solving - would benefit from application program interfaces (API) that link into already used social software.

The second proposition is to use existing and emergent lightweight services that support blogging, RSS and social bookmarking, a solution most present users adopt. However, it does not necessarily allow novices to participate; these services are used by the already digitally literate. The ideal solution is to have sufficient support and integration to make some sense of these services. One project to attempt to achieve this is the Elgg project[4] which attempts to provide a personal learning landscape that brings together key

elements to a portal like a blog and instant messaging, RSS aggregator and member profile. Similarly Knotes from theKnownet aims to offer an integration of content/links management, communication, blogging and community discussion based on open source software Plone.

The third proposition is that these services are integral to the desktop as small functional tools permanently available in all of your day to day electronic activity. This is a long-sought-after vision of computing that originated with the first window-based computer environments (Kay 1993). The vision was one of systems that let you do what you want to do when you want to do it, rather than having to move from one specific application software to another to do different tasks. The challenge is to build an open computer architecture that can support the building of lots of gadgets (ie small ingenious devices) that can work together.

In addition there are some other pointers to the development community. The successful business models in Web 2.0 favour owners or publishers of data. Having appropriate outlets for your data is, therefore, important (eg disaggregated content).

- Successful business will build on the ability of the user or third parties to add value to your products or data (eg learners discovering new uses for what you have).

- It will be beneficial to leverage the power of social software into your software. Develop with open standard APIs so that your application can plug into existing social software – thus your application may become part of a social environment using the existing social software the learner is using.

- To connect into everything else is important (interoperability).

- Where standards are open and enabling they should be followed. Be wary about closed and restricting standards.

- Noble and good members of the IT community would want to contribute to open standards. Being a good guy builds a loyal customer base who will market your brand.

[4] elgg.net

- There are people who will need help in structuring their social environment – configuring systems for appropriate purposes is a business – however the end result should be open for still further development.

- Applications that support the portability of knowledge (from desktop to phone/PDA/iPod etc) will have major added value.

- It should be accepted that users will, as they always have, adapt content for their own purposes. Digital technology has increased the ability of users to make more and more radical adaptations. This needs to be acknowledged in intellectual property legislation and licensing. Creative Commons or similar approaches should be adopted.

4.4 What can educators do?

Educators interested in supporting the use of social software can start simply. If you teach in a room with access to computers, students can pool knowledge in a wiki so they have the value of everyone's ideas. Alternatively, you can use a forum or chat room to record a discussion or students can make a podcast instead of writing an essay.

You can plan your curriculum as though education does not stop at the classroom walls.

- Make provision for learning from outside the control of the institution in planning learning experiences. Consider things beyond a single school institution to include school clusters and other learning environments such as museums and libraries for collaborative projects.

- Collaborate with people who have real knowledge problems in the domain of study – so that students can contribute to the solution and become knowledge creators.

- Develop patterns of learning that at least allow and preferably encourage collaboration. Remember there is more to collaboration than discussion (eg planning, evaluation, dividing jobs).

- Set harder challenges for students. Do not atomise learning to small chunks which lack context.

- Allow learners to develop personalisation for themselves, but do it in a framework which monitors their progress.

- Consider ways in which school can enhance learning outside school. Do not assume that all work done at home is homework, ie school-directed and a simple extension to a lesson. Give support and licence for different activities outside the school environment.

There are investment choices. You can buy and adopt big systems like complete virtual or managed learning environments, sometimes called learning platforms, or you can go for an alternative more in line with Web 2.0. You can acquire some small tools that work together to provide equal or better or more flexible functionality and see which ones suit you. Proprietary solutions may offer interoperability in content, however they may not offer interoperability with innovative or emerging tools.

Technology should allow children to interact socially with others, consume and produce information and media that is relevant to their construction of identity in a way that does not threaten their privacy or safety.

