From Encyclopaedias to Search Engines: Technological Change and its Impact on Literacy Learning

Jann Carroll

Introduction

There won’t be schools in the future … I think the computer will blow up the school … The whole system is based on a set of structural concepts that are incompatible with the presence of the computer. (Seymour Papert, 1984 in Leu, 2000, p. 108)

This article will discuss the evolution of information for research and teaching purposes as a result of the change the Internet has brought to our literacy classrooms, depicted in the shift from encyclopaedias to search engines. Papert had one point of view, only 26 years ago. Gates, from his perspective as a driver of these changes said, ‘No-one gets a vote on whether technology is going to change our lives’ (Papert cited in Leu, 2000, p. 111). Indeed the change is swift and, as history demonstrates, in times of major technological transition our values, our understanding of work and our teaching practices are challenged and transformed.

The challenge to educators is to fundamentally reshape literacy instruction to prepare our students, the Millennium Generation, for the future (Howe & Strauss cited in Considine, 2009). The students we now teach are the first generation to have grown up immersed in technology, known as Digital Natives (Prensky, 2001), who are fluent in the language of ICT, adjust easily to changes and who use ICT in creative and innovative ways (Considine, 2009). For the most part, their teachers are known as Digital Immigrants who, as Prensky describes, always speak with an accent and struggle to learn and apply new ICT (2001). Many of these teachers have been colonised by dominant models of technology, but do not use them efficiently in their classrooms (Gee cited in Donnison, 2007, p. 9). However, many teachers of literacy want to create a literacy environment in which their digital natives’ ways of knowing are valued.

Research has now moved beyond the question of whether the use of information and communication technologies (ICT’s) should be incorporated into everyday practice. The question that has become more pertinent is how can ICT be used effectively in teaching literacy to enhance learning? (Bowman as cited in Stephen et al., 2008). Technology is playing an undeniably significant role in the lives of children, and this fact raises questions around how we can utilise the skills and strategies gained by students, particularly boys and gaming, at home, to build literacy skills in the classroom (Prensky, 2006).

Exploration of how computer literacies, known as the New Literacies (Coiro, 2003) can support students’ traditional literacy development as they move from learning to read to reading to learn in the middle years of schooling is improving pedagogical knowledge. Flood, Lapp and Flood (1997) identified that computers and other forms of multi media facilitate the use of electronic texts, such as email, podcasting and wikis, and thus require new conceptions of literacy and literate behaviours (Leu & Kinzer, 2000; Labbo, 2006).
Using the analogy of the transition from encyclopaedias to search engines this paper will chronicle some of the changes observed in an upper primary classroom.

New technologies are transforming current literacy practices and challenging what it means to be literate. Literacy instruction is being both intentionally and unintentionally adjusted to take advantage of the opportunities presented through mediums such as search engines. The new literacies will build upon the solid foundational skills of comprehension, writing, spelling, vocabulary development, phonemic awareness and phonics in order to prepare our students for the unimagined literacies of the future. Our goal remains that students need to be equipped to become critical thinkers, problem solvers, innovators, effective communicators and collaborators and self directed learners (ISTE, 2007).

What are the new literacies?

Gee (2004) comments that the types of New Literacies that students are involved with outside of schools provide ‘processes of learning that are deeper and richer than the forms of learning to which they are exposed in schools’ (p. 107). The New Literacies include the skills, strategies and insights needed to successfully exploit the rapidly changing information and technologies (ICT) that continuously emerge in our world (Leu, 2002). The technology is present in schools, but the focus of curriculum in the schools is still largely based on traditional forms of text. Lankshear and Knobel (2006) identify two differing mind sets as a result of the possibilities brought about the new literacies. The first perceives literacy to be pen, paper and book-based where scarcity and production of goods is valued. The second conceives of literacy encompassing a much broader contemporary mindset using ICT to participate, share and expand knowledge and experiences. The latter is the view held by our students, but is at odds with the traditional school and curriculum model.

