Digital Literacy: A New Flavour of Literacy or Something Different?

By Dr Barbara Combes

New technologies, changing formats and delivery modes are becoming a ubiquitous part of our information landscape. First we had the mobile phone, PDAs and the Blackberry. These early mobile tools have now been replaced with multi-functional devices such as the iPhone which can provide access to applications and information on the Web that is relevant to almost every aspect of our daily lives. Other discrete reading devices such as kindles, iPads, tablets and ebooks represent technology's replacement for print/paper based information sources such as newspapers, brochures, books and catalogues.

Such mobile devices provide our students with 24/7 full-text access to information and recreational reading that extends far beyond the physical library collection. These mobile devices are definitely the way of the future, although the print options (old technologies) still exist and will probably continue to do so in the future. As costs diminish and these devices become more robust, they are becoming part of school library collections, just as videos, digital cameras, USB sticks, laptops and video cameras have in the past.

However, there are issues associated with these new devices apart from cost, maintenance, robustness, redundancy and how to deal with them as part of an evolving library resource collection. Research since 2003 is telling us that the literacy skills required to

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successfully navigate and make meaning from text, images and multimedia on screens are different from the traditional literacy skills of reading, writing, viewing, listening, speaking and understanding (Coiro, 2003, 2007, 2009; Castek et al. 2008). Computers are not compensatory, but complementary. Good traditional literacy skills are essential before students can use any technological device effectively and efficiently. Making meaning from information presented on a screen is more difficult and requires new literacy skills that should be a component of the information literacy skills set teacher-librarians embed in their collaboratively designed curriculum programs. This article will present a brief examination of the evolving information landscape, the reading process and current research findings, an exploration of the term digital literacy, the role of the teacher-librarian and the implications for our students if these skills do not become part of the literacy/reading culture in the school.

The Evolving Information Landscape

Before examining reading and digital literacy it is important to remind ourselves of the information landscape that is rapidly evolving around us. Some facts about the web we all need to be reminded about include the following:

1. When we access the Internet we are actually accessing the World Wide Web (WWW) which is a subset of the Internet, which is a much larger beast. The Public Domain Web represents approximately 8-10% of the WWW. This is the part that search engines like Google can access. If we think of the Web as an iceberg, the Public Domain Web represents the tip of the iceberg. The rest of the Web is locked away and represents 90%+ of what is on the web. This part of the iceberg is called the Deep, Hidden or Invisible Web (Deep Web Technologies, 2016) and it is not available to the public unless a paid subscription is involved or the user has authenticated access, ie. it is a password protected intranet or portal.
2. Change and an abundance of new and old formats, delivery modes and utilities are a major feature of this landscape, which is comprised of both digital and print formats.
3. It is a highly differentiated landscape, ie. it is layered, which makes it difficult to locate specific information.
4. It is HUGE! Information overload is a feature of this landscape (Walford, 2015; Kunder, 2016).
5. Complexity and density also characterise this landscape.
6. Information may be decontextualised. Technologies such as RSS Feeds and Twitter have limited content and information is often passed around that is out of context and with no link back to the primary source.
7. Information in this landscape is available 24/7.
8. Artificial intelligence is a built-in feature for many of the technologies used to access and participate in this landscape so users don't have to think about how to use it, ie. the tool is directing the user.
9. Technology is becoming faster, convergent (everything on one device), smaller and mobile.
10. Information is easy to manipulate with the result that authority, authenticity and date of publication are often difficult to establish.
11. Information is presented as static, multimedia, images and as infographics.
12. The technologies that now define the Web are also interactive, ie. communication can be one-to-many instead of just one-to-one.

Hence, the information landscape, particularly the online component, is very complex and an extremely dynamic environment, a fact that affects the literacy skills we need to be able to access it effectively and efficiently.

Reading

Reading is taught to students between four and six years of age. Some students appear to be reading-ready at a younger age than others. These differences may be attributed to environment and lack of stimulation, different rates of cognitive development and learning difficulties. Despite these differences children in schools are expected to have acquired basic literacy skills by the end of Year Three or when they are approximately eight years of age. As a point of interest, a component of the 2016 budget will provide funding to test literacy and numeracy skills in Year One (Riddle, 2016), a stage when many students are still in the beginning reader phase and not ready to read.

