



The digital landscape and new education providers

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Introduction

This report aims to consider the role that may be played in educational provision by organisations and sectors who, to date, have rarely been considered part of mainstream educational provision, or by completely new arrangements of educational provision. Part one takes a brief overview of current and emerging education providers that make interesting use of, or are enabled by, digital technologies and offer something new to education. In part two we consider elements of the debate around these new providers. Part three considers the possible future of education provision over the next two to three decades, while part four concludes with an articulation of the key themes to emerge from the paper.

Keywords: education, digital environment, media, home, school

Part 1: New and emerging education providers

We shall consider providers of educational media, teaching, courses, institutions, territories, assessment and accreditation.

Schools

The UK's three online schools opened in 2005 and collectively have approximately 200 full time students.¹ The schools group learners into classes of up to 15 and use visual presentation tools alongside 'Synchronous computer-mediated communication' (SCMC), that is, voice and text based communication that works at the group and 1:1 levels. All schools report a steady increase in demand. Online schools are now also seen in, for example, the US and Canada.²

¹ First College currently has 40 students, Interhigh has 125, and Briteschool has 30. Oxford Home Schooling and ICS provide online support for home learners but do not use a class form and as such are better defined as tutorial services than as schools.

² See, for example, CompuHigh and Virtual High School.

Home schooling is increasing in the UK and the US. In the UK, an estimated 16,000 children are now educated at home, a three-fold increase since 1999;³ various studies suggest that home schooling is growing at 10-18% per year.⁴ In the US, growth is estimated to be 400% in ten years.⁵ Increased availability of digital learning resources and dissatisfaction with mainstream education provision are plausible drivers of this growth.

A further relevant trend is the rise of schools governed totally or partially by non Local Authority actors including parent groups, companies, Universities, and third sector organisations such as the RSA.

Universities

'Corporate Universities' are a growing phenomenon in the US. In practice they range from training departments to degree-granting branches of major companies, and in 2001 they were estimated to number 2000 in the US, up from 400 in 2003.⁶ Among the most famous are those of Boeing, Motorola and Walt Disney; Apple University is due to launch in California in 2009.⁷ Corporate Universities tend to be well-resourced, media-rich environments and as such could be potentially interesting sites of emerging next practice.

Corporate accreditation has arrived in the UK, with McDonalds, Network Rail and Flybe being the first companies to be given accreditation powers by the QCA.⁸ This could be said to reflect a growing disconnect between what is learnt in formal education and the skills required by major companies.

While Universities and Higher Education institutions have long been making use of ICT to offer distance learning opportunities, entirely virtual Universities are a new phenomenon. Among them are the US Army's Virtual University (eARMYU), Duke Fuqua School of Business, Canadian Virtual University, Virtual University of Pakistan, Jones International University, the Open University of Catalonia, and the Virtual University of Applied Sciences in Germany.⁹

Some campus-based universities are now offering 'traditional' courses alongside 'reduced seat-time' courses and fully online courses, reducing institutions' bricks and mortar needs per student and thereby potentially expanding capacity (Bonk, 2005).

Professional training organisations are also employing a greater blend of face-to-face and distance learning. For example, "military training for captains in the National Guard now employ blended learning with combinations of asynchronous exercises for perhaps a year, synchronous tactical manoeuvre training for another 4-6 months, and face-to-face training at Fort Knox for a couple of intensive weeks."¹⁰

Open learning content

Web 2.0 enables platforms that broaden opportunities to participate actively in content creation and editing. Some consumers have become producers whose work can in turn

³ Press Association, 2007

⁴ Hopewood et al, 2007

⁵ Waks, 2004

⁶ Hearn, 2001

⁷ Kane, 2008

⁸ Elliot and Woolcock, 2008

⁹ *Digital Academe: The new media and institutions of higher education and learning*, edited by William H. Dutton and Brian D. Loader. London, Routledge, 2002

¹⁰ Bonk, 2005, p3645 (Bonk et al, 2002)

be accessed by far larger audiences than was previously possible. Some examples of resulting forms of education provision are as follows.

The Connexions Project from Rice University enables volunteers to contribute courseware for the formal learning of any subject at any level. Users can reproduce and modify the content, or contact the creator with editorial suggestions. Creators can make ongoing amendments directly and instantly. Both administrators and users can assemble personalised compilations of Connexions material into bound collections printed on demand. The project is funded by Hewlett Packard and the Hewlett Foundation, and claims to have nearly one million unique visitors a month.¹¹

Curriki is a US website to which any US teacher can submit content for the K-12 Curriculum. Successful contributors are paid \$500 - \$1500 and their content is put online for free use by other teachers. Curriki is run by the GELC, a non-profit company founded by Sun Microsystems and funded by Nortel, a major infrastructure company, and has 46,000 registered users.¹²

Wikipedia is an open-source encyclopaedia that "anyone can edit."¹³ It has a number of relevant elements which can all be contributed to and edited by users, including: Wikibooks (a free library of educational textbooks), Wikiversity (educational and research materials and activities), Wikispecies (a directory of species data on known life forms) and Wikimedia Commons (a repository of images, sounds, videos and general media, containing over three million files). English-language Wikipedia is consistently ranked among the top ten most visited websites in the world.¹⁴ It is owned by the charity Wikipedia Foundation and grant-funded. The German-language Wikipedia has state funding. Other wiki encyclopaedia projects have recently launched, including Citizendium and Knols.