Building on the work of Leu and the New Literacies research team (2000), Andrews (2004) and Labbo (2006) seek to explain the new literacies as that which is required for meaning making with computer technologies, which is complex and multimodal in nature. They further contend that making meaning in the new literacies environment of the online world includes learning how to read, write, listen and speak with multiple modalities in ways that reflect the socio cultural nature of learning. Examples may include search engines, graphics, audio, animations, video, music, power point presentations and print that are used to make meaning that is significant within particular cultural groups (Labbo, 2006).

Literacy, new literacies and pedagogy

The table below sets out the National Educational Technology Standards (NETS) for Students (2007) and Teachers (2008), which are a set of standards published by the International Society for Technology in Education (ISTE). The purpose of leveraging the use of technology in K-12 education to enable students to learn effectively and live productively in an increasingly digital society:

<table>
<thead>
<tr>
<th>NETS for Students</th>
<th>NETS for Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Creativity and Innovation</td>
<td>• Facilitate and Inspire Student Learning and Creativity</td>
</tr>
<tr>
<td>• Communication and Collaboration</td>
<td>• Design and Develop Digital-Age Learning Experiences and Assessment:</td>
</tr>
<tr>
<td>• Research and Information Fluency</td>
<td>• Model Digital-Age Work and Learning:</td>
</tr>
<tr>
<td>• Critical Thinking, Problem Solving and Decision Making</td>
<td>• Promote and Model Digital Citizenship and Responsibility:</td>
</tr>
<tr>
<td>• Digital Citizenship</td>
<td>• Engage in Professional Growth and Leadership</td>
</tr>
<tr>
<td>• Technology Operations and Concepts</td>
<td></td>
</tr>
</tbody>
</table>
The effectiveness of educational technology is enmeshed in the kind of pedagogy employed. Many factors determine the way in which students use computers to learn and teachers use computers to teach. Computers are a tool and can be used in a didactic or constructivist way in the classroom. Like a three cord rope, learning consists of three intertwined cords – the teacher, the student and a medium. It is only together that they form an effective rope or learning experience. Computer-based tasks in the classroom, used wisely, can provide a series of teachable moments and the opportunity to explore, expand and emerge into new ways of learning, participating and thinking. Through undertaking a task within the realm of technology the student comes to an understanding of the given concept supported by multimedia of which the teacher, fellow students and technology play a part (Wenglinsky, 2005). The virtue of the medium of technology is that it facilitates understanding by turning the abstract into a concrete problem that is within the students’ grasp to answer.

Pedagogically, ICT offers educators and learners opportunities to increase the breadth and richness of learning, including cultivating higher order thinking skills. ICT can facilitate learning in different locations (including real and virtual) and offers the possibility of empowering learners through the accommodation of different learning styles and preferences. ICT offers what Cambourne (1988, 1995) believes is central to learning and language learning in particular, and that is, engagement. The impact of the teachable moment is increased when engagement and interest is high. ICT often enables the engagement of all of a learner’s senses, a rich and lively environment in which to practice, learn and master concepts on the way to mastery.

From the New Literacies perspective, the skills and strategies middle school students require are identifying important questions, locating information, critically evaluating information, synthesizing information and communicating their answers. Of these, locating information is paramount to reading on the internet as all other decisions flow from the location of relevant information. Henry terms this a ‘gatekeeper skill’ for effective online reading (2006). Skills such as knowledge of the searching process, how search engines work, developing a metalinguage of search terms for your classroom topic, matching searching needs to the search engine and using visual search engines such as http://www.kartoo.com, to provide a visual representation of how concepts are connected, assists students to become proficient searchers. Sophisticated literacy skills are a fundamental requirement.