In particular, schools should not expect students to leave the 21st century in the cloakroom, for example, many schools do not allow e-mail, instant messaging, mobile phones or blogging. As a corollary there is an imperative to teach appropriate use and appropriate behaviour for ICT. This should include protection of students' own identity.

4.5 What should policy makers note?

A rigid curriculum inhibits the development of the knowledge and skills that may be useful in the 21st century. If we are to promote the benefits of problem solving and collaboration then they need to be validated and legitimated by the assessment system. This is the greatest challenge for education policy.

Further, if we want learners to get the benefits from using social software, the policy makers should also note some other policy issues related to ICT and education that could run counter to using social software – the issues of e-learning standards.

The goal in developing educational software should be appropriateness, interoperability and flexibility rather than compliance to a standard. It is relatively easy to make a policy to set a standard, however interoperability and standardisation are not necessarily the same. Therefore, policy should support standards that are open and enabling. Sometimes restrictive standards are necessary, but usually only if health or safety issues are involved. It is good that we drive on the same side of the road, however choosing some software that does not comply with SCORM formats to do a useful job does not really hurt anyone.

There should be support for open standards for online identity and the individual's right to protect that identity – including school children.

There are times that policy makers need to 'let go'. Social software thrives on the bottom-up approach and software Darwinism. If policy makers wish to encourage innovation, then fewer restrictions will yield better results.

Procurement should not favour particular styles of application or packaging. It is understandable that commissioners would want to specify a finished integral product – however monolithic applications can result in complex solutions and are prone to non-delivery, late delivery and not fulfilling emergent and changing needs. Acquiring systems that are modular, that build on existing tools, or subscribing to services from multiple sources may need more administration, but may give better results. Flexible models of procurement need to be devised.

There is a need to review both the findings and the implications of the Stewart Report (2000) on the radiological hazards of young people using mobile phones. Currently the precautionary measures in place inhibit the telecommunications industry exploring the educational benefits of the mobile phone and mobile social software.

4.6 What should we look forward to?
There are many issues that need to be addressed by policy makers, the developers of learning resources and individual schools, teachers and learners before the potential of these innovations can be developed.

This section will reprise the nature of the innovations and consider some implications of and responses to the innovations by policy makers, resource developers and schools. It will end with some key questions for debate.

IBM presented a three-phase model of the development of ICT within an enterprise (see Swanson 1994). In the first phase ICT is introduced as a tool that automates a few of the work processes (eg word processing replaces typing pools). In the second phase the enterprise addresses its core processes to see how ICT can improve on those processes. The fundamental nature of the enterprise, its products, its market sector and its business goals do not change, it just gets smarter at doing them because they use ICT technology. In the third stage an enterprise realises it is operating in a world that has changed because of the existence of ICT. The products and services people consume and the ways they acquire them are radically different. The modus vivendi of people has changed and the nature of the enterprise changes to exist in this new environment. By example, an enterprise that once lived by mail order finds that the information they hold on consumers is a more valuable business resource than the material transactions they have with those customers.

Education in the UK currently seems to be in phase two, although one can recognise specific examples that are still in phase one and others inching towards phase three. We are in the process of automating that which we have done for the past century. We are improving the delivery of 20th century curriculum and methods with learning platforms, improved information about institutions and students.

Students use a variety of software and internet searches to answer the questions that would be familiar to a student in the 1960s. However, the world is changing and an important question is: how is the enterprise of education going to respond to the change? It is clearly in this context that there is a demand for the concept of personalisation – a model of education for a changed world.

The socio-commercial environment in which Web 2.0 innovations are taking place is itself squarely in IBM's third phase. One significant phenomenon has been termed the "long tail" (originally coined by Chris Anderson in Wired Magazine in 2004). The long tail refers to the hundreds of thousands of products that are not number one bestsellers, ie all those products that form a line that tails off down any company's sales graph. But in the digital and online world, these products are booming precisely because they are not constrained by the demands of a physical retail space. In the case of music in an age of Amazon and iTunes, a lot of music buyers want the popular new releases, however just as many buy music by lesser-known artists or older music. All that small-market, niche music makes up the long tail. In this new digital era, the long tail becomes not only a viable space for production and dissemination, it is a space which makes innovation possible.