Research indicates that children in Year Three are at the age when the average child is only just beginning to make cognitive connections between their concrete world and concepts. According to Piaget (Bhattacharya & Han, 2001; Huitt & Hummel, 2003; Atherton, 2013) children aged between two and seven are in the pre-operational stage of cognitive development, where learning is defined by direct interaction with the local environment. Young children learn to use language and to represent objects by images and words (spoken/oral). Thinking is largely egocentric and young children perceive their world by relating it to what is real. Learning during these years is concrete. Hence, when learning to read and create the cognitive connections that are necessary to associate meaning with symbolic language, young children still need a concrete experience. So learning to read is an holistic experience. It usually consists of oral repetition, images to connect a concept with a real/concrete object and a physical object (picture book) to provide an anchor for the reader who still requires something physical in order to create their reading circuit. Maryanne Wolf concludes:

> We humans were never born to read. We learn to do so by an extraordinarily ingenuous ability to rearrange our original parts – like language and vision, both of which have genetic programs that unfold in a fairly orderly fashion within any nurturant environment. Reading isn't like that. . . . Each young reader has to fashion an entirely new reading circuit afresh every time. There is no one neat circuit just waiting to unfold. This means that the circuit can become more or less developed depending on the particulars of the learner: e.g., instruction, culture, motivation, educational opportunity (Wolf, 2009).

Books provide a physical/concrete object for children to relate to when learning to read. Books also teach beginning readers some important language skills such as the physical representation of whole (book & contents), which includes:

- parts of the whole;
- beginning, middle & end (concrete context);
- reading text goes from the top to the bottom of the page;
- we read from left to right in western society; and
- sequencing ie. one page/event occurs after another.

The book provides a physical context to assist children as they transition into conceptual learners. Text on a screen, however, accounts for approximately a third of an A4 page and exists as a single entity, ie. the user must do something extra to move through the dialogue or book and there is no whole structure or physical context available to the reader. Thus, the concept, structure and presentation of an eBook is very different to a book. If the eBook is interactive, it also introduces distracting elements or noise, which prevent the reading brain from focusing on making meaning from the text and/or images.

Research is telling us that reading or the decoding/making meaning from symbolic text is a very complex activity. The brain learns to access and integrate within 300 milliseconds a vast array of visual, semantic, sound (or phonological), and conceptual processes, which

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allows us to decode and begin to comprehend a word. The brain also recognises a word by its shape. Then 100-200 extra milliseconds occur to connect the decoded words to inference, analogical reasoning, critical reasoning and contextual knowledge. The reader must then decode and analyse a sequence of words in the form of a sentence and then a paragraph of connected ideas and concepts, which are all positioned to convey a certain meaning by the author. The author's intended meaning may not always be clear to the reader who always deconstructs to make meanings which are relevant or relate to the reader's own personal needs and experiences. The apex of reading is when the reader's own thoughts go beyond the text (Wolf, 2008, 2009) or we imagine when we read. So while we appear to be genetically wired or predisposed for oral and aural communication, this is not the case for reading. While reading is a skill that needs to be taught, it is also a skill that needs to be maintained since the reader must create a new reading circuit every time new reading occurs. Reading is a skill that requires ongoing development. The development of a reading habit and introducing reading that increases in difficulty is a major responsibility of the teacher-librarian and the school library. Hence, a major goal of schooling is to develop higher order literacy skills (Moats & Tolman, 2009).

There are, therefore, two parts to an elementary instructional reading program – the learning-to-read phase and the reading-to-learn phase. The instructional program develops readers who learn to read independently for pleasure and learning which, in turn, is supported by both instruction and the collection in the school library. Research over the last forty years has found that children who read for pleasure, particularly fiction, have improved academic, social, and economic outcomes (OECD, 2002; Clark & Rumbold, 2006; Dept. Edu UK., 2012; National Library NZ, 2014; Reading Agency, 2015). They have more sophisticated literacy skills and can engage with all types of media at a much higher level. Literacy, therefore, is an ongoing goal for the United Nations and a major part of the 2030 Agenda for all developing and developed nations (United Nations, 2015).

