Beyond Current Horizons

technology, children, schools and families

Changes in knowledge construction, participation and networks

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> Technological environments are not merely passive containers of people but are active processes that reshape people and other technologies alike.
> - McLuhan, 1962

> The future is here. It's just not widely distributed yet.
> - William Gibson, 1984

Introduction

In his fictitious book *Neuromancer* William Gibson portrays a world is governed by technology and computers. In the world Gibson creates, *the Matrix* is the computer system that is at the backbone of the human system and provides the backdrop for the terrifying journey of the lead character, Case, as he travels in and out of the matrix to the 'real world'. It was in this book that the people were first given the phrase with which to describe all of mystical relations and structures that exist through an interaction with a computer – Cyberspace. One implication of this vision of the world is that it can be very difficult to avoid a depiction of a future that does not represent everybody living with robots or using computers similar to that in the film *The Minority Report*.
William Gibson has also been documented as saying the 'future is here. It's just not widely distributed yet'. Essentially, we have a majority of the tools that will be predominant in the future; they will just be accessible on a global scale and technologically refined. As with most technology, the actual device is secondary to the action it allows the user to perform. Consequently, in this review the future changes in knowledge construction, participation and networks will be explored by looking at the cultural trends that have developed in an online participatory culture without lingering on the particulars of the technological development.

Web 2.0 technologies are personified by the integration of participatory culture into everyday life. Henry Jenkins (2006) describes a *Convergence Culture* as a community that becomes reliant on the fan contribution for its operation and survival. For Jenkins, the notion of 'participation' is bound up in a *Convergence Culture* that maintains the interplay between industry and the consumer. The *Convergence Culture* signifies a form

of participation that perpetuates the creation of content on the Web. In particular, there is a focus on different levels of User-Generated Content that are formed through 'mash-ups' and 'mix-ups' from other sources on the Web. The understanding of participation in the new *Convergence Culture* is difficult to define due to the multi-faceted ways that people are engaging with a range of identities, technologies and cultural practices. As Jenkins writes:

> New technologies are enabling average consumers to archive, annotate, appropriate, and re-circulate media content. Powerful institutions and practices (law, religion, education, advertising and politics, among them) are being redefined by a growing recognition of what is to be gained through fostering – or at least tolerating – participatory cultures (2006, p.i)

Most recently, the new form of participation is under continual evaluation for its ability to engage people with new learning opportunities. From this perspective, the old forms of traditionalism that are attached to schooling systems are lost. In this new climate, knowledge is democratised to no longer function as a static entity that moves from teacher to learner. In *Collective Intelligences* Pierre Lévy (1999) states how the high speed connectivity of the internet created a new form of epistemology. For Lévy, new communities online create access to a collective intelligence that is available to all the individuals in the community. This is formed in a new kind of 'knowledge space,' or what Lévy (1998) calls the 'cosmopedia,' which is the way that people access information from the 'deterritorialisation' of a new media environment. In these self-organised communities, Lévy notices a break from the geographical ties on information and communication. It is in these new spaces that a community feels a responsibility towards the production and exchange of knowledge practices.

In this review learning is treated as a subjective activity that is shaped through the thoughts and feelings that we encounter as we pass through different interactions of learning. New communities that are formed around recent networking technological advances will be explored for their potential to become effective learning space. What does this mean for knowledge? And what are the types of ethical rules, mutual goals, dilemmas and interests that can be characterised in the social practices of these new learning spaces? Underlying this discussion is the wider conceptualisation of knowledge construction, participation and networks. The findings in this review coincide with recent movement in critical psychology known as the 'turn to affect' (see Clough, 2007). Lévy's work has been coined as the foundational text in the new area of 'affective studies' (Rice, 2008). From this perspective, understanding grand issues such as memory, technology and organisation are treated as part of a subjective, embodied affect that lies in a shared social landscape which is continually influenced by our own experience. 'Affect' itself is a somewhat slippery term that continuously avoids definition, but can certainly be associated with a number of other expressions including emotion, corporeality, perfomativity and a de-centered subject.

Keywords: technology, communication, participation, culture, knowledge, robots

Commercialisation from Customisation

The participatory nature of Web 2.0 emphasised the tools and platforms that enable users to tag, blog, argue, rank and generate their own content all over the web. The new participatory culture blurs fundamental rules of marketing that aim to create a singular product that will sell on global scale. Instead, growing numbers of media industries are looking to design a service that will allow users to connect, create and share in ways that encourage a social aspect to new media. Many new technologies take full advantage of the Web 2.0 participatory culture that desires to customise, create and communicate

across a range of media and platforms. In the development of this technology, a culture of individuality has been employed to encourage users to join and construct their own profiles (ie Facebook, MySpace, Google Homepage, and My Yahoo). Based on Lévy's work, Henry Jenkins speaks to the differences of these new spaces in terms of commodity, labour and larger cultural traditions:

