

What does it mean to be 'educated' and 'digitally literate'? The impact of ICT and the knowledge society upon education in the 21st century.

Abstract

The rate of change of both society and technology is causing problems for schools, caught between continuity and relevance-directed reform. New technologies and ways of working have challenged what it means to be 'literate' in the 21st century. This study therefore aims to look at the impact that ICT and the construct commonly referred to as the 'knowledge society' is having upon educational institutions.

The idea of 'micro-literacies' and 'macro-literacies' is introduced as a distinction between those which apply within a given domain or subject area and those which more fundamentally underpin *all* domains or subject areas. It is argued that developments and changes in these concepts have an impact upon what it means to be 'educated' in the 21st century.

It is expected that the outcomes of this study will be a greater understanding for schools of the purpose of education in the 21st century along with how 'micro-literacies' can inform the bigger picture of the holistic education of the pupil. The suggested learning theory to make sense of the continually changing nature of education is that of *connectivism*, an evolution of constructivism, which sees learners as nodes on a network.

A final aim of the study is to understand and shed some light on the views of the purpose of education held by stakeholders and interested parties in the education policy-making arena. Examples of the views of 'digital literacy' held in other countries are then considered to put the discussion into context. The method by which the study shall proceed shall be a variant of Pragmatism, for reasons outlined below.

Introduction

Society is changing at an unprecedented rate. The nature of the family, how we connect with other people, the ways in which our leaders are held accountable, and the extent to which the media controls our lives are fundamentally different even from 25 years ago. Members of every culture and society have the world of everyday experience mediated by technologies, traditions and cultural norms or expectations. (Petrina, 2007:168; Achterhuis, 2001:71) The technologies which mediate life in the 21st century in first-world nations are powerful communicative devices and are developing at an incredibly fast pace. This means that the way in which the world is understood and presented to individuals can be somewhat incoherent and is certainly very different from that of previous generations. In turn, unless they are willing to change to adapt to the needs and future requirements of learners, schools are in danger of becoming, 'even more quaint and shaky against the backdrop of technology.' (Smith & Curtin, 1998:227)

Schools are the link between generations: they bridge the gap between the knowledge and skills of the previous generation and those needed by the next generation. One of the

roles of educational institutions is to ensure that young people have the knowledge and skills for the world of work. But education is not simply about preparing young people for the world of work, as evidenced by recent 'personalising learning' initiatives that have emerged across the western educational landscape. There remains something more holistic about the education system that aims at producing 'educated', 'literate' citizens.

As we discover more about how the brain works and about how students learn best, so what we mean by an 'educated' person changes. Technology also has a role to play in this, as for some educational thinkers it to a great extent redefines what it means to be 'literate'. Schools, therefore, are increasingly investing in and exploring educational technology such as interactive whiteboards (IWBs), laptops for teachers and/or students, and methods of electronic communication outside the classroom such as virtual learning environments (VLEs) and 'Web 2.0' technologies. This is an attempt to ensure that they remain relevant to the world outside the school gates. Whilst there is a top-down drive to adopt such technologies, however, their pedagogical use is still being worked out on a grass-roots level. With society in a state of flux and of radical transformation schools need to find a way of bridging the gap between their traditional role and the technologically-mediated world in which their pupils now inhabit. It is an open problem about which Jacques Delors, president of UNESCO wrote in 1996:

...there is a decisive issue at stake here, and it is important that schools and universities should have a central place in a profound change that is affecting the whole of society. There is no doubt but that individuals' ability to access and process information is set to become the determining factor in their integration not only into the working environment but also into their social and cultural environment.(Delors, 1996a:172)

The concept that shall be discussed in what follows as 'digital literacy', therefore, would seem to be a key one for schools and individuals who want to play an active role in the 'knowledge society'.