Literacy Matters!

Reading and the traditional literacy skills, which include writing, speaking, listening and viewing, are extremely important as foundation skills. However literacy also includes a sixth component that goes beyond the mechanics of reading. The sixth skill is comprehending, understanding or making meaning from what we have read. When children understand what they have read they begin to move into the reading-for-learning phase of literacy. The deeper definitions of literacy are inherent in the following definitions, which were written long before the WWW was invented (1993) (Berners-Lee & Fischetti, 1999).

(Traditional) Literacy is:
> . . . the integration of listening, speaking, reading, writing and critical thinking. It includes a cultural knowledge, which enables a speaker, writer or reader to recognise and use language appropriate to different social situations. For an advanced technological society such as Australia, the goal is an active literacy which allows people to use language to enhance their capacity to think, create and question, in order to participate effectively in society (The National Secretariat for the International Year of Literacy, 1990).

> . . . the making of meaning and its clear communication to others. Truly literate people not only read and write, but regularly do so in order to sort out their ideas and put them in words, to fit them together and test hypotheses - ie. to make sense and meaning out of our world. Truly literate people acknowledge that they need to write things down, to talk them out, to read widely, to listen critically and to respond articulately. Truly literate people are thinkers and learners (Brown & Mathie, 1990).

> . . . the foundation of effective citizenship, human communication and social integration in a literate society. Therefore it is important to foster the lifetime habit of purposeful and critical reading for information, education and recreation. Literacy is the foundation of learning in all areas of the curriculum (Holdway, 1979).

These definitions of the term literacy focus on the reader as expert, i.e. they have developed high level literacy skills (mechanics of reading, writing, listening, viewing, speaking and understanding). Research about how the brain makes meaning from symbolic text reveals that reading and literacy are skills that require constant maintenance and which are also evolving as new formats and delivery modes become available. Since 2003 research has been telling us that high-level traditional literacy skills are required before people can engage with technologies and make meaning from text, images and multimedia on screen. When people of all ages want to engage with text on screen at a deeper level they tend to print a copy for reading (Combes, 2009, 2012).

Reading From the Screen

Research has also found that there are some major issues when reading and making meaning from information on the screen. Julie Coiro's ground-breaking research occurred in 2003, before Google, iPhones, iPads, eBooks and Web 2.0 technologies were developed. She found that children in middle school required high level literacy skills before they could engage with and make meaning from text (includes images and multimedia) on screen. Her work continues to produce some astounding results, especially when the digital native label and associated attributes continue to be applied to young people (Coiro, 2003, 2007, 2009, 2011).

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Other research reveals that people read more slowly on screen, by as much as 20-30 percent. Reading on the screen requires more effort and is more tiring as the eyes compensate for the rolling of the computer screen. Workers switch tasks about every three minutes and take over twenty-three minutes on average to return to a task. Distractions abound online and task switching costs time and interferes with the concentration needed to think about what you read (Aamodt, 2009; Mark 2009; Liu, 2009). Research has found that users tend to switch simple activities an average of every three minutes (eg. reading email or Instant Messaging) and switch projects about every 10 and a half minutes (Wolf, 2008, 2009). Other studies have revealed that multitasking is really a myth and is not conducive to learning, especially deep learning, critical

analysis and effective memory retrieval. Task switching interferes with learning (Dzubak, 2008; Mark, 2009; Carr, 2010; Burak, 2012; Combes, 2012; Junco, 2012).

Instead of focused reading, users seem to suffer 'tunnel vision' when reading from the screen and only see certain parts of the text (Liu, 2009; Combes, 2012). Current research using eye-tracker software confirms that how we read from and engage with information on a screen is different to how we read print materials (Liu et. al, 2016). Other research indicates that it is the physicality of the book as a codex that makes navigability easier and helps the reader to create a coherent mental map of the text (Wolf, 2008, 2009). Most screen reading now takes place on smaller devices such as e-readers, smartphones and tablets, which have been shown to interfere with intuitive navigation of text and actually inhibit people from making cognitive mental maps in their minds (Wolf, 2008, 2009; Flood, 2015).