> The new information space involves multiple and unstable forms of recontextualisation. The value of any piece of information increases through social interaction. Commodities are a limited good and their necessity creates or enacts equalities. But meaning is a shared and constantly renewable resource and its circulation can create and revitalise social ties (2006, p140)

The 'meaning' that people construct in communities of user-generated content has become a highly marketable resource in the new media industry. Information and communication have become the currency of new Web based products and services. Through her work on 'Soap Talk' Nancy Baym shows how the online 'fan' is devoted to sharing and takes some joy in sharing knowledge –'epistemphilia' (Baym, 1998, pp14-15). Baym continues that there is a 'socio-emotional' aspect to many of the fan culture interactions, meaning that knowledge is in no way separable from our pleasures and desires in these new spaces. The implication for this new combination of product and emotion is a contextualisation of labour that distorts the relationship between producers and consumers. This confounds the old commodity spaces that were characterised by various forms of de-contextualisation, including an alienation of labour and hierachised view of knowledge.

Coté and Pybus (2007) characterise the recent movement in Social Network Sites (SNSs) as creating a new space for *immaterial labour 2.0*. They develop the ideas of Maurizio Lazzarato (1996) which defined immaterial labour as the 'cultural content' that is produced through a 'conflation of production and consumption; an elision of author and audience' (Coté and Pybus, 2007, p89). The *2.0* addition to the standard explanation of immaterial labour is intended to show the ramped-up, accelerated form of communication that is established through an increased level of participation. Immaterial labour 2.0 explains the new social practices that are heavily mediated in our everyday lives and how information and communication have become the capital which is integral to the market as a whole. For Coté and Pybus, it is through the affective relationships in MySpace that capital is sustained through a network of connections. This subjective turn is in direct opposing to material forms of labour and shows how the production of ones identity in MySpace produces a form of biopower[i].

New Learning Practices

So far, the new social spaces on the internet have been shown to create 'knowledge spaces' (Lévy) that generate a new form of immaterial labour (Coté and Pybus). The main aim of the next section is to describe these *new spaces* in more detail. As Coté and Pybus spoke mostly of MySpace and Lévy of a range of community practices sometimes not even of an online dimension, it is paramount to trace what exactly we mean by new social spaces. This should aid the ability to map out a possible set of futures with regard to the changes in information and communication technologies in these new spaces. The recent impacts to education that is considered to be more popular in the future will be explored in three main areas: Online Source Applications, Open Educational Resources and New Social Network Sites (SNS).

Open Source Applications and Open Educational Resources

Open Source Applications are programs that can be freely downloaded onto any computer and allow the student to take control of their own learning. On a larger scale

learning management systems such as Moodle, Sakai and ATutor focus on providing course management systems for teachers and educators. Open Source Applications have also benefited from the technological increase of community tools that are geared towards education, such as LAMS, Drupal and Connexions. These sites have a development and community essence to their design and encourage members to 'chat' with other users as they access their course management program. This has all been made possible by the development of supporting software including Firefox, Thunderbird, OpenOffice and Audacity. The advances in internet technology should not be treated as the success of one program over another; there is a more gradual rate with which it moves forward as a whole.

The collaborative culture has produced a wide range of Open Educational Resources (OER) that has undergone a number of initiatives from the United Nations Educational, Scientific and Cultural Organization (UNESCO). UNESCO intended OERs to allow free access to knowledge for courses and a wider public use. The internet was the only way to make this wave of information available to everybody and in a style that would not form a hierarchy of one piece of knowledge over another. The Creative Commons (CC) license also made sure that the rights of the user were accounted for. This made it easy to publish over the internet without worrying about copyright laws and led to the success of websites such as Wikipedia and WikiUniversiy. Clearly, the impact of OER and Open Source Applications has had an overwhelming impact on the shape of modern educational practices; however, the majority of this review will focus on the rise of new communities through SNSs.

Social Network Sites and Learning

The population size of some SNSs has grown exponentially in the decade. Facebook is currently thought to be growing at a rate of 150,000 new users per day; with most users are spending twenty minutes or more on the site (ComScore, 2007). On these sites (which also include MySpace, Hi 5, Bebo and Xanga) users are able to chat, blog, post videos and photos on a specially designated profile page. For danah boyd, these sites represent a space of 'networked publics' that allows people to come together through technology that promotes participation (boyd, 2006). These sites essentially perform many activities that are available in other areas of the internet. Most members quickly learn how to build a profile and manage issues of a technical nature quickly and simply. However, up until now MySpace and other sites have been used for primarily social purposes and the amount of actual information exchanged is very low – it is about communication. Recent attempts to use SNSs in education involves combining OER with the sites, this has most widely been used in conjunction with Facebook.