Identification of Problem/Issue

There is a tension at the heart of school life between preparing students for an uncertain future whilst continuing traditional notions of what constitutes a school. Successfully resolving this tension should result in educational institutions producing 'educated' young people who are 'literate' within the domains they shall operate, both now and in the future. However, due to the scale of social change witnessed over the last 25 years, coupled with the almost exponential rate of technological development and uptake, resolution of this tension is becoming increasingly difficult for schools. What does an 'educated' person look like in the 21st century? Are traditional literacy skills enough to be considered 'literate' in this day and age? Although some work has been done in attempting to make a traditional curriculum more flexible, coherent and relevant – for example, the QCA's 'Big Picture' review – few explicit identifications of what constitutes a literate, educated person in the 21st century have been made. (McCain, 2005:49) Having a clear focus as to what it means to have the requisite tools for life in the 21st century - to be 'digitally literate' - would enable schools to synthesise the traditional and the new more effectively.

Whilst definitions are both historically and culturally situated (Barton & Hamilton,

2000:8), it should be possible to identify common usage, at least implicitly, of what educators and policy makers mean when they talk about being 'educated' – and therefore 'literate' in a 21st century sense. In contrast to the view satirised by Charles Dickens' character of Gradgrind in *Hard Times* ('Teach these boys and girls nothing but Facts'), to be 'educated' in the 21st century is a more slippery idea to pin down. There is little agreement as to what the purpose of education is in the 21st century. Some are instrumentalists, seeing education as a means to a (usually vocational) end, whereas others stress the importance of the *process*. Likewise, as has been argued extensively, (Barton & Hamilton, 2000:11-12; Muller, 2000:56; Delors, 1996b:85) 'literacy' ranges across domains and applies to much more than reading and pencil-and-paper writing. Agreement upon what it means to be a 'literate' person is also difficult to find.

To have some clarity as to what it means to be 'digitally literate' will help move on the debates taking place at all levels in the western education system. Instead of these conceptions being an updated version of what was learned at school by the previous generation, there needs to be a thorough review of the needs of both students and the workplace. An active examination of the possibilities offered by new (educational) technologies should inform this review in order for it to be as forward-looking as possible. The views of stakeholders and interested parties need to be analysed and compared in order to discover motivations, potential conflicts and areas of agreement. Once these notions of what it means to be and 'literate' in the 21st century have been resolved then the way forward for education to move towards new pedagogies and ways of working should become clear. At present, however, the lack of clarity as to what it means to be 'digitally literate' means that teachers are subjected constantly to new proposals and reforms that aim to resolve the tension between the old and the new. Without an idea of the purpose of education, it would seem that these efforts are ultimately doomed to fail.

Research Aims

- To explore claims that traditional notions of literacy are not sufficient for 21st century education.
- To analyse policy documents from government down to school level in order to discover the level of coherence in evidence.
- To come up with workable, 21st-century definitions of what it means to be 'digitally literate' (i.e. literate in the 21st century)
- To highlight discrepancies between pedagogy in practice regarding educational technology in schools.
- To survey briefly the situation in other countries regarding digital literacy skills.

Literature Review and Discussion

Despite Tony Blair's famous commitment to 'education, education, education', the Labour government in the United Kingdom is notoriously cagey when it comes to defining and setting out the purpose(s) of education and schooling. Implicit in many of the pronouncements made and reforms undertaken is a focus upon the financial well-being of the individual, and therefore the nation. Achieving 'economic well-being' is even enshrined the compulsory *Every Child Matters* agenda to be implemented by

schools (HMSO, 2003). Leaving aside the use of education as a vehicle to economic prosperity, however, at least one of the purposes of schooling must be to produce 'educated' young people. What is meant by an 'educated' person in the 21st century, however, is difficult to define. In the past this was much more straightforward. Until the dawn of compulsory education in England with the Education Act of 1870, it was mainly only the educational elite who could be counted as 'educated' (Stonier & Conlin, 1985:28). This would consist of a knowledge of the Classics, literature and poetry. The aim of state schools on the other hand, according to Sir James Kay Shuttleworth, one of the founders of the system, was to rear "the population in obedience to the laws, in submission to their superiors, and to fit them to strengthen the institutions of their country." The education system today is in tension between a traditionally high-minded 'liberal education' and the more pragmatic notion of producing democratically-minded citizens making a positive contribution towards the nation's economy. Even leading educational thinkers such as David Carr (2003:11-12) have difficulty in pinning down a notion of what it now means to be 'educated':

The best we can so far say is that to be educated is to come to appreciate or value for their own sake the non-instrumental or teleological (intrinsically valuable) features of those forms of knowledge, understanding and skill for which a reasonable educational case has or can be made.