Research is also finding that digitised classrooms aren't necessarily successful due to an off-campus reason. Students come to school with a culture of technology use that is predicated on play and entertainment rather than using the technology as a learning and investigative tool (Bauerlein, 2009, Combes, 2012). 'Snacking' (using the computer for something other than learning) by students where one-to-one laptops are in the classroom, is a common behaviour that disrupts learning (Rockmore, 2014). Carr (2010) reminds us that 'a growing body of scientific evidence suggests that the Web, with its constant distractions and interruptions, is turning us into scattered and superficial thinkers'. Jabr (2013) wonders why we are so intent on replicating the codex that defines a book on the screen. He reminds us that reading and engaging with information on screen is a different type of reading and online literacy or screen/digital literacy requires a new skills set to match a new reading paradigm (Liu, 2009; Jabr, 2013).

Digital Literacy

Taking into account the previous discussion, it is obvious that the term digital literacy or literacies actually refers to a multi-faceted set of skills. At the most basic level, to be digitally literate requires strong foundational literacy skills we usually associate with print materials. Anyone using technology must be literate (able to read, write (closely connected with reading), view, listen, speak and understand) first and even then, they will miss information on the screen due to the way we engage with information presented via a screen.

At another level digital literacy includes a range of competencies or skills required to navigate the digital environment. These include:

- computer literacy – how to use the computer hardware and software to download; organise, collate and store information, and present information via word-processing, spreadsheets and presentation (PPT) software or using Web 2.0 utilities (eg. Prezi, Voicethread, blogs, wikis);
- ICT literacy – how to use information communications software such as email, the Web and the Internet, including how to use browser technology efficiently and effectively;
- Web 2.0 literacy – how to use interactive one-to-many utilities and apps (applications);
- network/Internet literacy – knowing where you are in virtual space, ie. having a mental map;
- media/multimedia literacy – making meaning from images, graphs, infographics and multimedia; and
- information management – being able to locate, filter, select and evaluate information to meet your needs.

These skills are complex, evolving as new technologies are developed and often not taught to children or students in schools. As a result most people, not just young people, use technology in a very superficial manner (Combes, 2012). Locating authoritative (good) information and being able to make meaning from that

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information is the second part of the digital literacy skill set. However, we do not embed the teaching of these skills into curriculum programs, even though ICT capabilities appear at all levels of the Australian Curriculum. This is partly due to the assumption that our students already have these skills, ie. they are digital natives, so we don't have to teach them.

On a third level the term digital literacy refers to knowledge and a deeper set of understandings associated with standards and values, cultural mores and legal requirements. Digital literacy at this level is not about skills or competencies. It is about being able to apply concepts and understanding to engage in the digital environment in an ethical and appropriate manner. At this level digital literacy means:

- being able to fulfil legal obligations and societal rules such as observing intellectual property, copyright and plagiarism;
- being culturally sensitive when using technology;
- recognising access for the disabled (now a legal requirement);
- ensuring privacy (a legal requirement) and safety in this environment;
- all while being able to use the digital information you have found, understand and apply or re-purpose it to meet an information need or solve a problem (information inquiry, higher order thinking and problem-solving).

Lastly, digital literacy refers to a concept that was previously impossible when working in a world dominated by print. The concept is the idea of a global society and global citizenship, where people connect and move beyond national and language boundaries and cultural and religious differences.

The Role of the Teacher-Librarian

This is a tricky one! Of course in an ideal world the teacher-librarian would be collaboratively planning with teachers and designing curriculum that embeds the teaching and assessment of digital literacy skills. Digital literacy skills are a subset of the much broader umbrella term or concept of information literacy. In today's information landscape you cannot be information literate if you do not have digital literacy skills. In reality it is difficult to get teachers to collaborate, especially when labels and terms such as digital native and digital literacy are thrown around with little or no understanding of what the terms really mean.

