Pedagogy and innovation in education with digital technologies

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It is generally recognised that children learn in school, but it is difficult to define how much they learn, the extent to which their learning is supported and developed by new technologies outside of the school environment and whether schools themselves are an impediment to learning with ICT. Not only have new technologies available both in and out of school developed rapidly, but the way that they have developed and the kind of devices which have emerged have moved faster than educational research and perhaps more importantly, pedagogical approaches. The concept of ICT has broadened and is now often referred to in some forums as digital technologies. The notion of the digital divide is no longer being discussed solely in terms of lack of access to technology but in terms of bandwidth. A whole new technological language has become embedded in our vocabulary.There is further confusion about the nature of learning itself. Whereas the difference between formal and informal learning is sometimes defined in terms of whether or not an instructor or teacher is present, it can be argued that the difference is in fact contextual and that there can be no separation between formal and informal learning and education. This is particularly relevant with regard to new technologies where innovative tools create learning opportunities and outcomes which cannot be measured in traditional ways.

Keywords pedagogy; e-learning; digital; reform

1. Introduction

> If the computer games industry can get millions of children to see themselves as player developers, how could we instil some of that culture of disciplined self-help and creativity into the education system? When children play computer games they feel part of the action; too often, at school they feel as if they are being "done to".
>
> Leadbetter (2006).

The past three decades have seen the rapid development of new and emerging technologies revolutionising the way we live, work and learn. This is reflected in UK and European policy aimed at closing the gap between the needs of the workplace and educational practice. Where Information and Communications Technologies are concerned, policy and practice do not appear to converge into a coherent strategy to move learning forward in an inclusive way, addressing the needs of all. As the divisions between wealth and poverty become more visible, there is recognition that individuals from some backgrounds are less likely to achieve in schools. Large numbers of young people are rejecting school and further learning. Numbers who can be categorised as "not in education, employment or training" (NEETS) in the 16 to 25 year old age range are increasing. This same group is over represented in the increasing prison population. Against this backdrop there is an expansion of the European Union which has lead to an unprecedented number of economic migrants to some areas increasing pressure on housing, education and infrastructure whilst language and textual literacy remain a barrier to skilled employment.
This paper argues that although innovative approaches to teaching and learning with digital technologies can offer solutions to some of these challenges, pedagogical practice has not reflected the dynamic shift in approach that ICT tools can offer to support engagement in learning.

2 Technology, innovation and learning

Significant skills are needed to use the products of a digital world, but education it seems has been left behind in this new technological age because it has not fully embraced the digital revolution for a complexity of reasons. Many schools have failed to implement ICT policy due to an embedded cultural resistance to new technologies, which have not always been viewed as valuable. Although widespread change has become more apparent, it has been largely infrastructural rather than pedagogical and the needs of learners have been marginalised. Pedagogical practice has not kept pace with an increasingly technological society and remains the root of disaffection from education by young people.

Because new technologies are integrated into our lives, they represent a powerful tool for learning which is often unrecognised and undervalued. Activities which are fun and enjoyable such as the use of computer games are often considered to be leisure and not learning. Collaborative discussion online as a precursor to, or even an integral part of learning is frequently not accepted as valuable. Similar activities conducted face to face, such as group work and discussion in the classroom are considered to be good practice. Virtual learning environments in schools are increasingly commonplace, but often represent content push models that reflect a culture which continues to focus substantially on teaching rather than learning and delivery rather than participation. The tendency here is often to attempt to recreate online the same fixed delivery approach of traditional pedagogies offering little more than a digital version of classroom texts with little flexibility, less portability and often at greater expense. This approach retains the pedagogical constraints of a fixed curriculum which Holt (1970) considered to be an inhibition to learning. In contrast, virtual communities on the web such as *Second Life* and *Neopets,* offer dynamic, multidimensional online areas where participants can create, develop and deconstruct virtual worlds using a range of thinking and creative skills.

Much of educational reform has centred around what should be taught and how it can be measured, largely ignoring creativity, cultural and emotional growth and the range of multiple intelligences–see Mintz (1999), (NAACE) (1999) and Kitching and Morgan (2001). De Bono (1990) saw the need to move away from content delivery models to supporting the notion of developing thinking skills. Papert (1999) considered the power of computers as supporting children in a self-directed approach to learning. Strommen and Lincoln (1990) saw the future of education in an increasingly technological world as founded in a constructivist rather than instructional methodology. They argued that children have become used to controlling information flow and access and the education system has remained largely unchanged resulting in "an estrangement of the schools from society, and from the children who live in it". Yet despite these theoretical critiques of the education system and significant supporting research, schools continue to focus on curriculum delivery models which have little bearing on the skills needed by the children of the digital generation. These models are embedded in an out of date system which continues to focus on legacy content described by Handy (1997) as "disabling" and "irrelevant".

Buckingham (2005) offers some discussion on the current irrelevance of the digital curriculum in schools and impoverished ICT experience of many young people, seeing teachers as unwilling and inflexible in a society where children's lives are defined by technology. He sees the unrestricted use of the internet at home as supporting the development of problem solving and autonomous learning as opposed to the restrictions applied in schools.

Thus it appears that the very fabric of the education system has failed to fully recognise the value of ICT in learning. As a consequence pedagogical approaches have not changed sufficiently quickly. Education has remained embedded in a system developed for the 20th Century and does not comprehend how to educate the child of the digital age, hence disengagement from learning has become an increasing problem.