Understanding New Spaces

How then to understand these new technologies? Or better still, the impact of technologies being merged together? The following section will be divided into three main areas: *Knowledge Production*, *The Networked Classroom* and *The New Experience of Teaching and Learning.* The first, Knowledge Production, will be looking at the changing role of knowledge in the new sphere of online based learning. This will use a range of examples to show how teachers can embrace the changing shape of traditional knowledge in a culture focused around communication and collaboration. The second section will focus on the classroom practices as a whole that can be networked through new technologies. This will show how institutions are beginning to combine 'blackboard' online resources with popular SNS like MySpace and Facebook. Finally, the last section will be dedicated to a wider discussion of the implications of the network culture with regard to the different subjectivities that are formed in mediated relationships online. More pressingly, how will education function in new spaces that have been, up until now, reserved for interaction of a purely social kind?

Knowledge Production and Sharing

Weblogs (or just 'blogs') are the personification of user-generated content, in the sense that they are personal accounts that are constructed into the truth on a certain subject (see Andrea's Jam Recipes[ii] and How to meet girls online using Facebook[iii]). A blog can be written about pretty much anything and there is even a collective name for all the blogs on the Web - the 'blogosphere'. The blog culture was initially documented by bloggers or media enthusiasts themselves (eg Blood, 2000). Many blogs have been found to contain personal information including first name terms, online/offline contact references and personal photographs (eg Nardi, Schiano and Gumbrecht, 2004; Herring, Scheidt et al, 2004). The structure of blogs are routinely composed in 'reverse chronological order', which means that new posts are found at the top of the page (eg Herring et al, 2004; Nardi et al, 2004). Trying to define 'the blog' neatly characterises the range of methodological arguments that comes to follow. So, for now, this review will use the fairly recent introduction of 'blog' (noun and verb) to the Oxford English Dictionary (2003) as a place to start: 'to blog is to be part of a community of smart, tech-savvy people who want to be on the forefront of a new literary undertaking' (OED, 2003, as cited in boyd, 2006).

Blogging was a relatively exclusive pastime until the release of the first free blogging software (Pitas and Blogger) and special search engines that made tracking blogs easier (Blo.gs, blogpulse.com, etc.). The impact of blogging can be seen all over the internet, particularly as an alternative way of accessing and sharing current news sources. The blogosphere has been found to be a flexible communicative space for different groups of people (Feenberg and Bakardjieva, 2004) that permeate most niches of social life, from scholarly to political issues (Glenn, 2003). The sheer transcendence of this technology has brought issues of privacy to the fore in modern interpretations of the technology. This review will now look at real world examples and how knowledge is appropriated and distributed within these blogs.

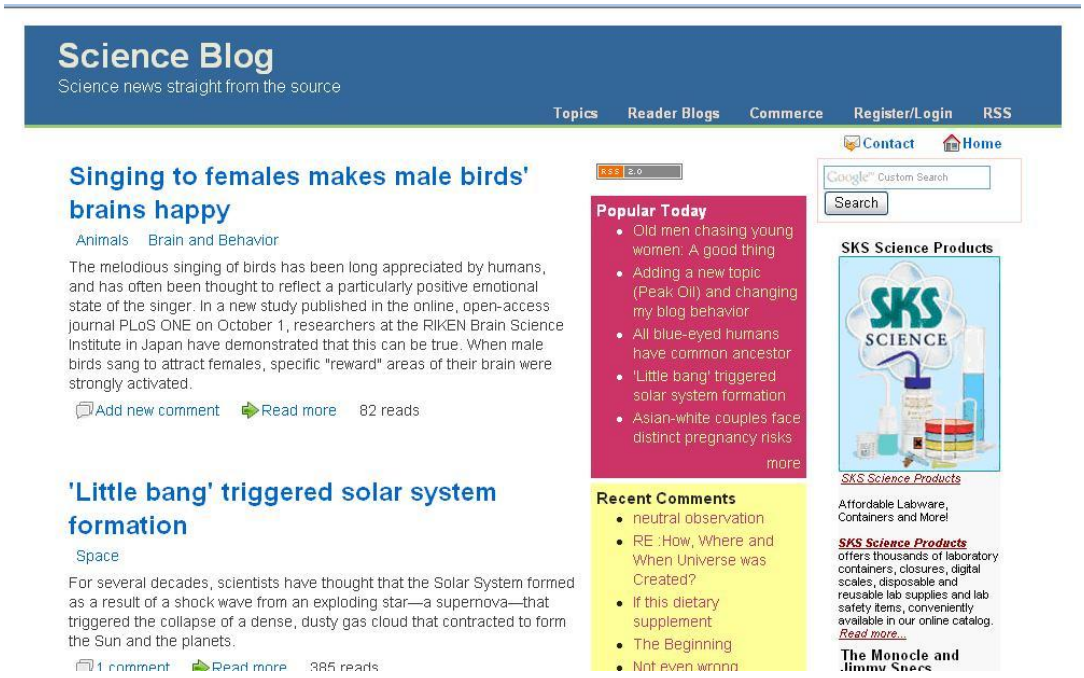

Figure 1. Screenshot taken from The Science Blog (www.scienceblog.com)

