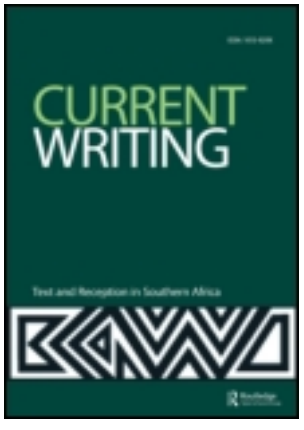

Current Writing: Text and Reception in Southern Africa

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/rcwr20

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Published online: 22 May 2013.

To cite this article: Ryan James & Leon de Kock (2013): Deepening the 'Shallows': The Fate of Reading in an Electronic Age, Revisited, Current Writing: Text and Reception in Southern Africa, 25:1, 4-19

To link to this article: http://dx.doi.org/10.1080/1013929X.2013.795744

Current Writing: Text and Reception in Southern Africa, 2013
Vol. 25, No. 1, 4–19, http://dx.doi.org/10.1080/1013929X.2013.795744

Routledge
Taylor & Francis Group

Deepening the 'Shallows': The Fate of Reading in an Electronic Age, Revisited

Ryan James and Leon de Kock

As the international turn towards the Digital Humanities gains ground, this article revisits the debate about how digital reading affects cognitive styles of immersion in the act of consuming literature. We ask the question whether the much-reviled state of "hyperattention" associated with screen-based reading invariably results in neurocognitive shallowing and cultural loss. Rather than sing along with this well-rehearsed and somewhat predictable chorus, we suggest that digital reading can, under controlled circumstances, enhance one's engagement with literature in a way unimagined and – and literally – unrealised before.

Keywords: Digital Humanities; digital reading; e-books; enhanced e-books; neurocognitive; amplified reading; humanities computing

The "fate" of reading in the humanities, we often hear nowadays, especially "deep" literary or scholarly reading, is by no means secure. If we are to accept the genuinely alarming conclusions reached by Nicholas Carr in his widely cited work, *The Shallows: How the Internet is Changing the Way We Think, Read & Remember* (2010), for example, along with Sven Birkerts's *The Gutenberg Elegies: The Fate of Reading in an Electronic Age* (1994), then the advent and rapid growth of e-reading should strike deep fear into the hearts of committed humanists, scholars of all kinds, and bibliophiles – people, in other words, who "live by the book", and who have derived both pleasure and extensive learning from a lifelong process of engaged, serious book-reading. For what one might call the "book people", the most alarming feature of Carr's work is the argument that "hyperattention" – the state commonly associated with screen-based, digital reading – invariably results in a process of neurocognitive "shallowing". This, in the Carr argument, is the result of a virtual "re-wiring" of neurocognitive processes in order to support *not* engaged and 'deep' scholarly reading, but rather to render possible that peculiarly superficial, hop-skip-and-jump kind of surface reading associated with digital screens. This is a terrible thought, indeed, for people of the book. In this article, however, we seek to render problematic such a dead-end in the debate – how could any researcher or scholar *not* be horrified at the prospect of intellectual shallowing out? – by making the case for a revised understanding both of digital reading in e-book formats, and of the potential of digital reading to create *enhanced* rather than reduced neurocognitive reading and learning skills.

About one thing there seems to be little doubt: Reading is in decline. Despite the current surge in the international academy towards greater resourcing of the field known as the "Digital Humanities" (cf. Burdick, Drucker, Lunenfeld, Presner and Schnapp 2012), the available literature, most of which is based on American studies, suggests that literary reading is on a downward trajectory. It suggests that such a falling-off in reading affects all socio-economic strata of society and that there is a positive correlation between the decline in reading and the increase in availability, scope and influence of digital media.

In a 2004 report composed by America's National Endowment for the Arts (NEA), *Reading at Risk*, with a sample size of more than 17 000 adults, a summary of the quantitative results shows that between 1982 and 2002 the number of US adults reading literature declined by a 10.2

percentage-point margin (2004: ix). As the data becomes more specific, it shows that the fall is most severe in the 18- to 24-year-old age group, where the dwindling rates of literary reading are shown to be 55 percent more pronounced than that of the total adult population (xi).

The NEA's most recent report, *To Read or Not to Read*, published in 2007, presented data from a number of American national studies conducted by US federal agencies, supplemented by academic, foundation and business surveys. While the 2007 report included many of the same findings as the 2004 report, of particular interest in the NEA chairman Dana Gioia's preface was the observation that in addition to the general decline in reading among teenage and adult Americans, "both reading ability and the habit of regular reading have greatly declined among college graduates" (2007: 3).