An example from the classroom: Encyclopaedias and search engines
Up until 30 years ago Encyclopaedia Britannica was widely used as a research resource and was considered an example of a trusted, reliable, valid and scholarly source of information. All school libraries proudly displayed their red-backed collection and parents with means purchased their set for home use, ensuring that their children were privileged in terms of accessing reliable information for school projects. Public libraries devoted much shelf space to encyclopaedia collections. In today’s language we speak of the digital divide which separates those who have access to the Internet and those who don’t. Prior to this we may have had the print-based divide, for example, the parental expense of purchasing the encyclopaedia set would have affected access; users were required to have very well developed literacy skills to comprehend the detailed entries; content was dependent on a small group of editors who chose what was included and excluded, and if there were errors detected, they would only be able to be corrected for the next edition, which may be some years away.

In contrast, Millennium students use search engines for research. Leaver (2009) writes that internet search engines like Google will almost always include the Wikipedia entry in the first few items of a search. This month there will be upwards of 31 billion searches using
Google alone (Do You Know? (video) 2009).

With the demise of the Encyclopaedia Britannica and other print-based reference materials so commonly used in school only twenty years ago, Wikipedia has found its way very strongly into classroom research practice. It is interesting to note that encouraging students to ‘Google it’, does not raise nearly the same level of emotion as Wikipedia usage alone, and yet the quest for the top ten entry listings on Google, is far more influenced by financial incentives and knowing the tricks of the trade, than the quality and reliability of the information presented (Kuhlmann, 2008).

Educators and academics express concern over their students using Wikipedia as a first and last source of information. The main issue with its use is that it is a free online encyclopaedia that has an open editing option, thus reliability is questionable. This is considered the major disadvantage. Other concerns raised include the preference teachers have for students to use sources with more authority and reputation (Leaver, 2000). Wikipedia is largely based on the interest of contributors; depth of knowledge is uneven and focuses more on popular culture, recent events and technological advances whilst other information can be relatively sparse. The strength of Wikipedia is due to subject experts constantly monitoring their sites and correcting errors instantly. Most Wiki sites are worked on collaboratively and can appear and are developed much more quickly than the Encyclopaedia Britannica. Wikipedia is far more responsive to change and the reliability gap between the two is relatively small (Leaver, 2009). Wikipedia has as its core principle that articles must be factual and written using a neutral point of view, with all information being fully referenced. This was also true of Encyclopaedia Britannica.

**Teaching the New Literacies**

The emphasis on literacy learning needs to be on the process of developing literacy skills and strategies, not merely on the source of that literacy, for example books, internet sites or audio books. As teachers of literacy we teach the skills of the code breaker, text participant, text user and text analyst (Freebody & Luke, 1990). Reading and writing remain modes through which our culture is expressed and reflects the social purposes that are valued by differing social and cultural groups in various ways and as such our students are required to be conversant with a wide range of literacy experiences, texts and opportunities (Harris et al., 2006).

A major ethical concern in internet usage is access. Access is defined in internet terms as knowing about and knowing how to collect and/or retrieve information (Henry, 2006). Those who lack the literacy skills to be efficient users, lack access. Access is denied through the sheer volume of entries one search engine provides as users struggle to evaluate and read all of the search results. Those who do not have access to computers with internet connection
at home lack the opportunity to improve their skill; schools who do not provide efficient and sufficient internet facilities disadvantage their students access and learning; teachers who are digital immigrants can prevent student access due to their own inabilities; students see information retrieval not as a process, but as a means to an end and lack critical perspective; students are denied access to balanced opinions as the motivation and alliances of the creator of information on the internet is not always transparent. These factors can be summed up as contributing to the digital divide.