The above screenshot is taken from a blog dedicated to science that is run independently. It markets the site with the tag line 'Science news straight from the source' and allows students to engage with a range of science topics freely and easily. There are three main implications for knowledge production of this form. Firstly, the website is positioned as a primary source of information. This site enables students to search from within a multitude of topics that are posed as written by professionals and not just by other students. Secondly, the knowledge is presented in an easily manageable form that spans a range of ages and abilities. It could also be easy to take the knowledge gathered on the science blog and re-produce it somewhere else on the Web. Thirdly, by adding the 'comment' section, students are openly encouraged to be critical of the issue in question. This allows students to question the origin of 'truth' and invites the student to feel empowered to question the foundation of certain knowledge. Even science itself is open to interpretation on sites of this kind; the basic principles of science are freely explored in terms of culture, politics and history.

The scope for online learning using blogs is not specifically geared towards children. In the following 'Maths Blog' (Figure 2) the focus is on maths help for parents of children aged 5 to 11. This blog is constructed by a number of authors and the intention is to de-mystify educational practices, thereby, making knowledge openly accessible to all. Numerous blogs of this kind exist and they make the possibility of learning through the internet a real possibility. In fact, knowledge of any particular aspect of everyday life can be readily mobilised into a blog that can shared with everybody on the Web (for example, Mothersclick and TuDiabetes). One potential drawback of knowledge of this kind is that there is a potential for people to publish incorrect facts in blogs. This is evident in moral panic around the site Wikipedia. This means that we need to educate children in the ways of validating information in blogs.

As stressed at the beginning of this review, the Web 2.0 era allowed students to use online blogs to gather information on a range of topics. This represented a form of informal learning that encouraged them to be critical of the 'truth' in knowledge. However, as we recall, the Web 2.0 was most characterised by the ability to 'mix-up' information by adding their own spin. Therefore, the Web 2.0 culture is learner-driven, conversation-focused and defined by the learners' perception of need. This unavoidably positions the schooling system as teacher-driven and defined by the perceptions of another person (the teacher). However, dualism is not always helpful as it rarely arises that a student has a negative view of the education system, while still having such a positive view for educational practices of another kind. Instead, this review would like to encourage the idea that blogs (such as the maths and science blogs mentioned here) offer students an opportunity to add to the teaching they are given in schools. It produces a space where a student can feel empowered to ask questions or take the time to read a particular subject they have more interest in. Education needs to shake off the image of schools as cold, hard places and encourage the idea of the internet as a fun, new place for learning. Instead, the internet and other emerging technologies operate as a mid-point for future learning as they create new spaces for creative, social forms of learning.

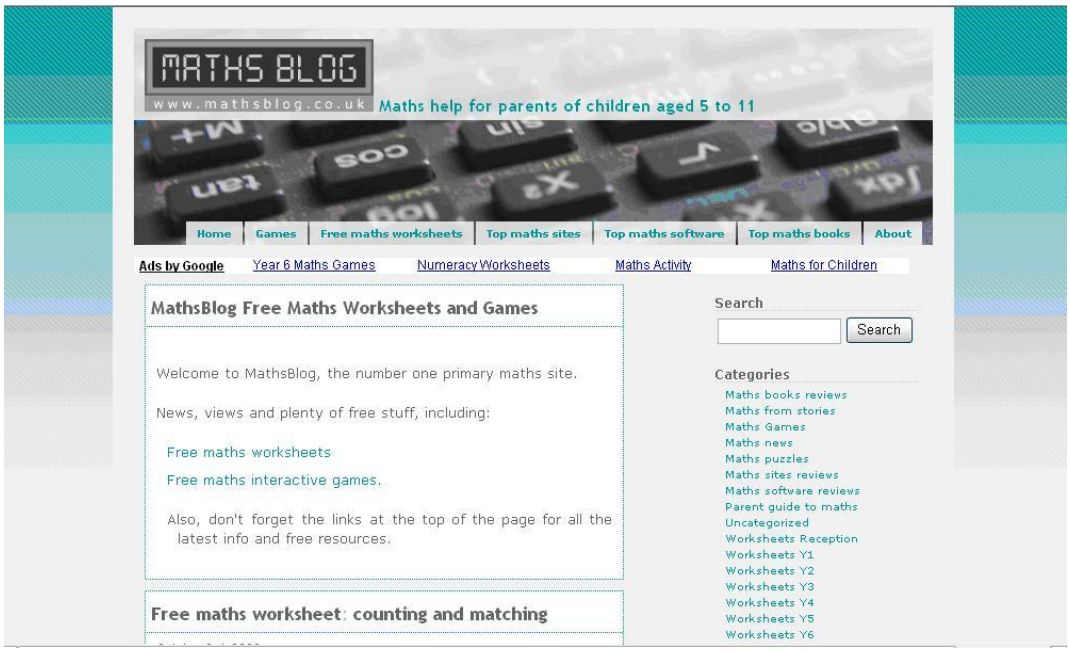

Figure 2. Screenshot taken from Maths Blog (www.mathsblog.com).