Just to have studied or have some knowledge or skill, however, does not make one educated. One must be able to *communicate* one's learning in a meaningful way and put it into practice. Carr argues that the notions of 'education' and 'schooling' need to be untangled (Carr, 2003:15,134), much in the same way that clarification needs to be sought over the difference between being 'educated' and being 'literate'. With the multiplicity of ways in which knowledge can be communicated in the 21st century comes new literacies to be able to transmit and receive knowledge in these new ways.

It has been fashionable of late to ascribe to 'literacy' those characteristics that would have traditionally gone under the guise of being an 'educated person'. (Delors, 1996a:174; Snyder, 2002:181; Rodríguez Illera, 2004:49-50) Literacy, with the emergence of new domains of application such as 'computer literacy' and 'visual literacy', has enjoyed an elevation in status. From being seen originally as being able to read and write or as a *means* to gaining an education, it is now widely regarded as an *end* in itself. An understanding of what it means to be 'literate' in the 21st century should lead to a greater understanding of what it means to be 'educated', if indeed the latter is something over and above the former.

According to the *Oxford English Dictionary*, the adjective 'literate' means, 'acquainted with letters or literature; educated, instructed, learned.' To many educational thinkers, however, this is an outdated definition. In 1958 UNESCO defined literacy as 'the ability of an individual to read and write with understanding a simple short statement related to his/her everyday life.' The difficulty with both these definitions is that they categorise people as either literate or illiterate with no shades of grey in between. Literacy is defined on a 'macro', global level without an understanding of literacy within a given domain or for a *specific purpose*. There is no scope with these definitions to be able to describe an individual as reasonably literate when it comes to pencil-and-paper-based reading and

writing, but almost 'illiterate' when dealing within a domain mediated by technology.

Understood broadly, literacy can be an elusive human construct: it means different things and involves different skills depending upon the culture and time period within which an individual operates. Whilst in the western world 'literacy' has traditionally meant the ability to read and write with pencil and paper, this makes a nonsense of societies with oral traditions and records. At the end of the 20th century some postmodern thinkers therefore attempted to deconstruct 'literacy', understanding it to consist in many different 'literacies'. The main stimulus to this, as Kellner (2002:163) attests, is the widening use of technology in society:

As technological convergence develops apace, individuals need to combine the skills of critical media literacy with traditional print literacy and new forms of multiple literacies to access and navigate the new multimedia environments.

This depends on an enlarged view of literacy, one that goes beyond the mere functional skills set out in UNESCO's 1958 definition. Literacy becomes 'gaining the skills and knowledge to read and interpret the text of the world and to successfully navigate and negotiate its challenges, conflicts, and crises,' (Kellner, 2002:157) 'the application of... knowledge for specific purposes in specific contexts,' (Scribner & Cole, 1981 - quoted in Rodríguez Illera, 2004:51), a 'set of social practices' that are 'historically situated' (Barton & Hamilton, 2000:8,13). Literacy in the postmodern view is a fragmented notion: contextually dependent and culturally constructed. New literacies are being formed all the time (Reilly, 1996:218). This has led to the compartmentalisation of different forms of literacy such as 'computer literacy', 'visual literacy', and 'critical media literacy' which served to demonstrate how, for example, an extremely literate person on the traditional view could be 'illiterate' when it comes to communicating with the aid of technology.

Whilst the postmodern deconstruction of literacy has been useful for purposes of clarification, something about the original holistic meaning of 'literacy' has been lost. Literacy is reduced to a science – training within a given domain – rather than an art. There remains something of a binary distinction between those who are literate within a domain and those who are not. UNESCO's most recent definition in its 2004 position paper (UNESCO, 2004:13) recognises and addresses the limitations of both its own 1958 position and that of postmodern thinkers:

Literacy is the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society.

This definition is a Hegelian-type synthesis of the original, 1950s holistic definitions of literacy, and the more fragmented postmodern separation and compartmentalisation. Literacy is a process, not a state (Rodríguez Illera, 2004) and as such *underpins* abilities within a given domain. It is better, therefore, to talk of someone having or lacking literacy skills within the domain of digital technologies, rather than ascribing to them a state of being 'digitally literate' or 'digitally illiterate'. Shades of grey within each domain are recognised which build towards an overarching global 'literacy'.