The 2007 report was more careful to investigate reading behaviours that were emerging as a direct result of the ever-growing digital revolution. Most notable is the speculation that, increasingly, time spent reading literature is shared with digital activities. The report found that 20 percent of voluntary reading time is shared by one or more of the following activities: watching television, playing television games, instant messaging, e-mailing or internet surfing (National Endowment for the Arts 2007: 8).

Scholastic, the world's largest publisher and distributor of children's books, found evidence to support the NEA's findings in their own *2010 Kids & Family Reading Report: Turning the Page in the Digital Age* (2010), based on a sample of 1,045 children, aged 6-17, along with their parents. The report found that as people got older, the amount of time spent reading books for fun dropped sharply, by almost 40 percent between the ages of 6 and 17 (Scholastic 2010: 7). And although based on perception only, 41 percent of parents said the time their children spend reading books for fun had decreased as a result of electronic or digital devices (6).

One of the more recent reports, published in 2010, by the Kaiser Family Foundation, *Generation M^2: Media in the Lives of 8- to 18-Year-Olds,* looked at an American national representative survey of 2002 3rd-12th grade students (Rideout, Foehr and Roberts). The report showed that during the ten-year period from 1999 to 2009, the only type of media usage in decline was print media; use of the remaining media types, including television, audio content, computers, video gaming and movies, all increased by varying degrees (Rideout, Foehr and Roberts 2010: 2).

The results of *Generation M^2* also indicated that the sample group spent a massive 7.5 hours per day consuming media, almost 1.5 hours more than the figure reported by the same organisation five years earlier (Rideout, Foehr and Roberts 2010: 2). Further, the report shows that as a result of the large number of young people who use more than one medium at a time, an average of 10 hours and 45 minutes worth of exposure to media content are crammed into the 7.5 hours of daily usage. This is an increase of almost 2 1/4 hours of media exposure per day over five years (Rideout, Foehr and Roberts 2010: 2).

These studies provide evidence to suggest that – at least in North America – traditional, paper-based reading is in decline and that, in a 'forensic' investigation, one could at a glance indict digital media as the primary suspect. In the context of this article, though, a much more thorough analysis is needed so that we may arrive at a summary conclusion from which an argument for the path forward can be more objectively hypothesised.

Scholarly critiques and writers' fears of digital reading

Soon after beginning research on this project at Stellenbosch University, we approached the highly regarded, Scotland-based contemporary South African writer Zoë Wicomb, during one of her visits to Cape Town, about the possibility of a digital reworking of her work. We

wanted to gauge her willingness to cooperate with us on a digital repackaging of her excellent collection of short stories, *You Can't Get Lost in Cape Town* (1987). The intention, if Wicomb had obliged, was to demonstrate how a specific kind of literary work might be digitalised and "amplified" so as to increase readership and engagement with a new generation of individuals – people who do most of their reading in the digital space, using personal computers, mobile phones and now, e-reading devices and tablet computers. The term "amplified" was coined by publishing giant Penguin Group and refers to e-books that are enhanced to "provide deeper, richer insight into an author's work" (Penguin.com 2012). In other words, on an e-reading device, such as Amazon's Kindle, or on a tablet, like the Apple iPad, a digital version of a text is supplemented with media – audio clips, timelines, maps, contextual links and so on, all of which can be accessed by the reader as he or she reads. Wicomb's response? She did not mince her words. She found the idea "absolutely horrifying".

To the printed book purist, such as Wicomb, the enhanced or "amplified" e-book represents the second assault on traditional, paper-based reading. The first such assault came in the form of the technology itself. Whether the device was an e-reader, tablet, personal computer or mobile phone, book purists argued that e-books would not succeed because they lacked the special tactile feel of material, real-world books made from paper and designed in an aesthetically pleasing manner – objects that are both beautiful and useful. When the possibility of a mass market in e-books began doing the rounds in the mid- to late-noughties, journalists, even technology journalists such as Mike Elgan – former editor of Windows Magazine – were given to utterances such as the declaration that the timeless technology of the codex book, such as its flexibility, its independence from electricity, its ability to be easily annotated, as well as its hardiness on a beach or in a bath, would sooner or later demonstrate that e-readers sullied the joy of reading (Elgan 2007). In fact, over the last two years there has been no shortage of "odes to the book" by online journalists, our favourite being that of luddite Ron Grossman of the *Chicago Tribune News* who listed "the mildew perfume of moldy bindings" as an experience with which like-minded bibliophiles would identify – and which they would continue to relish (2011: n.p.).