In the Maths and Science blog there is a definite sense of a strong teaching authority behind the content. As stated with Wikipedia, it can be very difficult to authenticate the information that is presented in a blog. This is because blogs are given a relatively low status (eg blogs are not considered to be credible for reference in a peer reviewed journal). However, in learning to ask questions of the facts found in blogs many students learn to accept that is there is a large amount of information that is not necessarily helpful. The maths and science blogs in this example are presented as more than just one person's opinion on a subject and manage the problem of authenticity by using a professional style. A future development would be to teach students how to find a reliable source on the internet and encourage them to openly criticise the origin of certain truths or facts from the Web.
Knowledge production of the future will be reliant on inventive thinking. The student will have to be creative, self-directed and curious about new forms of knowledge. They will also need to be able to manage complexity and risk taking. It is these skills that should become fed, intravenously, into the teaching of the future through the traditional school setting. Teaching will involve giving the student tools to take command of their own learning and cover the essential communication skills: collaboration, communication and social responsibility will be at the heart of future learning. The student will no longer be a consumer of education, but a creator. This will have an overriding affect on the way we use future learning programs, so that, the wealth of information on the Web is encouraged through the traditional school system.

The Networked Classroom

The following section will show that blogs are not the only way students can communicate and learn online. The amount of new possibilities for online learning has exploded in the last decade and this can be seen due to a continual need to 'network'. In Computer Mediated Communication (CMC) literature the issue of a 'network' has become one that is frustratingly adjoined to the phrase 'networking'. In this sense, a network is the physical distribution of a collection of nodes in a network and 'network-*ing*' is social and cultural practices that are focused on making new friends instead of maintaining existing friends from their offline relations (for more detail on this discussion and history of SNS in generalm see boyd and Ellison, 2007). SNSs are packed with different forms of

information and communication that allow the member to construct a profile and then add this profile to other profiles. Each person who joins the site adds value to everyone else on the network by opening their 'friends' to new connectedness across the network. The notion of a friend here has been found to not have a literal translation, but moreover, represents the enigmatic way that people continually add more friends to increase their social status.

At first, SNSs like MySpace and Facebook seemed to be an extension of older SNSs or an amalgamation of other online activities, such as YouTube, Flickr or Instant Messaging. However, new SNSs quickly became much more; infiltrating schools, colleges and strict working environments with their catchy profile pages and their constant need to be updated. Many authors have considered the rise of SNSs as a unique way of constructing a personal identity within a web-based system; a system that is then deeply entangled with a 'mainstream' culture (boyd, 2007). This has gone as far to say that MySpace use is so heavily intertwined with a member's life that their self-esteem is driven by MySpace activity (Valkenburg, Peter and Scouten, 2006). In MySpace the notion of friending is of particular importance as the popularity of a 'top 8' application made many members group their friends into an order of personal significance. This would list the 'best friends' for everyone on the network to see and brings an air of social drama to the construction of a MySpace profile.

SNS members engage with others through their own profile by leaving blogs, photographs, videos or any other range of personal information. They can also 'post' on a friends profile by leaving a message on their 'wall' (the wall being a specifically designed area of the profile that caters for short text-like messages). The many SNSs vary slightly in the profile arrangement, but most are organised around a profile photograph (which is typically of the member) and their personal information. The SNSs are usually geared towards a certain demographic: Facebook for the college graduate, MySpace for the plucky teen and LinkedIN for the professional, for example. There have also been SNSs for niche networking groups, such as Sagazone for the over 65s. One thing that is paramount throughout all of these SNSs is that the visual appearance of the profile page is of great importance. Many users spend hours subtly modifying the background, layout and aesthetic features of their profile page.

The drive to customise a profile page personifies the wider web 2.0 genre that is obsessed with creativity and communication. Although, with a medium of this kind it can be difficult to see how education could benefit from embracing technologies like MySpace and Facebook. The answer to this question is layered: at one level Facebook may exist as a good place for course leaders to post information, such as links, course messages and general information. On another level, Facebook could also be a place for like-minded students to talk about recent educational issues around a certain topic or ideas. There is also the possibility that Facebook could be combined with course management systems like Blackboard or Moodle, which would update the Facebook with any recent information that had been added to the system. So, there seems to be the educational possibilities of using Facebook as a tool in its own right or combined with another form of learning software.