As evidenced above, recent definitions of what it means to be 'educated' by those in control of education in the UK are hard to come by. Elsewhere in the western world they are more forthcoming, however. A representative statement is enshrined, for example, in the definitions set down by Michigan State University as part of its VISION 2004 reorganisation:

An educated person is someone who has learned how to acquire, analyze, synthesize, evaluate, understand, and communicate knowledge and information. An educated person has to develop skills that respond to changing professional requirements and new challenges in society and the world at large. He or she must be able to take skills previously gained from serious study of one set of problems and apply them to another. He or she must be able to locate, understand, interpret, evaluate, and use information in an appropriate way and ultimately communicate his or her synthesis and understanding of that information in a clear and accurate manner.

That is to say that being an 'educated' person involves taking skills and knowledge from one domain and applying them to another, as well as making links between areas of knowledge and keeping up to date with developments within one's field and those which affect it. This definition appears to have more in common with traditional conceptions of *wisdom* than it does with those of literacy. (Town, 2003:54) Put simply, becoming literate can be thought of as acquiring the skills to be able to participate in the discourse of a particular domain, whereas becoming educated is to be able to range across domains and synthesise the knowledge that has been gained.

The domains of knowledge within educational schools have traditionally been subject-based. Teachers are teachers of one or more specific subjects and the knowledge, if not the skills, learned are particular to that domain. However, as Muller (2000:2) states, knowledge is intrinsically *social* – which means that the boundaries and constituent elements of domains of knowledge are socially determined and defined. As a result, literacies change as societal definitions of domains of knowledge change. We view knowledge within a given domain through the lens of current literacies (DiSessa, 2000:65) meaning that what an individual can know and understand is limited by and dependent upon their use of semantic and technological tools. Limiting the 'micro-literacies' that make up the more holistic view of literacy ('macro-literacy') is to limit the ability of the individual to access some of the knowledge within a given domain. For example, using the 'micro-literacy' of familiarity with some digital technologies could allow Geography students to communicate in real-time with other students around the world. The knowledge they would gain from this would be of a different order than that which they could construct from the inputs of teacher and textbook. Each 'micro-literacy' the students develop count towards a more global Geographical 'macro-literacy'. In turn, this would feed into an ever-higher 'macro-literacy' that enables the student to function in the world they inhabit.

Some may argue that literacy is best defined by being able to construct knowledge from information presented through various means. For example, a literate person might be able to understand another person's point of view from various utterances or written accounts made. This version of the constructivist position depends not only upon a sharp distinction between information and knowledge, but a human-centric view that knowledge

cannot reside in, for example, machines. If the latter is the case then we would want to say that literacy is more than information-processing. Whilst there is no space here for a full discussion of the difference between information and knowledge, the consensus from the literature (Burniske & Monke, 2001:129; Delors, 1996b:174; Okan, 2003:256) seems to be that knowledge is *contextualised information*. We use this knowledge to form understanding within a domain of enquiry. To be 'educated', therefore, could be understood as making links between various domains, which in turn depends upon both micro- and macro-literacies. Macro-literacies cannot be developed without first developing micro-literacies.

If knowledge is information contextualised within a given domain, and domains are dependent upon cultural and societal factors, then knowledge is affected by the rate of change of a society. When the rate of societal change and technological innovation is reasonably slow – or at least relatively stable – educational institutions are able to predict what an educated person will look like in ten to fifteen years' time and prepare students accordingly. When the rate of societal change and technological innovation increases, however, these predictions become less accurate and strategies have to be employed in order for educational institutions to be able to function. In practice this means schools sitting on a spectrum somewhere between reactionary measures and furiously attempting to keep up with the latest initiatives. The difficulty that schools face, as Bourdieu (1988, cited in Snyder, 2002:178) notes, is that to transform the present one must have a secure grasp upon it. Given the 'precariousness' of contemporary life this is difficult to achieve: the sociality of knowledge means that domains of knowledge and of enquiry are constantly shifting. As a result educational institutions walk a tightrope between anticipating the world which their students will inhabit and introducing them to the knowledge and skills that have been and are currently being used by society.