Finally, MIT Open Courseware provides free learning resources for all MIT courses online. Unlike the other examples, only MIT staff can contribute content, and users cannot amend the content. The project costs MIT US\$4million a year to run, but attracts 25 million visitors annually whose feedback confirms to MIT the value of its ongoing investment.¹⁵

Open learning content providers such as these support new types of relationships between the consumers and producers of educational media. Social software supports new types of communication and exchange between learners, teachers and peers.

Social software

"Each day, consumers upload 100,000 videos, watch more than 200m video clips and view more than 1.3bn web pages at social networking sites."¹⁶

Web 2.0 collaboration and many-to-many communication tools are used for learning in a variety of ways. Voice Over Internet Protocol (VoIP) services such as Skype offer synchronous voice, text and video communication between individuals and groups, mostly free of charge. VoIP is used for language learning, media sharing, and communication among students, teachers and their contacts. Skype uses excessive bandwidth and for this reason at least one University has attempted to ban it, but

¹¹ See Cohen, 2008 and http://www.ted.com/index.php/talks/richard_baraniuk_on_open_source_learning.html

¹² www.curriki.org

¹³ This phrase is controversial, as discussed in part 2.

¹⁴ <http://searchengineland.com/wikipedia-enters-top-ten-most-visited-sites-10536.php>

¹⁵ Email correspondence with the MIT OCW External Relations Director, October, 2008

¹⁶ User Generated Nation, 2007

relented following protests from students and faculty. However, tensions between institution and technology, and the debate around Skype, persist on many campuses.¹⁷

Blogs are widely used for peer learning on informal and informal subjects. Some interesting examples are stackoverflow.com, a highly active Q&A site for the web developer community. People who are stuck post their questions to the 'crowd' – and helpful answers usually return. As all members of the crowd get stuck at some point and can only be helped by other crowd members, mutual need and reciprocity sustain active engagement. [Ask.metafilter.com](http://ask.metafilter.com) is a popular Q&A site of unbounded subject matter; the knowledge exchanged ranges in topic from pure mathematics to parenting, spirituality and car ice scrapers.

Alongside these demand-led peer learning sites where activity starts with a question are supply-led peer learning sites where activity starts with an answer, often offered in video form. Sites with a specific learning angle include 5min.com and videojug.com, which offer short, free 'how to' videos on a range of subjects. Youtube has very broad user-generated video content that contains some items with learning value, such as a rap about physics that has been viewed 3.7 million times and lessons in playing the Mbira thumb piano.¹⁸

While the broad trend is for content to be free, some pay-per-download sites thrive. Peepcode.com is a video tutorial site that is highly valued by developers working with the programming language Ruby on Rails. Tutorials made by a closed group of experts are downloaded for \$9 each. These packets of knowledge - produced swiftly in response to a rapidly developing subject such as a new programming language, and accessed by the learner in response to a real-time learning need - present interesting examples of new digital provision of professional learning support which will be further explored in part two.

Two new sites connecting people who wish to learn with people who wish to teach have launched this year. The School of Life enables informal adult learners to contact experts on the database to arrange "an hour of chat in exchange for a fee."¹⁹ The School of Everything is a matchmaking site for self-defined learners and teachers of unbounded subject matter, who arrange face-to-face meetings. The site is used to support life-long learning, informal learning, private tuition, and home schooling. Some learners use the site to self-organise into classes and share a teacher, and school teachers in other countries have used the site to find experts to invite into school. Membership is growing at 50% a month.²⁰

Other social software tools worth attention include collaborative design tools where users post ideas for the crowd to develop – for example, crowdspring.com. Google's collaboration tools include shared documents, calendars and blogs. These make it easier for communities of learners, be they formal or informal, local or distributed, to work together. Some institutions - for example the six Bloomsbury Institutions within the University of London – are developing their use of Google's free collaboration tools for teaching, learning, administration and research.²¹

Finally, in the space between social software and institutional software is the rise in the provision of open source and free learning platforms. At the forefront is Moodle, recently identified as the most popular VLE in UK secondary schools.²² While Moodle is free,

¹⁷ Woo, 2006

¹⁸ See, for example, the Large Hadron Rap - <http://www.youtube.com/watch?v=j50ZssEojtM> and Mbira Lesson One: KarigaMombe on Gwara Nyamaropa <http://www.youtube.com/watch?v=upRR9UgXjS8>