One potential benefit to using Facebook as an educational tool is that students could feel empowered to communicate with others in an informal style that would benefit learning. There is also the possibility that those who intend to learn using Blackboard infrequently do. This seems to fit the analogy of the teachers who tirelessly add more references to their course material, but finds that their students typically use other resources to understand a certain topic (eg Wikipedia). It should not be assumed that the student does this to simply try and find the information in the easiest manner; it could be that the format of knowledge being explained on different websites is of a style they can better understand.

It is clear that combining Facebook and Blackboard is no easy process. The introduction of formal educational practices into a space that is essentially a social arena has implications for immediate boundary issues. Many students use Facebook and MySpace as an essentially social space where they like to hang out and spend time with their friends. Thus, the introduction of formal education practices are met with anxiety and

apprehension. As we saw with the blogs, learners are empowered to take control of their education by using sites like MySpace and Facebook. One interpretation is that students will learn through SNSs regardless of the absence or presence of exact course materials. It is the sense of using the connected network to advance their own learning that drives them to use the site. Perhaps, instead of providing the exact teaching practices the teacher may get more success out of inspiring the learner to go off and use a SNSs or a blog to find what information they can. In the case of the science blog, it was maintained by a headmaster from a secondary school, therefore, the future could imply that teachers are still handing out the information; it just comes in a variety of new forms. So far, we have looked at two very different forms; the teacher-run blog and the student-driven SNS. However, they are both underpinned by a focus on the learner being driven towards a form of education that instils innovation and communication in the student. The teacher in this new world is not to be forgotten; in fact, there are some definite advantages to teaching practices in the technological future. Course management systems make it easy to contact an entire group of students and construct lessons that build on a number of resources. But there is a high likelihood that the transition to the increased dependence on technology will not be an easy one. This could be primarily driven by the high amount of personal information that students place on the site (Stutzman, 2006). For the student, Facebook has been found to be a place for a heavy amount of identity work that does not easily coincide with formal teaching practices.

It is highly probable that the technology of the future will be just as disjointed as it is today. It is in the current movement that all forms of technology are trying to be used for education. In actuality, some technologies provide a sense of informal learning and function most efficiently not as an official educational tool. The innovative student of the future enjoys scouring the Web for new places to communicate and source different facts. It is within a future plane of informality that a high amount of learning is done, and, by giving the student the tools to use the Web effectively, the teacher of the future will need to be fluent in information and communication technologies. It is clear that the network that will provide much of the background to the education of the future is heavily mediated with communication technologies and the wide spectrum of knowledge practices.

Towards a New experience of Teaching and Learning

The use of SNSs like MySpace and Facebook as educational tools brings a variety of issues into view including; conceptions of 'mind', how knowledge is stored, and brings subsequent ideas about learning to the fore. This causes an opportunity to rethink the dominant ideas around knowledge as a fixed entity that exists objectively, independent of people. For example, the idea that knowledge incurs slowly over time with the gradual increase of areas and disciplines, which is typically stored in a book or database is up for debate in light of the future changes to education. Learning is no longer an individual activity that takes place in the 'mind' of the student. It is also no longer to be treated as a fairly similar experience for everyone. Essentially, learning of the future will be subjected to a social backdrop of infinite information and communication.

New forms of education will need to incorporate the social aspect of learning and creativity. Education practices of the future will need to be attuned to the way social groups use technologies, such as MySpace and Facebook which can be used to aid teaching and learning. SNSs operate as a way of supporting the collective memory that is held by a community. SNSs, like schools, do not exist purely in terms of learning. They also open up to do a wide range of identity related issues that are effervescent in any school-time interaction. MySpace allows members to constantly update their profile and change the 'top 8' friends to those who they are most genuinely friendly with at the current time. It is a way out, playing out many of the dilemmas that are typically associated with the image of playground interaction. But, even in this function, this serves a purpose to education as a whole.

Issues of Searching and Unwanted Content

An area for controversy emerges around the equal access to these new spaces with reference to a strong digital divide between those who can and can not afford to have the internet. As part of the UK Children Go Online project, Lingstone and Bober (2004) notice how socio-economic status discriminates between daily and weekly users. This is reinforced at home as children from middle class families typically experience the internet first-hand from their parents. Middle class children have been found to have a greater quality of access to the internet that is recognizable in the improved sense of the risks that are attached to information. The widespread appreciation of access can be seen in a number of governmental initiatives that are continually trying to close this divide (eg 'One Laptop per Child' and city-wide wireless access). It is clear that policy needs to strongly encourage equality in information that does not limit the working class experience of the internet (ie speed of access, freedom of searching).

'Digital Natives' as explained by Marc Prensky (2001) is the provocative name for those children who have grown up with digital technology. For Prensky, digital natives operate at a 'twitch speed' that is a product of their time spent with computer systems and a culture of diverse media influences. Prensky states that the advanced level of media exposure has lead to changes in 'neural wiring' through a process of neuroplasticity. Within this theory digital natives are considered to have shorter attention spans, but have an increased ability in visual and spatial tasks that is represented neurologically. It is clear to most people that those children who use more computer based tasks will have some impact on their experience of learning in the future. Oblinger and Oblinger (2005) describe the next generation of learners (n-gen) as highly computer literate, connected to a variety of networks and benefiting from a creatively-rich form of learning.