The rate of change of society in the 21st century is being driven to a great extent by developments in technology. As the OECD report *Learning to Change: ICT in Schools* (2001:9) noted, Information and Communications Technology (ICT) has changed the way we live and communicate with one another:

The ubiquitous presence and utility of ICT in modern life are having a significant impact on the way we live, and even on the notion of an educated person. It has led to the concept of the knowledge society - sometimes also called the learning society or information society. There is a widespread awareness that these developments have profound implications for education, and that schools must change, but as yet little detailed consideration of the extent of the change needed and the advantages that ICT can bring. The growth of the knowledge society and the pervasiveness of the technology represent a major challenge and a major opportunity for education.

Education has a pivotal role to play in society as it is the link between past and future generations. In the past this link has been relatively easy to achieve, as the knowledge and skills useful to have acquired would vary only slightly within a generation. In the brave new world of digital technology, however, fundamental shifts in required knowledge skill sets and knowledge can occur several times within a generation. The most important skill one can have in a world where knowledge has a 'half-life' (Machlup, 1962) is to *learn how to learn*, to have a secure framework or scaffold upon which new knowledge can be grafted

and discarded when necessary. This changing nature of knowledge has been described by George Siemens in the introduction to *Knowing Knowledge* (2006) as knowledge having 'broken away from its moorings, its shackles'. Nowhere is this more evident than in the realm of educational technology where, using the tools already available in most schools, learners across the world can communicate, interact and share.

Learners within schools have the power, if not the current opportunities, to be co-creators of their own future. With the shifting boundaries of domains of enquiry those with relevant micro-literacies will be able to, along with members of organizations ranging from businesses to churches, take part in what has been dubbed the 'knowledge society'. Within such a society, knowledge is used as a commodity rather than an end in itself, which fundamentally alters our view of knowledge. Mass compulsory schooling began with a modernist 'transmission' model of education, with somewhat of a paradigm shift towards a more postmodern 'constructivist' model of education in the late 20th century. Writers such as George Siemens (2006) argue that the correct pedagogical stance to take at the beginning of the 21st century is one of 'connectivism' which is a 'learning theory for the digital age'. Connectivism concentrates upon 'competencies' distributed within a network of learners. These learners are viewed as 'nodes' and learning is seen as 'a process of connecting specialized nodes or information sources'. In a world where the most knowledgeable node could be a non-human machine or database, the ability to *connect* knowledge across domains becomes the valuable skill, not the learning of facts. This 'right-brain' approach to education is something that has traditionally been missing in the education system which, as Daniel Pink (quoted in Friedman, 2005:307) indicates, is to the detriment of 21st century learners:

Until recently, the abilities that led to success in school, work and business were characteristic of the left hemisphere. They were the sorts of linear, logical, analytical talents measured by SATs and deployed by CPAs. Today, those capabilities are still necessary. But they're no longer sufficient. In a world upended by outsourcing, deluged by data, and choked with choices, the abilities that matter most are now closer in spirit to the specialties of the right hemisphere - artistry, empathy, seeing the big picture, and pursuing the transcendent.

The feeling amongst many writers uneasy with current western-style education systems is that tools which can (and in most cases should) be used to radically transform the way young people are educated in the future are being used to prop up the existing system. Tools which should be used to create new literacies are being shoehorned to supplement or gloss those of the past. Some writers talk of these digital tools being retro-fitted to outdated pedagogies to produce what could be termed 'School 1.5' instead of 'School 2.0'. Ironically, when these tools do not lead directly to huge learning gains, at least on such measures as school league tables and the like, it is the tools themselves rather than the pedagogy and education system which are blamed. Using relevant technologies is essential in 21st century education when it is the principal way by which the world is mediated to individuals; new pedagogies need to be constructed to use the tools and technologies invented and used outside of the school gate.

There is an abundance of literature on the use of technology in education: ever since the first computer entered the classroom, grandiose claims have been made about their potential to revolutionise learning. Seymour Papert, for example, in the early 1980s

announced the imminent death of the school as we know it (Cuban, 1986:72). However, as Larry Cuban noted in his review of classroom technology since 1920, "so much school reform has take place over the last century yet schooling appears to be pretty much the same as it has always been." (Levin & Riffel, 1997:9) Far from computers being a panacea to solve the woes and inadequacies of the education system, technology seems to have added to the problems which beset it. Much of this is due a lack of debate centred on the purpose of education and what it means to be 'literate' in the digital age.