What is true for the music and book industry is also true for all other human activity. In the publication of educational software the bulk of the activity will be with a few core products, however programs and content for small corners of curricula are still needed - these would be in a long tail. Social software itself starts in this long tail, however it is also in the open accessible sociable networks that new needs are identified and ideas and digital artefacts are initially disseminated, tested and validated - often referred to as viral distribution.

Another important word in the educational software vocabulary is interoperability. This refers to the ability for software to operate together with other software. Social software is often explicitly interoperable. We expect blog software to work with syndication software, we look for ways of linking our discussion of other digital artefacts (eg a conversation about a conversation about a podcast) to the artefact itself and so on. There is an implication that other software - including commercial software - could be interoperable with social software. If one was designing peer-to-peer tools - for instance for collaborative design, or a collaborative game - it seems logical to use the existing channels for collaboration provided by social software rather than designing a proprietary, closed application specific subsystem. Adopting this approach would reduce development costs and make it easier to integrate.

This is fundamentally an argument for open software architectures and application interfaces that allow new products to build upon the efforts of others. This is one of the ways in which the long tail can operate to everyone's benefit. Undoubtedly the major software suppliers will have the broad head of any supply curve, however if the system is significantly open others can produce material which interoperates with the major software items. This is desirable for the producers of the major items because it means that the systems they produce would be given wider coverage without having to make the financial and other resource investment needed to have complete coverage. It also allows smaller producers to enter into the market of the major producers. The consumer wins because minority interests are supplied.

4.7 Conclusion: e-Learning 2.0?

Our discovery of new ways to transform our lives using digital technologies is not slowing down. In recent years we have witnessed the emergence of new tools and services. Some of these have been characterised as Web 2.0, some of them have been characterised as social software. The significant attributes that these new tools and services display are that they are about knowledge creation, knowledge management, knowledge sharing and knowledge dissemination. Keywords have been creation, collaboration and communication. These technologies are changing the way we are able to deal with knowledge. This raises two issues for those engaged in education. Firstly they supply the enterprise of learning with new tools and new and useful ways to go about learning. The second suggests that because of the changing nature of human knowledge management we need to change priorities in what we need to learn.

The individual learner has many choices available for their personal learning. The list of social software activity is long and is growing. However, there is also a need for a response in formal education. These technologies do provide a mechanism for transformation in education that appropriates these technologies for educational advantage. This includes a change in our vision of e-learning to a more open approach to the acquisition, organisation, creation and assessment of knowledge: e-Learning 2.0.

4.8 Some questions for debate

How do we respond to the needs of an information society (new life choices and new employment patterns)? How is the enterprise of education going to respond to the change and has social software a place in a new scenario?

How do we enable teachers and support curriculum renewal to adopt the practices of learning and living that are emerging in the information age? How do we marry the opportunities of c-learning with informed professionalism?

How can we recognise and validate the learning that some young people already achieve through using social software?

What actions have to be taken to enable learner choice and voice that makes the use of social software in the education system an available option? What barriers have to be removed?

What changes in procurement and purchasing policy need to be made to provide social software with an equal opportunity with other ICT systems?

How do we encourage interoperability? What steps need to be taken to ensure open and non-restrictive standards are adopted when appropriate by educational suppliers?

What can be done to stimulate new innovative social software specifically designed to support educational activity?

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Appendix 1: Some annotated links

This covers some links to software and systems and websites that are mentioned in the text. To find out more about any of the ideas expressed in the paper we suggest you look for the topic on Wikipedia (www.wikipedia.org).

There has been no attempt to make this a definitive list.The field moves and changes quite quickly. You may branch from any of the weblogs associated with the some of the links. A good use of Google or blogsearch.google.com will lead you into interesting and informed spaces.