The publishing industry, together with its authors, has also been fairly mulish in its response to the digital reading space. In his capacity as the senior director of online consumer sales and marketing for Penguin Group USA, Jeff Gomez etched out a nonpartisan position for his company as far back as 2008, criticising major trade publishing for "slowly hardening into hubris" by thinking that "any challenge to the way it does business is an attack of philistinism rather than an idea whose time might have come" (2008: 62). By 2012, the hubris referred to by Gomez was thawing quickly, yet it was only in March 2012 that the author of the best-selling book series in publishing history, J.K. Rowling, allowed the release of her *Harry Potter* series in digital format – and there are still many authors who are vehemently against the idea. The late Ray Bradbury, one of the most lauded science-fiction writers of the twentieth century and author of *Fahrenheit 451* (1976), said in 2009: "To hell with … the Internet. It's distracting. It's meaningless; it's not real. It's in the air somewhere" (Steinhauer 2009: n.p.). Doris Lessing, a recent Nobel Laureate, has expressed similar sentiments. In her Nobel Prize acceptance speech, Lessing made the clear-sighted observation that "the internet … has seduced a whole generation with its inanities so that even quite reasonable people will confess that, once they are hooked, it is hard to cut free" (2007: n.p.).

For book purists, the dissolution of codex technology is unthinkable, but so is the idea that a text should exist on a networked screen, with all the screen's inanities, and, according to many more people than just Ray Bradbury and Doris Lessing, its distractions. Terje Hillesund, media and communication theorist at the University of Stavanger in Norway, summarises this fear neatly:

> While hypertext theorists celebrate a new-won freedom for readers (and writers), others claim that the current shaping of the Web induces a new form of constraint – a psychological urge to click; a kind of uneasy wariness of mind and index finger. (2010: n.p.)

It was bad enough that we suggested to Wicomb a digital version of her short stories, but the further suggestion that her book would be digitally "enhanced", with the inclusion of contextual "amplification", was simply a bridge too far. The idea, unmediated, does at first glance seem "absolutely horrifying" to a committed book person.

Such responses find ample justification in recent scholarly literature on digital reading and the supposed 'crisis' it has caused. Prominent among such scholars are technology writer Nicholas Carr, and American literary critic Sven Birkerts, both of whom are noted for their scepticism about the ability of the digital reading space to promote qualities inherent in traditional, paper-based reading. Even literature theorist Katherine Hayles – a proponent of the new digital reading space – is careful to promote caution as imaginative storytelling starts to explore the electronic realm.

Carr and Hayles both write about the possible neurocognitive changes taking place as humans spend more of their time in the digital reading space (Hayles 2007; Carr 2010). Carr, in particular, discusses changes to human neural circuitry whereby internet reading skills such as scanning, and the common act of performing several tasks at once, are seen as overriding cognitive space previously reserved for thinking deeply (2010: 140). Hayles describes this quality as "deep attention", promoted by the quiet, linear act of traditional, paper-based reading, as against "hyper-attention", which is seen as a state of distractedness promoted by the frenzied inter-connectedness and discontinuity of the internet's web-like a-linearity (2007: 188). As much as Hayles attempts to differentiate her concept of hyper-attention from Attention Deficit Hyperactivity Disorder (ADHD), it still sounds like something for which a person might need treatment, and the Diagnostic and Statistical Manual of Mental Disorders (DSM), widely viewed as the authority on mental illnesses, plans soon to include "Internet use disorder" in its appendix (Richtel 2012).

Carr's large-scale literature review suggests that learning or engaging with a text in a digital environment draws heavily on problem-solving and decision-making abilities to the detriment of language, memory and visual processing skills (2010: 122). Essentially, one of paper's spatial limitations is its isolation; there are no other options for the reader but to read the text linearly, and the advantage is the brain's ability to focus on effective comprehension within a closed environment. Online, humans are operating in an open environment and on most web-pages there can be hundreds of opportunities to navigate to other online destinations. Worse still: pop-up images, hypertext, adverts, instant messages and emails all contend with the word, and with every interruption there is the chance that some small irony might be missed, or a subtle innuendo skimmed over. It is indeed little wonder that 'traditional' authors and scholars are often horrified by the idea of digitalisation.