¹⁹ www.theschooloflife.com/

²⁰ According to the co-founder and CEO, Paul Miller, during an interview

²¹ <http://sites.google.com/a/jiscapt.net/project-plan/Home>

²² Besa, 2007

adaptable and developed by its users, other learning platform providers have gone further in enabling users to put together their own learning platforms.²³ Unsurprisingly, there is "a fierce debate between proprietary suppliers and open-source supporters."²⁴

ebooks

There is current trend towards personalised, 'cut and paste' arrangements of knowledge in discreet units, regularly updated and printed on demand. Some publishers are moving towards a new form of provision, away from printing 'books' and towards producing 'playlists' of short discrete topics. O'Reilly is one of the biggest publishers of computer books. It sells topic-specific PDF documents, usually of fewer than 100 pages, and custom books made by splicing in chapters and topics from the whole library. The modular format enables O'Reilly to publish new material before there is sufficient content for a book if demand is there.²⁵

CourseSmart is a year-old service owned by five publishers. It allows students to subscribe to a textbook and read it online, with the option of highlighting and printing out portions of it at a time. The Connexions Project's user-compiled print-on-demand collections have already been mentioned. Content formed in this way challenges traditional publishing in both agility and price. *Introduction to Economic Analysis* is on reading lists at Harvard University and has a market value of around \$200. Its author put it online for free download in word or PDF, and two print-on-demand companies sell bound copies for \$11 - \$60.²⁶

Devices

The range of devices through which people digitally access learning experiences continues to grow. Professional training organisations are providing multimedia learning content for iPods;²⁷ developers have created interactive physics simulation games that school children play on phones²⁸; in November 2007 Amazon launched its Kindle electronic ebook reader, and the Japanese market for mobile phone ebooks is now worth US\$83m.²⁹ Personal computers continue to get smaller, lighter and more powerful, while the trend towards single devices that perform a variety of functions remains strong.

Learning in virtual worlds

In 1992, science fiction writer Neal Stephenson coined the term 'metaverse' to describe an immersive 3D virtual environment "in which everything from business to entertainment could be engaged in by any user, anywhere in the world, with access to a terminal."³⁰

Sixteen years later a number of 3D 'metaverse' territories exist, and the most popular, Second Life, has 15 million registered members. Learning sites within Second Life now include:³¹

- The Virtual University of Edinburgh

²³ See, for example, Excel Soft, identified by Guardian Professional as the leaders in this area
<http://www.excelindia.com/index.html>

²⁴ Kenny, 2008

²⁵ <http://safari.oreilly.com/home>

²⁶ Cohen, 2008

²⁷ Business Wire, 2005

²⁸ http://sodaplay.com/creators/soda/items/newtoon_microgame

²⁹ The Economist, 2007

³⁰ Collins, 2008

³¹ See, for example, the Second Life Education Wiki.

http://simteach.com/wiki/index.php?title=Institutions_and_Organizations_in_SL#UNIVERSITIES.2C_COLLEGES.26_SCHOOLS

- 'Second Health,' Imperial College's Hospital Polyclinic
- A Sexual Health SIM in Second Life from the University of Plymouth
- Harvard Law School's Austin Hall
- Ohio University's Second Life Campus.³²

Universities are using virtual worlds to provide distance learning, and learning with simulation. Students at Harvard Law School practice in virtual courtrooms, a US graduate student researched and 'defended' his thesis in Second Life,³³ and some scientists are working within Second Life to create and observe 3D models and simulations.³⁴ 3D virtual environments are also being used by professional training providers, particularly for the military.³⁵

Teen Second Life (TSL), a separate site for 13-17 year olds with carefully policed access, hosts a growing number of youth education projects. *Global Kids*, a New York-based non-profit company, was the first mover at the invitation of Linden Lab (creators of Second Life). They provide summer camps on global issues in TSL, and director Joseph Barry describes learning in Second Life as "on the cutting edges of progressive pedagogy."³⁶

Like 'first life', Second Life plays host to a wide variety of education providers, from the anytime-access weather visualisation simulations from the US National Oceanic and Atmospheric Authority³⁷, to identikit representations of real world classrooms that have specific value when attended at specific times, to an island created by a psychiatrist to help people experience how it might feel to have schizophrenia³⁸. They may have Second Life in common but they represent a broad range of pedagogical approaches for formal, informal and social learning.

Assessment

Simulation assessment technologies are currently used in pilot and medical training. In diagnosis training and formative assessment, for example, computers describe symptoms and ask the learner to make a diagnosis. They track performance by recording how quickly an accurate diagnosis is made.³⁹

Computers are marking students' essays perhaps as competently as the average human. The US Graduate Records Examination essays are marked by a human and a computer using 'e-rater' software from non-profit e-assessment provider ETS. Dylan William, Deputy Director of the Institute of Education, reports that if the marks differ by more than a grade, a second human marks the paper and more often agrees with the computer's score than the first human's.⁴⁰ Pearson Digital has its own rival technology, and Angela McFarlane points to similar interesting innovations.⁴¹

It is noteworthy that Pearson, a leading publishing company, is diversifying into intelligent assessment technologies as one of many digital products and services

³² For readers unfamiliar with Second Life, Ohio University has a video demo on Youtube <http://www.youtube.com/watch?v=aFuNFRie8wA>. Institutions purchase land on Second Life (with real money) and then construct their presence there.