The information landscape is also an intimidating one for many adults. Our children and students have never known an information landscape that is not dominated by instant gratification, new and exciting ways of doing 'stuff', immediate communication and technologies that allow for ego and celebrity publishing where the most important person is the individual. Young people tend to approach these technologies with confidence and a culture of use that is based on experiential learning or trial and error based on success. This is a very powerful learning pedagogy. Many adults, however, are anxious in this environment due to a belief that as digital immigrants they are somehow inferior to the natives. What many teachers and teacher-librarians don't understand is that everyone uses the technology superficially. It takes careful planning and thinking to use and embed technology into the classroom so it becomes a teaching and learning tool. Students also recognise the value of their teachers and do not see or want technology as a replacement (Aldridge et. al, 2002).

Using technology for teaching and learning means assessing student outcomes and this is where the teacher-librarian can work alongside the teacher in the classroom. Getting started takes extra planning and approaching a teacher who is willing to step outside their comfort zone. The teacher-librarian should always take a reasonably developed plan with them when negotiating for collaboration. The plan should clearly outline what you will produce/develop (learning resources to scaffold student learning and an online presence or website if the technology is robust in your school), your instructional and assessment role. Start small and plan well, including a thorough evaluation process by you, the teacher and the students. Having a debriefing session with students at the conclusion of a piece of curriculum is one way of including students in the learning process as well as teaching them reflective practice. At all times use your skills to provide extra resources for the teacher and the students, as well as becoming an expert in whichever tech tool you choose as a vehicle for teaching and learning. Don't be afraid to include the students as technology experts either. What you bring to the table as teachers is expertise in how to deal with and make meaning from information, a skill the students recognise they lack.

Lastly, the collaborative team should share the program with other staff members and teacher-librarians, even if you don't think it is anything particularly spectacular. A well-planned and executed program that includes strategies for initiating collaboration, provides details about what worked and more importantly what didn't work, will always have resonance with your peers. Each program you celebrate in this manner raises your status and visibility in the school, embeds your role and that of the library in the core business of the school (teaching and learning) and will lead to more collaboration with other teachers. If teacher-librarians don't continue to press for collaborative curriculum design and the teaching of digital literacy skills and understandings, we will not be graduating flexible and thinking students who are capable of engaging with further education or the workplace beyond school. We will not be graduating students with the capacity to become lifelong learners.

Concluding Thoughts

The information landscape of the twenty-first century is a very complex and evolving concept and it is currently populated by new and old information artefacts and people. Both of these characteristics ultimately change the structure of the landscape itself and how society views it. Therefore, developments in technology affect the landscape and the humans who inhabit it and vice versa. To engage successfully in this environment we all need to be digitally literate. The term digital literacy, just like the term literacy, goes beyond the skills/competencies required to work in this environment. There are layers of meaning to the term digital literacy, and while it is used to mean many things, it is rarely defined and the competencies or skills rarely taught to our students. To be able to work in the digital environment a person also needs to have a high degree of literacy. Hence, a fundamental skill when working with digital tools and information is the ability to read, interpret and understand.

Being digitally literate means being literate first and having digital literacy skills or competencies second. Such competencies include navigation and information management skills to ensure up-to-date, relevant sources are located in an accessible format, and sources are well organised and documented to enable the efficient retrieval of information.

Being digitally literate also includes knowledge and understanding of the ethical and legal use of information, maintaining security and privacy (your information and others); while at a much deeper level, is about understanding how to be a global citizen. Students who are digitally literate have a range of skills and capabilities, which enable them to live, learn and work in a society that is increasingly dominated by technology and digital information.

The term digital literacy is often understood and used differently depending on the context and discipline. In education we should be focusing on the literacies rather than the media, because the technology will change. We need to be wary of making assumptions about the skill levels of our students, because research is telling us that reading, teaching and learning using technology and the screen requires a different literacy paradigm. Lastly we need to engage everyone in a conversation about the deeper layers of meaning that sit behind the term digital literacy. In this instance, when we use the term literacy as a descriptor, it is because being literate is fundamental to how we communicate knowledge and meaning, and this includes the digital environment.

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