These are interesting times for reading, and it is tempting to submit to the view that we are on the precipice of the most significant, and deleterious, change in literacy practice since Gutenberg made extensive reading available to the masses more than five hundred years ago (Birkerts 1994). It should not be unreasonable, though, to suggest that rather than debate the "whether or nots" or the "pros and cons", we should now be moving into a position of thinking about how the publishing and reading establishment – including publishers, technologists, academics, librarians, scholars and authors – can use the digital space to *re*-engage readers, *re*-invent the reception of imaginative literature and constructively enhance the experience of reading. More importantly, we will argue that said group of professionals should be looking at ways to enhance literature not for enhancement's sake, as is the case with an iPad app such as *Alice for iPad*[1] (Atomic Antelope 2010), for example, but for better reasons. There is a need to imagine how the content of

digitally enhanced long-form text can be presented with the purpose of adding real literary, imaginative and/or scholarly value. What value can be delivered by an enhanced e-book, and how can that value be delivered in a way that promotes as many of the venerated cognitive qualities of traditional, paper-based reading as possible?

As yet there are no definitive answers to questions such as these, but commentators are beginning to circulate a number of interesting ideas on the matter. Marc Prensky, an American speaker and writer on education and learning (and perhaps best known as the inventor of the term "digital native"[2]), suggests that the most interesting challenge will be to incorporate skills associated with traditional, paper-based reading, like critical thinking, into an on-screen, connected space (2001a: n.p.). Hayles, in her turn, warns educators of the need urgently to rethink the entire education system – media-rich environments are dramatically changing the way young people think, and linear learning environments, as well as paper and textbooks, are quickly becoming obsolete (Hayles 2007: 188). Hillesund adds that there could be

> severe consequences if [screen-based technologies] did not include easily readable long-form text in which detailed descriptions, long arguments and complex narratives are decisive, providing students with important frames of reference indispensable for deeper understanding. (2010: n.p.)

This somewhat topsy-turvy debate is fairly well summarised in a recent report comparing print, basic and enhanced e-book platforms. Released in 2012 by the Joan Ganz Cooney Center, the report, entitled "Print books vs. E-books", finds that

> [w]hen measuring *child-book engagement* (e.g., direct attention, touch), more children showed higher levels of engagement for the e-books than the print books, though a majority were equally engaged by both book types … Children also physically interacted with the enhanced e-book more than when reading either the print or basic e-book. (Chiong, Ree and Takeuchi 2012: 2)

However, the report also states that although e-books improved engagement, they were not as effective as print books in "literacy building" (2) and the summary concludes that "research should systematically examine what types, combination, and placement of e-books (e.g., hotspots, games) help or hinder learning and conversation" (4).

Let us acknowledge, then, that various scholars are reaching more or less the same conclusion: they are convinced that there is a need to engage young people in the digital environment, which is also the environment with which young people are most familiar; they are hopeful that new methods of interactivity in the digital reading space might improve young people's engagement with literature; and they are in agreement that it would be an important achievement if new digital reading spaces might allow the reader to retain some of the qualities of traditional, paper-based reading such as deep attention, critical thinking and literacy building.

Before the work done by Prensky, Hayles and Hillesund, humanities computing (precursor term to "digital humanities") theorist George Landow had already tabled a number of ways in which hypermedia within a digital reading space might deliver value; value that the codex would not be able to deliver quite as effectively. Landow suggested that literature and literary theory – if correctly packaged in a digital reading space – would have the potential to introduce students to new forms of academic writing, facilitate interdisciplinary work and collaboration, break down elitist textual barriers by making all text immediately available, and free students from teacher-centred classrooms (1997 cited in Dobson & Willinsky 2008: 289). Notably, Landow also suggested that the digital space he was trying to imagine would empower students by promoting critical thinking (1997 cited in Dobson & Willinsky 2008: 289). In a 1989 article, "Hypertext in Literary Education, Criticism and Scholarship", Landow wrote as follows:

> Unlike books, which contain physically isolated texts, hypertext emphasizes connections and relations, and in so doing, it changes the way the texts exist and the way we read them. It also changes the role of author and reader, teacher and student. (1989: 174)

While Landow's vision is understood within the context of a scholarly environment, the intention of this article is to consider *extending* the projected values of an enhanced or "amplified" book. More specifically, within the confines of a theoretical discussion, we seek to demonstrate how a new aesthetic of book presentation might stimulate renewed interest in the humanities and liberal arts, reinstate imaginative literature – fiction in particular – as one of the central components in the education process, and bring into recirculation books that have become increasingly obscure over time or inaccessible to young people.