³³ PRLog, 2008. 'Defending' your thesis is like a viva.

³⁴ Shepherd, 2007

³⁵ <http://ict.usc.edu/about>

³⁶ Au, 2007

³⁷ <http://www.metaversedl.org/NOAA.htm>

³⁸ Elliot, Jane (2007). *What it's like to have schizophrenia*. London, BBC News, 19th March.

³⁹ See, for example, www.hmsgilbert.com and <http://harvardmedsim.org/cms/>

⁴⁰ <http://www.ets.org/portal/site/ets/menuitem.1488512ecfd5b8849a77b13bc3921509/?vgnnextoid=e1b42d3631df4010VgnVCM10000022f95190RCRD&vgnnextchannel=5416e3b5f64f4010VgnVCM10000022f95190RCRD>

⁴¹ McFarlane, 2008

provided by Pearson Digital. The fundamental challenge that new media presents to the publishing industry was clear from the 1990s: between 1990 and 1997, Encyclopedia Britannica experienced an 83% drop in sales as the internet began to provide people with free knowledge.⁴² Now that the internet and cheap, print-on-demand publishers are providing free and low cost learning materials of competitive quality, the giants of publishing must diversify and digitalise in order to survive.

Further new and potentially disruptive technologies are emerging on the horizon. ETS' 'c-rater' software analyses paraphrases and compares student phrases to 100 possible good answers to judge their quality.⁴³ Dylan Wiliam imagines that this may develop into what he terms 'third generation' digitally enhanced pedagogy, in which software analyses a group's work and assists teaching and learning by identifying key themes and common errors more quickly and accurately than an average unassisted teacher could do.

Cambridge University's Local Examination Syndicate (UCLES) has experimented with conducting physics 'O' level examinations online. They found a relatively poor correlation between paper based results and digital results, suggesting the need for further research and development if the use of digital technologies for formal examinations is to be developed.⁴⁴

Public services broadcasters

The new Channel Four Innovation for the Public (4ip) website summarises its position succinctly: "interactive media not tv"; "networks not broadcasters"; "a post-broadcast world".

Channel Four sees itself in "a critical process of evolution: from a publisher broadcaster into a multiplatform network, from a commissioner of TV programmes into an investor in original interactive media products & services."⁴⁵ It plans to develop a cross-platform approach to delivering educational and schools content and services, along with a new pilot fund for creative output aimed at older children. Over the next two years Channel 4 plans to invest £50 million in providing public service content through digital media with 4ip.

Like Channel 4, the BBC is constructing its strategic response to a changing climate for public service broadcasting, characterised by declining audience satisfaction and a gradual shift in usage hours from television to the internet. The BBC aims to share more of its content and expertise, while providing its core educational content across platforms. Foster and Terrington (2008) argue that the full potential of cross-platform, '360 degree' delivery won't be experienced until bandwidth is expanded significantly by fibre to the home.⁴⁶

While both the BBC and Channel 4 comfortably inhabit the intersection between formal and informal learning at all ages, the BBC has a more formal curriculum association while Channel 4 claims to occupy a more 'edgy' space. In the short term, Channel Four plans to move from targeting teachers to targeting students directly, partly because learners' access to multi-device web connectivity is better outside of school.

⁴² <http://www.businessweek.com/1997/42/b3549125.htm>

⁴³ Bolge and Sukkarieh, 2008

⁴⁴ Harding, 2002, and Harding and Roberts, 2002.

⁴⁵ Foster and Terrington, 2008.

⁴⁶ Enders Analysis estimate cost of deploying fibre to home of 90% of UK households would be approx 14bn Euros. 'Very high speed broadband: a case for intervention?' Enders Analysis, January 2007

Part 2: Discussion

The trend towards free, open and peer produced learning media

The trend towards “what may prove to be the most powerful industrial model of the 21st century: peer production”⁴⁷ is seen by some commentators to be part of a broader economic trend where “closed groups and companies give way to looser networks where small contributors have big roles and fluid cooperation replaces rigid planning.”⁴⁸ Technology has reduced the cost of enabling groups to communicate and co-ordinate, making it cheaper to facilitate voluntary or nominally remunerated contributions than to pay and manage professionals.

As participation opens up, power to influence the contributions reduces, and many commentators argue that this reduces reliability. Some argue that Wikipedia, for example, is vulnerable to abuse by those pursuing an agenda, and to error and bias.⁴⁹

Others argue that all knowledge production is open to some degree of bias and error, and emphasise the importance of critical thinking skills and source appraisal for all learners. Research published in Nature compared the accuracy of Wikipedia with Encyclopedia Britannica, and found an equal number of serious errors in each (four), and a slightly greater number of minor errors in Wikipedia (162, compared to 123 in Britannica).⁵⁰ Others see this as evidence that formal publishing is also vulnerable to error and that the ‘crowd’ is fairly good at correcting itself: “Wikipedia works in most cases because errors are often clear, and, where they are not, collective wisdom can usually remove inaccuracies over time.”⁵¹

Wikipedia and Connexions report that they continually invest in quality improvement mechanisms, and Wikipedia in particular is carefully controlled by a tight hierarchy of contributors.⁵² Critics point to the contradictions between the power hierarchy and the “myth” of open-ness. Yet policing is necessary in liberal systems: if the open liberty is valued, the policing must also be accepted. The criticisms may be seen as an invitation to open content providers to describe themselves more accurately.