Broadly speaking, there are two ways in which critics miss the point of educational technology. The first is to dismiss it as 'just another fad', as no more significant than the use of televisions and overhead projectors in mid to late 20th century education. The second is to overemphasise the importance of the technology itself – to see it as the saviour for a failing system. Neither of these two positions is accurate. Every new technology changes and re-shapes the world in which individuals dwell: Postman (1993) reminds us of the way that Gutenberg's printing press not only changed access to knowledge but undermined the authority of the Catholic church. A 21st century example would be the difference between using the Internet as opposed to an encyclopedia for research purposes. Websites such as Wikipedia allow users to edit entries – i.e. interact with knowledge – as well as passively consume it. There is no such facility with the traditional encyclopedia; the way that users conceptualise and interact with knowledge has therefore altered. The new literacies necessary to function within digital domains lead to a change in what is meant by an 'educated' person. Such an individual does not tend to work in splendid isolation but is connected in various ways, usually involving one or more technologies. Technology tends to unify and connect people (OECD, 1994:195) which has implications for the flow of knowledge and barriers to learning. Barriers that can be removed by technology – for example the availability of specialised knowledge – can be replaced by others, such as access to the Internet (Cromer, 1997). There is a real danger, therefore, that a 'digital divide' could prevent some individuals becoming 'educated' in the sense of being able to be literate across a range of domains.

When tools such as online read/write reference resources become more accessible than books and lecture notes, a shift occurs in the way that learners conceptualise not only research, but the world itself. As many authors have noted, we use technology to shape the world – but tools, technological or otherwise, also shape *us* (Burnett, 2002:145; Apple, cited in Darder, et al., 2003:454; Demetriadis, et al., 2003:34; Provenzo, et al., 1999:40; Sutherland, et al., 2004:6) Although he could not have envisaged the online worlds available to us through the Internet, the effect of such tools on learners is put perhaps most succinctly by Dewey (1925, quoted in Blacker & McKie, 2003:235):

A tool is a particular thing, but it is more than a particular thing, since it is a thing in which a connection, a sequential bond of nature is embodied. It possesses an objective relation as its own defining property. Its perception as well as its actual use takes the mind to other things.

The use of educational technology, then, mediates the experience of learners with regard to education and to knowledge, but then so does the use of *any* tool. This process of human-created tools mediating human experience has an impact upon education: learners need to be able to use and shape these tools for their own ends. To be 'educated' involves being able to leverage semantic and technological tools across domains in order to make

connections.

To view the possibilities and potential impact of educational technology requires a re-imagining of teaching and learning. Even with a reconceptualization of what it means to be 'educated' and 'literate' in the 21st century, what does not change is the *human* element in learning, a thread that winds its way from the Socratic dialogues through to 21st century classrooms and (virtual) lecture theatres. Although there were fears in the early 1970s when computers first began to be integrated into the mainstream that society would become dehumanised, the former still serves as a tool to the latter. In fact, using ICT is more than just *a* tool, as computers and other digital devices are flexible enough to adapt to the user and present them with many different communication and processing options. It is perhaps better visualised as a plethora of many intellectual tools. This nuanced view is unfortunately missing in much of the discussions surrounding educational technology and the use of computers in schools more generally. Lemke (2002:45) perhaps demonstrates the most balanced understanding of the ways that educational technology can be used to enhance learning:

New technologies can often do the job of simulating and talking about the typical activities of the community far better than the average teacher in the average classroom. Technologies will not, however, be able to substitute for direct participation, nor will they be able to replace thoughtful guidance of students' critical reflection and analysis, nor the emotional encouragement of achievement and creativity that live teachers provide.