At this juncture, it might be helpful to clarify a number of important points. First, the proposed *digital* aesthetics of book presentation does not suggest that the primary text, or an author's narrative proper, should be changed in any way. We do not contend that, for example, a literary work like Zoë Wicomb's *You Can't Get Lost in Cape Town* (1987) should be digitally repackaged to the extent that media becomes integral to the original story. To the contrary, this study proposes that existing or old media technologies, such as video and social networking software, might be *repurposed* within a digital reading environment in order to supplement primary texts. Nonetheless, this argument will keep in mind the idea that a requirement for hermeneutic immersion, as Hillesund reminds us, "is that technology offers minimal disturbances on the part of the user; that it becomes more or less transparent" (2010: n.p.). Accordingly, we make a number of arguments and suggestions for hypermedia to avoid becoming a fluency disruption.

Second, we wish to emphasise that there is a need for the current technology debate to evolve so that all stakeholders might proactively look to contribute to new reading experiences in such a way that the qualities of traditional, paper-based reading are protected, but an experimental hypermedia digital reading space is not squashed or ruled out of contention. Further, an experimental space, while steering the new technologies which make the touchscreen electronic interface of *Alice for iPad* (Atomic Antelope 2010) possible, should also be exploring how theoretical visions for the future value of content, such as George Landow's (1997 cited in Dobson & Willinsky 2008: 289), can be realised in the digital reading space. That is to say, apart from the proverbial "bells and whistles" of the tablets and e-readers that are racing out of Silicon Valley (two years after the launch of the initial iPad, there are already murmurings about the arrival of iPad 4), how might the instructional interface design of a digital reading space improve young people's engagement and understanding of literature, both new and old?

Third, while the cognitive differences between traditional, paper-based reading and digital reading are critically important to any discussion of digital literacy, we have tried to avoid some of the nay-saying narratives that dominate much of the New Media debate. Accepting that there are many interesting points both for and against digital reading, our argument faces up to the overwhelming evidence that the digital age, together with its vastly changed conditions of reading, is upon us; and that there is a necessity to develop constructive and valuable frameworks for future literacies so that we can all take advantage of the digital reading space.

Lastly, given some of the concerns that have been raised about the future of the book in a digital age, it is to be expected that authors, especially authors of fiction, will be wary of making their texts available for digital "enhancement". After the Wicomb experience, we would formulate a proposal to an author in this regard in a way that took into consideration the fact that words like "enhanced" and "e-book" might lead many writers to entertain a notion of hypermedia overthrowing the autonomy of the text. That is not the intention of the model we wish to propose. The idea is to find ways to enhance literature; and such enhancement should seek to empower readers – via digital tools – so that they have a better chance of

achieving the deep attention associated with hermeneutic immersion when reading. In many ways, this proposal argues for the use of technologies from a new generation to access the content and literary value of past generations.

In all likelihood Wicomb would still say "no, absolutely not". Hopefully, though, rather than seeing the experiment as just another instance of technology inching its way across the sheets on her bureau, she might at least acknowledge that the ideas to follow are the early stages of an attempt to navigate the digitalisation of books so that literature is *not* lost in the black hole of the internet, along with the ideas of the world's great authors.

The Nicholar Carr Debate

Central to this whole debate is Carr's *The Shallows: How the Internet is Changing the Way we Think, Read and Remember* (2010). In his discussion of neurocognitive changes taking place as a result of the digital revolution, Carr dedicates a discussion to the work of Australian educational psychologist John Sweller, who has spent his career studying how the human brain processes information, and, more importantly, how humans learn from such information (2010: 123).

Cognitive load theory (CLT) is central to Sweller's research. In order to demonstrate how people create wisdom, Sweller distinguishes between two types of memory: working memory and long-term memory (Carr 2010: 123). Carr helps us to understand the concepts better by describing working memory as the "mind's scratch pad" and long-term memory as the mind's "filing system" (2010: 123). In actual fact, Sweller's research shows that the function of long-term memory goes beyond simple filing; rather than merely a storage facility for facts, it is the site for creating what Birkerts (1994) describes as universal patterns or schemas. And it is precisely such schemas that form a foundation for depth of understanding, insight, perception and, ultimately, wisdom. More eloquently put, it is within the stores of long-term memory that we are able to organise "scattered bits of information into patterns of knowledge", allowing schemas to "give depth and richness to our thinking" (Carr 2010: 124).