Alongside issues of accuracy are questions about quality. Contributions in unconstrained social systems tend to follow ‘the power law distribution’ in which a few people contribute a lot and a lot of people contribute a little.⁵³ Some argue that there is fresh value in that “long tail” of micro and amateur contributions. Indeed, when before was a rap about physics viewed 3.7 million times?⁵⁴

⁴⁷ Anderson, 2006

⁴⁸For example, Shirkey, 2003 and at

http://www.ted.com/index.php/talks/clay_shirky_on_institutions_versus_collaboration.html

⁴⁹ <http://arstechnica.com/news.ars/post/20051204-5682.html>

⁵⁰ Nature magazine, 2005

⁵¹ Foster and Terrington, 2008

⁵² see, for example, <http://portal.acm.org/citation.cfm?id=1357054.1357214>

http://en.wikipedia.org/wiki/Wikipedia:About#Wikipedia_contributors and

<http://www.time.com/time/magazine/article/0,9171,1187286,00.html>

⁵³ The power law distribution describes a number of phenomena that follow the 80:20 rule, for example the Pareto law that 20% of the population earn 80% of the wealth, the idea that 80% of a businesses’ sales come from 20% of the customers, and the project management idea that you can get 80% of the job done for 20% of the cost. For more information see, for example, Anderson (2006), Surowiecki (2004) and Shirky (2003) http://www.ted.com/index.php/talks/clay_shirky_on_institutions_versus_collaboration.html

⁵⁴The Large Hadron Rap - <http://www.youtube.com/watch?v=j50ZssEojtM>

But for every rap about the Large Hadron Collider, there are countless items of poor quality. Navigation and time efficiency have become key issues. Virtual Learning Environments may help, but the response is still at the institutional level; a music teacher in Suffolk may have similar needs to a music teacher in Dumfries, but the resources stored by one won't be accessible to the other. The same work is reproduced thousands of times.

Open source and user-generated learning materials are like a new landscape we have no shared map for yet. Investors and innovators are rumbling around in search of the new navigation applications, and projects like LikeCube are starting to emerge.⁵⁵ Some go as far to declare that navigation will define the internet's next phase: "Web 3.0 will be about mass content navigation."⁵⁶

In the age of navigation, Foster and Terrington suggest, users will rely heavily upon trusted navigation brands. "Time Berners-Lee, widely regarded as the inventor of the World Wide Web, has argued that the future of the internet – the so called semantic web, or Web 3.0 – will hold the expert, the aggregator, the brand, as key."⁵⁷ They argue that Public Service Broadcasters, among the most broadly popular brands in the country, are well placed to play that role.

Implications for professional content producers

Despite the rise in user-generated content, audiences still value the professionals. A recent survey found that 62% of people questioned reported preferring professionally produced content, with just 19% preferring amateur productions.⁵⁸

But Dutton (2002) argues that a sustainable stream of professional content cannot be expected if the revenue stream is not also in place, and others agree that there are "real challenges ahead in finding viable business models to drive the next stage of internet content provision."⁵⁹ Colin Hughes, Managing Director of Guardian Professional, holds that "where content is essentially generic you are no longer going to be able to charge for access to that content." He looks for future revenue to new markets and unique content that cannot be easily reproduced, such as Guardian Newsdesk. The UK's major education publisher, Pearson, is expanding its work on digital services such as intelligent tutorial and assessment systems described in part 1. New business strategies are required and emerging.

Open and shared content raises complex Intellectual Property issues. In the music industry, the 'rip, mix and burn' model that Connexions applies to educational content is illegal. "We have to find an IP framework that makes sharing safe and easily understandable," argues Connexion's creator, Richard Baraniuk.⁶⁰ Colin Hughes is working to create exactly that: a Business to Developer (B2D) IP model whereby Guardian Professional shares its data but retains the rights and a share of any revenue made by a third party using it. Hughes perceives an imperative to create the model. "Heaven knows what's going to happen with this technology, but whatever we do we need to go with it. We have no option but to keep going with it."⁶¹

⁵⁵ <http://www.likecube.co.uk/>

⁵⁶ Foster and Terrington, p176

⁵⁷ ibid

⁵⁸ Pew Internet and American Life Project: Online Video, 25 July 2007

⁵⁹ Foster and Terrington, 2008

⁶⁰ http://www.ted.com/index.php/talks/richard_baraniuk_on_open_source_learning.html

⁶¹ Colin Hughes of Guardian Professional in interview, October 2008.

Lifelong learning and the learning society

Contemporary discourse on workplace learning is shifting away from a focus on training – “an instructor-led, content-based intervention” towards learning, “a self-directed, work-based process, leading to increased adaptive capacity.”⁶²

“The rise of wireless, wearable and mobile technologies puts increasing emphasis on offering short bursts of learning when and where the learner needs it,” suggest Bonk et al.⁶³ As described in part one, we see this starting to happen in, for example, ipod professional learning resources and bite-sized instructional videos for web developers.