3 Text, toys and tools

Technological developments and the market penetration of digital devices have accelerated faster than any accompanying educational or pedagogical change. The concept of ICT has broadened and is now often referred to in some forums as digital technologies. The notion of the digital divide is no longer being discussed solely in terms of lack of access to technology but in terms of bandwidth. Inclusion is often considered in terms of digital inclusion. A whole new technological language has become embedded in our vocabulary, with phrases such as *text speak* and *digital immigrant* in common use. Notably the term *digital native* is reserved for those who have grown up with new technologies, unlike the current generation of educators. Prensky (2001) argues that this generation of young person learns differently and is "used to the instantaneity of hypertext, downloaded music, phones in their pockets, a library on their laptops, beamed messages and instant messaging", having little interest in more traditional instructional approaches. They use ICT intuitively, for leisure and for fun. It is an integral part of their lives and they do not perceive it as learning.

The development of wikipedia, blogs, podcasting and free online communities such as *MySpace*, *YouTube* and even *Friends Reunited* are raising questions and challenges to academics about the nature of learning and how to analyse and how to draw meaningful conclusions from non-static and non textual electronic data. Even text itself offers cultural and contextual challenges with the widespread popular use by teenage culture of patois, text speak and African American Vernacular English popularised by rap music. A new generation of teenagers expects access to computers, mobile phones, programmable videos and CD players in their day to day life, whilst the culture in our schools continues to restrict that access, seeing them to be of limited educational value. Nevertheless, access to some of these tools demands problem solving ability and higher level ICT skills. The 21st Century Literacy Summit (2002) concluded that:

> In this new century, information and knowledge matter more than ever, and the ability to use them effectively rests on a set of skills that extend beyond the traditional base of reading,writing, math and science...all of us must now incorporate the following components to enhance our knowledge and critical thinking skills: Technology Literacy, Information Literacy, Media Creativity, Social Competence and Responsibility, Education, Workplace Skills and Civic Engagement.

Whilst textual illiteracy still retains some social stigma, technical illiteracy remains acceptable in many parts of our society. Resistance to technological innovation as a tool for learning is deeply embedded in the education system itself. Although pedagogies have moved away from didactic towards more collaborative approaches, content and targets appear to have greater significance than how a child learns, what they learn with, how they demonstrate that learning. Radical reform of school examinations is likely to be needed if a range of intelligences is to be recognised and different pedagogies developed. There are a number of developments trialing examinations online. However, examination reform can only be effective if it reflects the changing needs of the 21st century and shifts away from textual dependency, rather than measuring success against the standards and requirements of a 20th century system. With significant numbers of young people failing to achieve examination success at this level, it seems appropriate to consider whether that failure is because of ability, or because the system itself is flawed–see Dooley (1999).

There is a body of research which considers the current schooling system outdated and inappropriate for the needs of society–see Papert (1999), Smedley (1993), Snow (1965) and Fisher (1995). There is less consensus about the changes which are needed to that system. On the one hand, there has been a great deal written about the use of ICT in education being unproven –see Steeg (2000), Livingston (2001). On the other hand, there is research stating that new technologies are central to change–see BECTA (2005).

At government level, policy implementation regarding educational technology has been recognised as "haphazard"–see DfES (2005), and even exclusive–see Kitching and Morgan (2001). Pederson *et al* (2006) in their study of the impact of ICT in Nordic countries viewed ICT as "an essential cultural technique which can significantly improve the quality of education", but accept that there is a lack of measurable evidence especially with regard to what and how much is learned, changes in pedagogical approaches and relationships between schools and home. Indeed, its findings state that "...avoiding exclusion is still an issue with ICT in schools". Buckingham (2005) concurs, suggesting that schools could even be responsible for widening the digital divide.

All this presents a very confused picture, but the researchers and academics presenting this evidence are almost certainly digital immigrants rather than natives. For organisational change to be successful, it is generally recognised that all stakeholders need to be supportive and willing–see Tan (2000). Schools are unusual in that the consumers - the young people themselves - are marginalised when consideration is given to the future shape of ICT in education.

4 Summary and Conclusions

Although education has focused on what it feels children need to be taught, it has paid scant attention to learning in its variety of forms, yet young people have used new technologies to develop how they learn using a range of ICT tools for innovation and creativity. Much of this learning has taken place at home because most schools do not recognise the value of many of these new ICT devices and web based environments. It appears that the very fabric of the education system has failed to fully recognise the value of computer technologies in learning. Owers (2001) said: "When a subject is valued neither culturally nor educationally, its place in society cannot be adequately examined, defined or understood, at a level of acceptance likely to be influential". As a consequence pedagogical approaches have not changed sufficiently quickly. Education has remained embedded in a system developed for the 20th Century and does not comprehend how to educate the child of the digital age, hence disengagement from learning has become an increasing problem.

Embedding of digital technologies in traditional education systems is further inhibited by the fixation of educational culture on textual literacy and the perception that other intelligences or creative literacies are of less value, whilst continuing to regard technological illiteracy as acceptable even amongst educators themselves. Whilst this could arguably have been the case in a 20th century system where schools catered for a 2-tier society of academic and vocational workers, technology has brought globalization to the forefront. A new generation has redefined an innovative pedagogy using the same technological tools so frequently barred by schools. Buckingham (2005) said: "Ultimately this means we need to stop thinking in terms of technology and start thinking afresh about learning, communication and culture".

Since our educational system has for too long been a one-size-fits-all structure, it also raises questions about the ethos of education, the structure of the curriculum, and its suitability for sustaining ourselves as a society both economically and environmentally in the 21st Century.
It is difficult to predict how education will change over the next decade let alone the next century, but there will most certainly be changes in pedagogies which more readily recognize the way young people learn with new technologies. Learning outcomes and measurable outputs will need to adapt to reflect this.

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