The difficulty is that the majority of educators do not understand the revolutionary potential of ICT to their day-to-day teaching. What they see as akin to the television or overhead projector has, if not the ability to 'blow up the school' (Papert (1984), cited in Cuban, 1986:72), then certainly the ability to help create an environment where learners can construct their own educational tools. Micro-literacies can be thought of as having the ability to create, or at least modify, tools in order to make sense of the knowledge within a given domain. Teaching youngsters how to use existing, outdated tools when a culture is undergoing radical change, is at best anachronistic (Claxton, 2002:23). Educational technology is not the answer to everything – a teacher's pedagogical outlook and teaching ability is still the biggest determinant factor in the quality of a learner's education – but technology does allow different kinds of 'ecologies' to be created. These are more likely to be focused on learning than on 'teaching'. (Burnett, 2002: 145)

'Learning ecologies' demand a different approach to education than has been possible previously, and is reflected in some of the 'personalising learning' agendas that have made their way into policy in some areas of western education. Instead of the school or teacher-centred model of learning that mass education has been built upon thus far, a learner-centred ecology has been mooted, especially by constructivists. The driving force behind this has been the possibilities opened up by ICT, which has driven curriculum change (OECD, 2001:15) and a rethink of what we mean by 'literacy'. The difficulty lies in what Levin & Riffel (1997:18) call the 'logic of confidence': schools can remain fundamentally unchanged so long as they are seen as embodying the right kind of activities and processes. Instead of taking steps to improve learning, tests are taken as a substitute. Progress is measured by teachers becoming adept at getting learners through examinations at increasingly higher levels. As politicians also have an interest in these

examination results, the whole system becomes somewhat of a charade. Given this barrier, the greatest bequest of ICT to education thus far may have been simply to point out how stale and boring traditional teaching actually is (Burniske & Monke, 2001:258). Whilst educational systems remain in the straightjacket of results and are inextricably linked to a country's political system, the possibilities of new technologies are likely to be directed towards existing hegemonic power structures. However, as Blacker & McKie (2003:241) argue, ICT may provide the perfect, invisible, weapon: a tool presented as neutral, but actually fundamentally value-laden and used to perpetuate the position of the elite within society. Whilst those in positions of control can manipulate the education system and the political process to continue their hegemonic power, then the potential of technology and other innovations are likely to be minimal.

Technology is being used on an everyday basis, however, and to complain about the use of ICT in education, would in the words of Tom Snyder, be 'about as smart today as complaining about the printing press would have been in the 1500s.' (quoted in Provenzo, et al., 1999:245) Whilst technology is not *inevitable*, as a society we have made a decision to put it at the centre of our culture – much in the same way as we did with the automobile in the 1950s. (Balle, quoted in Eraut, 1999:89) To 'jump off the wagon' and consider a change of direction (Apple, quoted in Darder, et al., 2003:456) would involve a radical change in our civilization. Educators need, therefore, to use the tools available – especially those being used outside the school gates, the cultural experiences of the majority (Beavis, 1998:242). To do otherwise is to prepare young people for a reality that no longer exists – something that is perhaps best illustrated by the following tale told by Benjamin (1971, quoted in Tiffin & Rajasingham, 2003:117),

...a prehistoric tribe... decided to introduce systematic education for its children. The curriculum was specifically designed to meet particular survival needs in the local environment and so included such subjects as sabre-tooth-tiger-scaring-with-fire. But the climate of the region changes and the sabre tooth tigers perish. Attempts to change the curriculum to meet new survival needs encounter stern opposition.

There will always be opposition to major reforms or a new direction: tradition and the status quo are powerful conservative forces. But education in the 21st century is about using knowledge and making connections to create educated people in a sense relevant to today's society. To be 'literate' is a relative notion depending both upon the domain within which one is operating and the relevance of that domain to contemporary life. Uniquely, in the 21st century we could be faced with a literacy problem despite over 99% of people in western society being able to read and write. Whilst it will remain possible, at least for the time being, for individuals to be considered 'educated' without using ICT, these individuals will miss out on a large chunk of what it means to be 'literate' in the 21st century. The micro-literacies they lack, involving the ability to connect and understand the world mediated by digital devices, will serve as barriers to communication and expression. The connections with other learners as nodes on a network will have to be made through other, perhaps more difficult, methods. Technology introduces new ways for humans to communicate and create, introduces new micro-literacies that contribute to the wider 'macro-literacy' construct and, as a result, redefines what is meant by an 'educated' person in the 21st century.