The literature suggests a shift in responsibility for learning from employer to learner, and learning as “a diffuse and dispersed activity taking place across the organisation.”⁶⁴ Bonk suggests that the role of the trainer remains critical, yet becomes an on-demand mentoring and navigation service.

The language speaks of a learning society. Information is a site of power and its opening causes the erosion of hierarchical authority structures.⁶⁵ In its place rises the network organisation and the knowledge worker, “agile professionals referred to by Robert Reich as ‘symbolic analysts’. They are *learning-oriented*, because their unique human capital derives from continuous learning in their professional endeavours.”⁶⁶

Bonk predicts that “the differences between workplace training and formalised learning environments will ... begin to shrink,” with company workers learning and studying while University students embedded in the workplace use ICT to report back.⁶⁷ Paul Miller, creator of the School of Everything, argues that “for the school system to be the main thing we think about when we discuss education policy is outdated. Schools will be ten per cent of education policy in twenty years time. Learning will have to focus on helping you continue to learn throughout your life.”⁶⁸

For Yang (2008), the debate is characterised by “over-enthusiasm and underestimation.” 70% of professionals surveyed preferred face-to-face to e-learning activities.⁶⁹ Noble (2001) raises concerns over the quality of distance learning, arguing that as reach increases, richness decreases, and the resources required to deliver good quality e-learning are underestimated.⁷⁰ Chris Collins points out that virtual worlds are limited by their lack of interoperability, and many are concerned about transferring human activities from territories ruled by democratic governments to a territory ruled by Linden Lab Inc.⁷¹

Research by Sugata Mitra suggests that learning functions as a ‘self-organising system’ where motivation is sufficient.⁷² Leitch (2006) argues that motivation is frequently insufficient, and points to broad low aspirations in the workforce.⁷³ Alongside the rise of the knowledge worker, just 30% of UK jobs require degree level skills.⁷⁴ Stoll argues that

⁶² Sloman, 2008, p4.

⁶³ (2005, p3649).

⁶⁴ Sloman, *ibid*

⁶⁵ Dutton, 2002; Castells, 2000 and 2001; and Harris, 2002.

⁶⁶ Waks, 2004, p573

⁶⁷ Bonk, 2005

⁶⁸ Paul Miller, CEO and co-founder of the School of Everything, in interview, October 2008.

⁶⁹ <http://www.elearnmag.org/subpage.cfm?section=research&article=5-1>

⁷⁰ Discussed in Dutton, 2002

⁷¹ Collins, 2008; Shepherd 2007

⁷² Mitra, Sugata. *The hole in the wall: self-organising systems in education*. New Delhi, Tata McGraw-Hill Pub. 2006. See also http://www.ted.com/index.php/talks/sugata_mitra_shows_how_kids_teach_themselves.html

⁷³ Discussed in Sloman, 2008

⁷⁴ Sloman, 2008

we should “keep computers out of schools,”⁷⁵ and McFarlane (2008) reminds us that the evidence that ICT benefits learning outcomes is thin, and of the evidence that points to the converse.

It is possible that, at this early stage, the main beneficiaries from embedding ICT into learning may be the companies that provide devices and infrastructure. The Infrastructure company Nortel, which funds the US ‘open source’ learning website, Curriki, had profit margins of 43% in the second quarter of 2008, on a quarterly revenue of \$2.3bn.⁷⁶

Finally, many commentators point out that we lack a shared national sense of the purpose of education. Hock (2005) argues that greater motivation, engagement and activity can be elicited from people in an organisation when power and ownership are localised as much as possible, with one key condition: that the *purpose and principles* of the endeavour are understood and bought into by all, and defined as collaboratively as possible. Hock was the leading creator of Visa, named the largest business organisation in the world: 1/6 of the world’s population is its customer. Though Visa provides a less complex service than the governors of learning, its scale may make it a valid subject of study.

Part 3: The Future

The first possibility when considering the future is always that very little changes. “You know how long [schools have] managed to resist the kind of organisational change which every other part of the economy now regards as ordinary and normal. So it continues to be a fair bet that they will carry on doing that I think.”⁷⁷ Yet it is also reasonable to expect some degree of change. Some possibilities are as follows.

We could witness the arrival of effective ‘intelligent tutor systems’ (ITS) “in which every learner will have an expert system helping them learn.” Like GPS, the system would monitor a learner’s position and aims, and suggest activities to assist progression.⁷⁸ “We’re trying to move towards a position in which assessment is indistinguishable from learning,” says Dylan Wiliam of the Institute of Education. “What I’m looking forward to over the next twenty to thirty years is a focus on the design of effective learning environments in which assessment is integrated into instruction.”⁷⁹

Wiliam imagines that such a system could have several implications for assessment. The exam form could become irrelevant as the ITS would monitor a broader range of skills over a longer period, providing more reliable data than a few short examinations. This would disrupt the ‘teaching to the test’ phenomenon. What would learning look like if daily practice were assessed rather than, or as well as, the knowledge and writing skills displayed at the end of a period of learning?⁸⁰ “Within five years we could have these systems up and running. The barriers are political, not scientific,” says Wiliam, who identifies conservative attitudes towards assessment as the main barrier.