What is important is that the interested reader should start to plug themselves in and see what the current developments are – start by looking at a few key blogs on subjects you find using blogsearch.google.com, also get yourself a RSS aggregator and subscribe to some syndicated services.

Articles on Web 2.0
Tim O'Reilly's article 'What is Web 2.0':
www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html
The 2005 conference report:
www.publish.com/article2/0,1895,1868672,00.asp

Some tools to support weblogs/blogging
www.myspace.com
www.livejournal.com
www.typepad.com

Some tools for clipping the web, and social bookmarking
del.icio.us
www.connotea.org (more academic)
www.citeulike.org
www.blinklist.com (comes with an easy to use clipping tool)

Tools to help you create blogs
BlogThis (help.blogger.com/bin/answer.py?answer=152&topic=17) works with Blogger, a Blog writing tool that allows clipping pieces of webpage, annotating them and then posting them to your blog

Syndication (RSS) systems
A list of available RSS readers is at blogspace.com/rss/readers

Other media
Podcasting and the use of the iPod: www.ipodder.org

Flickr photographs: www.flickr.com and in this Yahoo Directory there are many more: dir.yahoo.com/Business_and_Economy/Shopping_and_Services/Communication_and_Information_Management/Internet_and_World_Wide_Web/Personal_Information_Management/Photo_Albums/

Machinima: making movies from screen-saved files: www.machinima.org and www.machinima.com

Collaborative writing: the Writely collaborative word processor allows just word processing and publishing to a blog: www.writely.com

Broadcast Machine: participatoryculture.org/broadcast posts videos to blogs and allows you to make internet TV channels

DTV: Internet TV: participatoryculture.org. DTV is a new, free and open source platform for internet television and video and lets users subscribe to channels, watch video, and build a video library

VideoEgg: also allows posting video to blogs and websites and assists in taking some of the technical decisions: www.videoegg.com

Online radio: Synergy TV's Radiowaves for schools www.radiowaves.co.uk and music www.dbass.co.uk

Mobile phone technology
Crowd surfer: smallplanet.net
Software which uses the Bluetooth connection on your mobile to locate friends within 80 feet of your location, and then exchange photos and information.

Mobiluck: www.mobiluck.co.uk
The software can display all Bluetooth devices within 25 metres. It also shows the signal strength of each device so you know their relative distance from you. The phone then matches the profile you create on your device with that of other phones around you, comparing your interests or requirements. It can then sound an alarm when you have a match.

Active Match: www.simeda.com/products.html
Taking these ideas one stage further allows you to set up networks dependent on your location and your preset preferences. Active Match is the

first application of its kind to combine location information with a matchmaking database. When a match is found, the phone beeps and displays the match (with the description and the thumbnail picture of the other person). The two matched users can now get in touch by phone or SMS.

'Push to Talk': www.nokia.com/nokia/0,8764,46740,00.html
Press one button on the side of your phone and send an instant voice message to someone in your contacts list, or send this message to many people at once. It works like a 'walkie-talkie' but with no limit on distance. You can talk instantly with people anywhere in the world with mobile coverage. This technology is already widely used in the USA instead of text messages. This application is at its most powerful when combined with presence technology. Similarly instant text messaging is now available on phones and it is only a matter of time before instant video messaging will also be a feature.

Crunkie: www.crunkie.com
The software combines social networking, mobile blogging, and geographic location. You set your location on a map, displayed on your phone, and then see the location of your friends. You can create and swap location-tagged photos and messages. This is currently experimental software and only available in the USA.

Tiny GPS: www.psiloc.com/index.html?id=169
Actually, not GPS at all, but software which uses cell location to trigger events on your mobile. These could include playing a sound file when you enter an area of town, automatically sending an SMS, turning the Bluetooth on or changing the image on the phone. In cities it can be accurate to 20 metres, in the country this can fall to 1 kilometre.