However, in recent cases it has been found that children who have been heavily socialised in a strong media environment do not come without their problems, and to a certain extent, many issues that have been found to impact a child learning are found to be re-produced in the use of new technology. Many of these issues are presented in the work of Williams and Rowlands (2007) in the combined efforts of the British Library and the JISC. This work brings together a number of resources to show how children and young people have a set of computer related problems that are based on basic learning practices. Williams and Rowland (2007) cite the work of Chen (2003) who found that children have difficulty finding alterative synonyms when the original searches do not find any relevant results. But on a broader scale, Williams and Rowland (2007) draw together findings that show how children can have difficulty checking the relevance of information gathered through a searches on Web (see Valenza, 2006; Shenton and Dixon, 2004).

In light of these issues the responsibilities across government, education legislation and industry have been highly debated. Through this debate the role of the parent has been identified as one of particular importance. In many cases parents fail to see the educational benefits of using such a technology and are generally ambivalent about the use of the internet. This could be related to the many moral panics that continually plague privacy issues on the Web. Many of these issues cloud the worthwhile activities that can back-up the learning that is taking place in the school setting. However, in many cases tighter regulations would act to control the unacceptable use information and communication on the Web. For example, in a recent case of a Facebook hate group, Oboler (2008) reported the ineffective nature of the Facebook organisation to intervene due to their ambiguous terms of service which limited the amount of action they could take to reduce discrimination in their pages. Ultimately, the hate group was broken down by users within the site. Similarly, many children are able to recognise behaviour they should avoid, for example, Livingstone, Bober and Helsper (2005) found that only 9% of the UK Children Go Online project had visited a website that encouraged hateful behaviour, 2% being those who had visited the page intentionally. The proportions of younger children (9-11 year olds) were considered less likely to encounter undesirable content.

It appears that there is a considerable amount of pressure on parents to regulate Internet responsibility. Even though younger children have been less likely to find unwanted content, the slight amount they do come in contact with could have more drastic effects. Allborn and Wlliams (2002) found that 45% (60% boys and 28% of girls) had experienced unpleasant material over the internet, but only 14% had then gone on to discuss these issues with their parents. It also appears that older teenagers are aware of privacy issues and they restrict access to the photos and videos (PEW, 2007). There is also evidence to suggest that most Bloggers, who are more likely to be older, upload information to the Web even when they are fully aware of the risks (McCullagh, 2008). This shows that new regulatory procedures are needed to protect younger users and improve communication channels between parents and children who are at risk.

With ever increasing access to the internet children of all ages are going to be continually faced with some form of unwanted content. Most believe that the increased level of anonymity and access to the internet will cause an increased level of anti-normative behaviour, for example, the internet has been shown to increase gambling (Griffiths, 2003) child abuse (Carr, 2004) and pornography (Hughes, 2004). New benchmarks need to control the way that children are able to search the net, this stems from parental controls at home through to legislative responsibility to reduce the amount of harmful content on the Web.

Intellectual property and Copyright

Web 2.0 as a platform for content creation is based on the presumption that people will re-distribute content they find in others places on the Web. The content is typically owned by the site owner (the organisation hosting it or the user in whose domain the content is being created) and people who created or contributed to content on the site. Within blogs or media sharing sites the latter is usually limited to tags, comments or extra content that is clearly divisible from the original content. There is also the possibility that an entire system may own the copyright to all the content posted on it, such as YouTube and MySpace. In each of these communities the organisation writes their own 'terms of service' and 'code of conduct' that explain how information can be used and shared. In many cases, users of these latter sites are unaware of the legal, pragmatic and ethical guidelines that are not universally undertaken by these sites (this was shown in the formation of a hate group on Facebook mentioned earlier). The sites rely on users reporting issues that confound the interests of the site. These sites also make use of the Creative Commons license that involves a number of re-use policies for the public to avoid being held liable for copyright infringements. This involves a number of licenses that are continually evolving and can sometimes make use of a number of 'take down' measures for inappropriate content.

New Social landscapes

One further tool of the future that could change the way people learn and interact on a wider scale is Web 3D. Second Life (SL), for example, is an online 'virtual world' that enables the member to construct a fully 3D avatar and roam around the virtual world. In Second Life you are free to build any kind of structure or building; the only cost is incurred by paying for the piece of 'land' that the building resides on. SL has its own currency (Linden Dollars) that can be exchanged for US dollars before entering the virtual world. Similarly to the other technologies contained within this review, Second Life relies heavily on the student engaging with the technology on a personal level and using it in their own way as an educational device.