The ITS is one example of a technology that potentially enables more personalised learning. In more deeply personalised learning environments, in which learners pursue their learning ‘journeys’ at their own pace, the grouping of learners by age can become

⁷⁵ http://www.ted.com/index.php/talks/clifford_stoll_on_everything.html

⁷⁶ I calculate that to be a quarterly profit of \$1.13bn
<http://www.nortel.com/corporate/investor/events/q2earnings2008/>

⁷⁷ Colin Hughes, Managing Director of Guardian Professional

⁷⁸ <http://www.aaai.org/AITopics/pmwiki/pmwiki.php/AITopics/IntelligentTutoringSystems>

⁷⁹ Wiliam in interview, October 2008

⁸⁰ McFarlane, 2008

unmanageable. New ways of grouping and supporting learners may emerge. An interesting aspect of the growing sophistication of distance learning techniques is whether and how those practices will permeate traditional education providers. A few universities are beginning to use distance learning techniques to provide new kinds of learning experience to campus-based learning communities alongside face to face instruction.

Some schools could, for example, use distance learning techniques to enable learners to take personalisation to the next level. When a learner becomes too specialised in a topic to find an appropriate learning community or teacher within their school, they could find it online. A 'School of Everything' style platform could be used to find like-minded peers and a learning facilitator; they would meet together in a virtual learning territory such as Second Life, and use the virtual world, digital learning materials and social software to explore their subject matter. In this scenario, students would work with a kaleidoscope of physical and virtual learning communities in a given day. Such a scenario would raise complex questions about resourcing of teachers in virtual learning territories, alongside issues of inclusion and exclusion in a given group of learners, that is, where the lines are drawn on age, nationality and so on.

Alternatively, it may be that the decoupling of age from stage would enable closer groupings of students by interest, level and pace within a single institution, such that virtual meetings become less desirable. Or institutions may not reach the stage of offering that degree of personalisation. We shall probably continue to observe the current combination, with most people learning and working within physical communities, while others in more remote areas or in need of greater flexibility make use of and help to develop increasingly sophisticated distance learning techniques.

These future potentials bring into question the balance between different purposes and principles of education. For example, distance learning techniques enable students sitting beside one another to connect with specialised and non-spatial learning communities rather than their neighbour. But just such a scenario appeared in one of the 'Worst Learning Environments' modelled by a group of fourteen year old boys in a Beyond Current Horizons consultation. In the boys' model, people of all ages were in the classroom together sitting in rows, facing their computer screens and wearing headphones, with no connection to their physical neighbours, and no physical teacher or learning community to speak of. This prompts us to articulate the principles by which we navigate new technological affordances alongside a broader range of elements that are valued by learners and society as a whole.

Agile education provision that groups learners by interest, level and pace rather than by age and place would produce more diverse clusters of learners than are currently found. If the range of learning opportunities broadens, would curriculum and accreditation follow suit? Joe Elliot, Head of Learning and Children's Media at Magic Lantern Productions, is one of many commentators who advocate a reduced core curriculum and greater freedom for learners and teachers to pursue their particular interests, or a more diverse curriculum to select from.

In the US, the explosion of new accreditation providers and corporate universities has focused on post-16 education. A more diverse curriculum at any stage may invite a diversification of accreditation providers, and vice-versa. However, this potential sits alongside the powerful social and structural desire for consistency in the experience of pre-19 education, and the meaning of its certification.

It seems reasonable to infer from present trends that the range of players accrediting learning will continue to increase. Quality Assurance and recognition will become more complex. This is one element of a broader trend towards increased complexity, suggesting that navigation will be the key theme of web 3.0.

Bandwidth is reasonably likely to become the next frontline of the digital divide. Large global differences in bandwidth provision are already emerging.⁸¹

In the publishing industry, "There is an impending disintermediation happening ... that will be reaching a crescendo in the next few years" argues Baraniuk of the Connexions project.⁸² Perhaps intermediaries such as publishers will become new types of navigators in a digital future. The experiential value of a paper-based novel may have a secure place in our future, but for non fiction texts our contemporary 'cut and paste' or 'playlist' approaches to accessing knowledge online are likely to keep working their changes into publishing.

As we discuss the growth of ICT in our learning, it may be unwise to completely ignore its carbon cost, particularly as the prices of oil and carbon rise and the availability of oil falls. Some estimates have put the carbon footprint of the global ICT industry as equal to the global aviation industry, and the average carbon footprint of a Second Life avatar as equal to that of a Brazilian.⁸³ Ubiquitous digital technologies may not be financially or politically feasible in a carbon-constrained future.

Alternatively, greener technologies and energy sources may move centre stage, and distance communication tools may have to take over from a dependence on flying. But how many international business and social relationships would we maintain in a future where the cost of transporting goods and people is very high?