Mobile Commerce: 217.37.20.28/corporate
Mobile Commerce is the UK leader in providing location-based information services that are network- and device-independent and can be accessed over multiple platforms. Services can be ordered by the proximity to the location of a mobile handset with content tailored for this location. For example texting the word "cinema" to a short code would return your nearest cinema with a

link to film times.Accessing these could allow you to read a film review or see a video trailer of the movie. Although this is a commercial service, quite soon it will be possible for affinity groups to populate their own location databases for people to share knowledge. The Wren family will be able to text "birdwatching" and local birdwatchers will have supplied information about avian study in the neighbourhood.

Active Codes, eg Hewlett-Packard 'Active Posters' or Neven Vision (www.nevenvision.com/products/oR-ASP.html), or Siemens Siecodes or Fujitsu steganograph. These are all marks on real objects in the environment (like barcodes) which can be decoded through the mobile phone camera. The code can then carry information like a website URL, a phone number or just some text that can trigger the phone into action. They have been used in treasure hunt games in Canada and in an architecture event in Amsterdam they have been used to barcode children's clothing in a day-care experiment.

Visual emotional responses:
www.nevenvision.com/products/app-interact.html
The system can track the player's gaze and expressions to determine emotions or reactions. If the user has a bored or tired expression in a computer game, the game can provide more challenging activity; if the user is not watching the screen, the game can take action to retain his/her attention or ask if they would like to continue the game later. This is not yet social software, however as the phone becomes more sensitive to the affective state of the user then there may well be social applications.

Interactive streaming video – MxTeleco:
www.mxtelecom.com/uk/index.jsp?m=video#ivr
By dialling a short code on a 3G handset, you will be connected to a 'playout' server showing video content. You can then use your phone keypad to select different video streams or to split/change the incoming audio associated with the video. Each mobile phone connected to the service can have its own flash-based graphics overlay. Currently gambling activities are envisaged - an example is a live game of cards where you see your set of cards on the mobile phone together with video of the game. However it will be possible to develop collaborative educational activities using the same technology.

Location and geography

Mobile Bristol has a toolkit for creating location-based experiences, and its website describes some activities: www.mobilebristol.org

Google Earth: earth.google.com. Google Earth links all kinds of data to maps – which create located social software

MSN Virtual Earth: virtualearth.msn.com offers an alternative service to Google Earth but at present is not as well developed as a community resource and does not really have much data outside the USA

Finding other blogs or other people

There is a review of blog search systems on the web on Poynter Online: www.poynter.org/column.asp?id=32&aid=91001
Inevitably, Google blog search is blisteringly quick blogsearch.google.com. Google also allow you to syndicate your search with RSS, so you can keep watch on your chosen subjects technorati.com allows you to search 21.6 million blogs. This page in the social software blog lists 380 sources of finding other people: socialsoftware.weblogsinc.com/entry/9817137581524458

Bringing it all together

Elgg lets you set up a personal presence online and then use it to interact with others. You can create your own weblog, journal, store of files like photos and Word documents, create communities, establish social networks, and manage your online content. elgg.net

Knotes from theKnownet adds the functionality of group discussion, blogging, trackback and syndication to another free product – a content management system - Plone. Plone can be used as an intranet or extranet server, a document publishing system, and a groupware tool for collaboration between separately located entities. Together it allows a mixture of blogging together with discussion forums, adding annotations to other peoples work and resource management.
www.theknownet.com
www.plone.com

About Futurelab

Futurelab is passionate about transforming the way people learn. Tapping into the huge potential offered by digital and other technologies, we are developing innovative learning resources and practices that support new approaches to education for the 21st century.

Working in partnership with industry, policy and practice, Futurelab:

• incubates new ideas, taking them from the lab to the classroom

• offers hard evidence and practical advice to support the design and use of innovative learning tools

• communicates the latest thinking and practice in educational ICT

• provides the space for experimentation and the exchange of ideas between the creative, technology and education sectors.

A not-for-profit organisation, Futurelab is committed to sharing the lessons learnt from our research and development in order to inform positive change to educational policy and practice.

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