However, there is also a large number of teaching practices that are taking a similar form in SL as in the offline world. For example, new auditorium style lecture theatres are growing in SL that enable people to engage with different topics and speakers from all over the globe. There are also other Web 3D programs, such as World of Warcraft and The Simms that are still positioned as a game. However, SL is set out for members to roam freely and conduct in the usual activities they would do in the real world. The New

Media Consortium has a number of videos that indicate the educational value of SL[iv]. There is a limitless possibility to the activities in SL that will allow students to recreate many learning settings, for example, taking a tour of ancient Greece or the world from above. There is a limitless potential to the experiences in SL and students can learn by 'doing' and 'seeing' in a way that promotes creativity, communication and new forms of learning. Through these technologies modeling and simulation are ways of knowing and experiencing learning.

Possible Futures

This review does not support the possibility that new generations will only need a computer to teach them how to speak, calculate and talk by the year 2020 (Eskow, 1998). Instead, this review attempts to recognise that education of the future could have great success by harnessing the creative use of new technologies. By embracing the social aspects of future technological trends education could join the communication and participatory culture. In returning to William Gibson's opening quote, we are reminded that many future technologies are already here - they are just waiting to be distributed on a wider scale. However, it is clear that at the rate that SNSs like MySpace and Facebook are growing they will not be able to continue for long. Most likely, a number of similar programs will emerge that facilitate the same social drive for information and creativity.

The future should be considered as a plurality of possibilities which will produce independent learners who are responsible for the own realization of these goals. One possibility is the growing sentiment of Personal Learning Environment (PLE) movement that is based on utilising Web 2.0 social software that enables learners to take control of their own education. Obviously, this has stronger implications for higher education, but aspects of the personal style of teaching will potentially filter down into teaching practices for younger children. However, it is difficult to see how many of these technologies will be different to the majority of systems that are already in place. In fact, Web 2.0 technologies currently work to try and aid the traditional schooling system by backing-up the education that takes place in the classroom. The PLE is generated to be almost self-sufficient and not require the work in the classroom. This seems to be returning to the original problem of excluding teachers from the educational process. This raises issues of assessment and the issues of a changing political climate that may detract from an education system of this kind.

A further possibility is that notions of pedagogy may change dramatically. As we have seen in this review, it is becoming more common to try and merge social, cultural aspects of learning with individual notions of agency. This raises the question; can schooling ever be constructed as an agency for individual forms of teaching, whilst maintaining or furthering a culture? If the answer is yes, then the future of teaching and learning will demand new forms of assessment, particularly in the higher education sector that will allow for pedagogic experimentation that will utilise Web 2.0 tools. Namely, how will Web 2.0 technologies that are formed through participation remain a sense of individual assessment? This is within a context that individual assessment is required for a labour market that demands a reorganisation of individual skills that can be assigned to certain jobs. Also, how will these new pedagogic models influence the learning in younger children? Will we be shaping the future possibilities of information and communication from a younger age? How can we then protect younger children from the risks? Would this eradicate the argument that has been explained as against notions of a digital native? In short, the future requires a great deal of research on the implications of changing pedagogic systems and new ways of understanding new knowledge spaces.

Conclusion

The aim of this review was to explore how students will view future education in light of the changes in knowledge construction, participation and networks. At the heart of this discussion was a drive to keep the vision of the future within a realm of certain possibility (in the sense that wild speculation about computer technology, however probable that future may become, does not aid the preparation for future education practices). The future has therefore involved a discussion of many of the technologies that exist currently, but on a wider scale. The first section focused on the new form of knowledge using examples from a range of blogs. These blogs indicated the amount of knowledge that was accessible to a student and encouraged them to question the origin of certain 'facts' and 'truths'. The second section, entitled the networked classroom, gave an insight into the social, collaborative community that underpins future learning practices. Where SNSs like MySpace and Facebook encourage members to build a personal profile and identify with their network of values and practices.

The final section of the review was focused on the overall sense of knowledge and education in the future networked, participatory culture. This emphasised the essential role of communication and information from the earlier parts of the review. SNSs and Virtual worlds were explored as a new area of educational enhancement due to the limitless possibilities within education. All of these technologies require teaching to encourage the social aspects of online communities and a clinching of new tools and platforms that make education of the future possible. Learning has been shown to take many forms and to benefit, if not always directly, from the creative, innovative practices that are instilled in future collaborative technologies.

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Notes

[1] Coté and Pybus work extensively with Michel Foucault's notions of power/biopower. For an introduction to this work on power and subjectivities, cf. Coté (2003).

[2] Jam recipe blog: http://www.andreasrecipes.com/2008/10/07/jalapeno-jelly/
[3] Meeting people through Facebook article:
http://www.datingserviceswebsite.com/meetinggirlsonline-using-facebook.php
[1] Second Life video from the New Media Consortium:
http://uk.youtube.com/watch?v=TMGR9q43dagandfeature=related

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