Contextually, our regional strategic narrative around the development of a knowledge economy competing in a global marketplace may shift in the phase directly following the scope of this paper, that is, from around 2035 onwards. With reduced transport capacity, national economies may need to develop more mixed, localised models. There is also some likelihood that climate change will render vast areas of inhabited territory uninhabitable, and vice versa, over the course of this century.⁸⁴ This would lead us into a new era of geopolitical relations. This is worth mentioning because it may alter our notions of the priorities for education in coming years.

Part 4: Key Issues and Conclusions

Web 2.0's theme of participation has brought a powerful and disruptive trend of openness and peer production, and with it have come new approaches to the creation of learning media, new kinds of learning communities and peer relationships, new kinds of professional training and even new kinds of school and university. Innovative practice is not expected to dry up.

As choice and complexity slowly explode, the need for effective navigation comes to the fore: indeed, navigation is likely to become a defining characteristic of the internet's third phase. Learners in future may navigate through, for example, peers, new navigation technologies, and actors such as Public Service Broadcasters who may take on the role of navigator.

The rise of free and cheap learning resources presents traditional production and publishing industries with a challenge. At the same time, demand for professionally

⁸¹ Foster and Terrington, 2008

⁸² http://www.ted.com/index.php/talks/richard_baraniuk_on_open_source_learning.html

⁸³ http://afp.google.com/article/ALeqM5hh_4eJ8N4PXuE6TToc3Zq_7sf05Q
<http://blog.entrepriseitplanet.com/green/blog/2008/04/freedom-to-connect-verizon-carbon-negative-internet.html>

⁸⁴ <http://www.ipcc.ch/graphics/graphics/2001syr/small/01.17.jpg>

produced, high quality content remains strong. Good businesses are adept at navigating changing markets, and winning players will be those who successfully find new markets, and new models of revenue, business and IP. The pressure on them to innovate may be to the benefit of many.

Public Service Broadcasters face a similar challenge. If we continue to value their quality and unique position in education provision, more future funding may need to be directed towards cross platform delivery of public service content.

With literally millions of websites offering useful learning resources and connecting learners with useful people, there's a rich world out there for those who know how to find what they need and manage their own learning. For this to translate into improvements in engagement and attainment, and more high quality personalised learning experience for the majority of learners, the organisational response is key.

In the workplace, the successful organisations will be those who balance connections to the community beyond the organisation with the quality of the community within the organisation, and who help their people develop their professional practice in dialogue with mentors and peers developing similar practice within and beyond the organisation.

In the school, the picture is similar, with the addition of a local and national demand for a personalised learning experience alongside manageability, security, and reassurance that learners are getting something very similar to those at the other end of the country. The most feasible way of meeting these demands may be to group learners within a school by level, pace and interest rather than by age and subject, reorganising within. Once that happens, the potential to plug whole groups of similar learners into the world beyond the school becomes less threatening and more of an interesting opportunity for learning communities to manage together.

One can become quite playful speculating whether the new diversification of organisations offering accreditation will continue, and if so, where it will go. From the McDonalds Award for Restaurant Management, will we see The Apple award for ICT Proficiency, the JK Rowling award for Creative Writing, or The Guardian award for School Journalism? Again, if and when the landscape becomes increasingly complex, navigation and quality recognition become central issues.

At the meta level, the overarching theme from the reading and conversations that have fed this paper is that the purpose and principles by which we navigate these new and unfolding education landscapes are not currently clear or shared among stakeholders. Today's education system is largely designed upon ideas formed by a more narrow group of people in and for a different era. A national conversation about the purpose and principles of learning today and in the future, at all levels, may be a useful next step.

Our education system is not something to be ashamed of. But it could be even better. It may be that by holding control so centrally – by placing the decision about what is learnt and when mainly with the government rather than mainly with the teacher or the learner, for example – we are holding education back. There is a possibility that by organising the system differently, much higher levels of engagement, motivation and attainment could be released. The point made by Visa's creator Dee Hock is that it is precisely by agreeing upon its purpose and principles that a system can release power from the centre and distribute it more evenly, and that it is the more even power distribution that gives a system its energy.

The lack of shared purpose and principles may simply be a reflection of a healthy plurality; on the other hand, perhaps like a good national learning support system, purposes and principles should be able to accommodate some diversity. A conversation about purpose and principles can start with a conversation about values.

For example, it may be fair to say that we all value open-ness, participation, communication and collaboration, and that we value professional expertise and quality assurance. We value individuals and their free pursuit of ideas and interests; we value communities and the compromise that they necessarily entail. We value knowledge and innovation; we value health, the body and genuine sustainability. We value our economy and the role for education policy in ensuring a good fit between what is learnt at all stages of life, and what is needed to sustain a healthy economy run by competent, confident, adaptive people. We value the classics, the arts, and learning for the sake of personal development and wellbeing. We value diversity and flexibility; we value cohesion and manageability. We work together, with hope, towards a future of physical and social technologies that reflect these values.

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