Major Research Questions

- What does it mean to be an 'educated' person in the 21st century?
- What is 'digital literacy'?

Minor Research Questions

- Are traditional distinctions between school subjects appropriate and relevant in the 21st century?
- What barriers stand in the way of the adoption of technologies in schools?

Methodology

There are two main methodological paradigms, the quantitative approach and the qualitative approach. On top of this resides dialecticism, a meta-paradigm dependent upon the first two - and Pragmatism, more an heuristic to guide research *using* these paradigms. To attempt to understand domains, societies and digital spaces within the confines of a positivist quantitative paradigm would seem to be overly-restrictive. When discussing the physical world it is tenable to hold a post-positivist approach, acknowledging the reality of the external world whilst holding that our relations to it can only ever be subjective. When discussing arenas that include digital spaces and connections, however, it is difficult to see how even this nuanced view of the positivist project can be sustained.

On the other hand, the qualitative paradigm also seems to suffer from a poverty of descriptive power when it comes to the 'blended' digital/physical arenas that constitute the 'knowledge society'. People *do* agree upon the way the world is, experience things in broadly similar ways, and connect in meaningful ways. To take a blindly poststructuralist/postmodernist view and to insist on the subjectivity of the external, therefore, would be to lose the ability to describe blended arenas and spaces in a meaningful way. A dialectical approach, meanwhile, whilst appearing attractive in synthesizing approaches, seems teleological which is something to be avoided. Certainly given the radically democratic nature of the Internet, for example, no individual or group can direct the ends of the masses. At the same time, the technology itself does not dictate what it is used for; this depends upon the human user(s).

Perhaps the best approach to take, therefore, is the Pragmatic one. This is a 'multi-methodology' that looks to understand the world from many viewpoints, therefore building up a more coherent picture. This fits in well with the idea discussed above of 'micro' and 'macro' literacies and also gives more of a picture of what it means to be 'educated' in the 21st century. Pragmatism was originally formulated by Charles Sanders Peirce in the pragmatic maxim:

Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object. (quoted in Potter, 1996:94)

By this, Peirce meant that concepts (and therefore knowledge statements) *emerge* from

the *effects* of things such as tools and objects. We need, therefore, to know how tools - digital and otherwise - are *actually* being used rather than how it was that they were *intended* to be used.

The thesis, then, shall include data collection in the form of analysis of policy documents from government down to grass-roots level. An eight-step process outlined by Johnson and Onwuegbuzie (2004) shall be considered as a model to move from data collection to analysis; the Pragmatic framework will allow for the gaining of an understanding of how education in the 21st century is conceived in the UK. There are many stakeholders, interested parties and 'pressure groups' within the education system, so this multi-methodological approach should ascertain the extent to which conceptions of digital literacy are diverse. Whilst loosely following the trail from policy formation through to implementation there will be limitations in terms of access to the individual opinions not evident in homogenized official reports and, most importantly, difficulties in terms of the size of school sample regarding the type of information required. The thesis, therefore, will not attempt to make general and sweeping claims about the whole education system but instead, where appropriate, highlight conflicts, disagreements and disparities in the wording and implementation of policies surrounding digital literacies.

Finally, a comparison shall be drawn with other countries in terms of varying approaches to '21st century skills' and what it means to be 'digitally literate'. Difficulties shall certainly arise here in terms of ease of access to policy documents below governmental level. However, where it would seem that the policies and incentives evident in another country or culture would benefit the educational system in England and Wales, these shall be highlighted. Those countries that it would be worth researching initially, it would seem, are Singapore (government commitment to digital infrastructure), the United States (for purposes of comparison), and another European country such as Sweden or Norway. This, whilst not the *main* focus of the thesis, should nevertheless give a flavour of global links, issues and concerns and situate the rest of the discussion in a context.

Conclusion

The proposed thesis shall be focused upon the concept of 'digital literacy', using a Pragmatic method in an attempt to understand the educational landscape within which it resides in England and Wales. By comparing and contrasting research, governmental policy documents, the views of various groups within education and on the fringe, and what goes on in schools, a broad view of what literacy means in the 21st century should be obtained. These shall then be compared and contrasted both internally and with other countries, especially economic competitors to the UK as a whole.

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