Most students are fast users, but unsophisticated, inefficient researchers (Judd, 2007). Google as a search engine has changed the way in which we read and retrieve information (Henry, 2006). Advantages include: simple text supported by graphics making it appealing to read; critical information is easy to recognise; and it is a fast and easy source of information, providing students have developed critical literacy skills. However, when students display good ‘Googling’ skills, this does not mean that they are learning or comprehending. Students require new reading comprehension strategies to become effective users of technology (Henry, 2006). Learning only occurs when students display the ability to create something new from the information they have found. Teachers need to coach students to discern quality information; discuss the relevancy of information found and create ways to test understanding through implementation. Henry, in her article SEARCHing for an answer: The critical role of new literacies while reading on the Internet, outlines how teachers can integrate a ‘Search’ framework to assist students to develop the new literacy skills that reading on the internet requires (Henry, 2006). She offers a number of useful sites, activities and strategies for developing these skills. The use of real world activities such as activity journals (Kuhlmann, 2008) and online literature circles (Day & Kroon, 2010; Grisham & Wolsey, 2006) are a good starting point in which to practice and develop these skills in the middle years. One such example appears below:

**Middle years classroom example**

**Purpose:** Use of online literature circles to give students opportunities to access, evaluate, sort, search, gather and read information from a variety of sources to produce texts for authentic audiences and purpose.

Students choose a book to read and discuss in small virtual groups using online programs such as Moodle, Blackboard or First Class Client software. Teacher becomes a participant in the process of joint construction of knowledge and understanding. Benefits include: forging a sense of belonging to a community of readers; egalitarian participation opportunities; engagement of reluctant readers; development of critical thinking as students put their thoughts into words; facilitates the social aspect of learning (Vygotsky, 1934/1978); opportunity for students to understand themselves and others better; see themselves as readers; provides choice and control of their reading activities (Daniels, 1994,2002, Grisham & Wolsey, 2006).

**Concluding thoughts**

Socially, the use of search engines has created online collaborative learning environments that the Encyclopaedia Britannica was never able to achieve (Knobel, 2009). Online literacy learning encourages us to share, explore, experiment and imagine. In classrooms, through
the use of interactive whiteboards teachers and students enjoy access to a much wider variety of interesting information which brings with it graphics, sound and video. Students can view and share information more quickly and easily to work on collaborative projects in teams. Students have a sense of ownership when they publish their work online for authentic audiences and this facilitates and encourages peer assessment (Black, 2009). Reluctant learners are more engaged as search engines open up worlds most children will never experience for themselves. Teachers are required to guide students to develop skills to identify important questions; locate relevant information; synthesize information and communicate answers otherwise searching for information becomes a pleasant wander through the world wide web with friends, rather than a learning experience (Henry, 2006).

Today we seek and consume information in very different ways to the Encyclopaedia Britannica days. In one month Wikipedia received 97% of the visits by web surfers in the United States (Cohen, 2009, NYT). In developed countries this is normal as the Millennium Generation have a ‘no fear’ approach to technology and, on the most part, easy access (Waterman, 2009). Culturally, most search engines like Google or Wikipedia have a very Eurocentric slant; many systematically exclude certain sites and give preference to others, which leads to a narrowing of the web’s functioning in society. This runs counter to the basic premise of a world wide web and brings into question the values and ideals for its widespread growth and development. Instead of being a democratising force that will give voice to all social, cultural and economic groups it frequently silences and excludes those who are not in the dominant cultural group or who through economics do not enjoy access (Introna & Nissenbaum, 2000). Literature has always been a vehicle through which such contradictions can be explored.

The transition from encyclopaedias to search engines has been rapid, the change in pedagogy demanding. The benefits are tangible, but troublesome. The optimistic predictions of democratising and empowering all users have, however, become muddied by the concentration of power and access in the hands of a few dominant individuals. Fewer than 10 transnational media conglomerates dominate most of our media and are motivated more by commercial interests than altruism (Introna, 2000). The concept of search engines opening up new worlds of information to our students is an exciting prospect, as long as we realise that the benefits are conditional and rest capriciously on a range of political, economic, technical and personnel related factors. It becomes, therefore, even more important that we, as teachers of literacy in the middle years, equip our students with online reading comprehension skills, critical thinking skills and continually provide opportunities for rich, varied and authentic literacy learning, to set our students up for the successful future they deserve.
References


Prensky, M. (2006). *Don’t Bother me Mom – I’m Learning!* Paragon House Minnesota, USA.


**Web Resources**