An essential part of this process is an individual's capacity to transfer, from working memory into long-term memory, information received. It will come as no surprise that this is not an easy process, not least because according to research humans are capable of storing only two to four items in their working memory at any one time (Carr 2010: 124). "Focus", then, is the ability to harness those two to four items situated within working memory, and then systematically to transfer them into long-term memory, where more complex conceptual analyses and connections can take place. The importance of this mental function should not be understated. According to Carr, "[t]he depth of our intelligence hinges on our ability to transfer information from working memory to long-term memory and weave it into conceptual schemas" (2010: 124).

This is precisely why so many anecdotal criticisms of the digital reading space accuse it of inhibiting attention, focus and deep reading. Instead of having a single focus, most on-screen reading experiences contain any number of hypertext links, moving images and other hypermedia sources and these are seen to be over-burdensome for any one individual's cognitive load (Carr 2010: 125). These distractions are likely to prevent information stored in working memory from being transferred into long-term memory; even in cases where it is transferred, our ability to retain the information in a meaningful way, allowing it to contribute to knowledge patterns and schemas, is seen to be greatly reduced (Carr 2010: 125).

The process above can also be understood in terms of the construction integration model (CIM), which proposes a three-stage process of text comprehension. In "Learning from Hypertext: Research Issues and Findings", Amy Shapiro and Dale Niederhauser summarise this process:

> The first [step] is character or word decoding, which is invariant across media. The second is the construction of a *textbase*. This is a mental model of the factual information presented directly in the text. The process of textbase construction is also thought to be invariant across media. The third stage in the process is the creation of the *situation model* . . . A situation model is constructed when prior knowledge is integrated with new information from a text (the textbase). According to the CIM, the integration of prior knowledge with new information is necessary to achieve a deep understanding of new material. In other words, if no situation model is formed, no meaningful learning has been achieved. (2004: 606)

In the case of reading a printed text, there are far fewer distractions, allowing the reader complete autonomy over the speed at which he or she processes the information. Controlling the speed of information intake allows the reader more effectively to manage the entire process of comprehension, from decoding the text, to choosing what components are important to working memory, and finally, having the focus to allow the natural migration of information from working memory into long-term memory, where the situation model can occur.

If we accept the view that the new generation of digital natives is prone to a state of hyper-attention, then we must accept that the ability of paper-based text – as a technology – to tame such distractibility and dominate the reader's attention in a way that shepherds maximum comprehension, is second to none. However archaic Gutenberg's type appears next to screen technology, it is still seen as superior in its ability to facilitate a situation model, and certainly Sweller's cognitive load theory, as well as the construction integration model, appear to support such a notion. The book acts against our instinctual urge "to shift our gaze, and hence our attention, from one object to another, to be aware of as much of what's going on around us as possible" (Carr 2010: 63). Instead, as summarised by Carr,

> [i]n the quiet spaces opened up by the prolonged, undistracted reading of a book, people made their own associations, drew their own inferences and analogies, fostered their own ideas. They thought deeply as they read deeply. (2010:65)

At this point, two brief observations need to be made. First, while the act of reading print is considered – as a technology – superior in its ability to help the reader retain and meaningfully comprehend information, an increasing number of online publishers are presenting information in formats that attempt to reduce the extent to which electronic text formats overburden the cognitive load of their readers.

Second, although it is difficult to argue with a theory proposing that an overload of working memory detrimentally affects an individual's ability to transfer information into long-term memory, a more up-to-date study that uses digital natives as its subjects might show that the capacity for human beings to process multiple pieces of information has increased in the last ten years as a result of this generation "growing up" in the digital space. For example, Neil Selwyn, a lecturer at the Institute of Education at the University of London, shows how an emerging body of scientific evidence suggests "that internet use enhances the capacity for young people to possess greater working memory and be more adept at perceptual learning" (2009: 367).

Let us accept, though, that over-stimulation of the working memory has a negative effect on the brain's ability to transfer information into long-term memory. The threat, as discussed above, is the likelihood that less opportunity exists for information to evolve in our minds in such a way that it might actualise in the form of mental schemas or wisdom.

According to Carr, the reality is that the "redirection of our mental resources, from reading words to making judgments . . . [has] been shown to impede comprehension and retention" (2010: 122). In other words, understanding of the text is hampered because the surrounding online paraphernalia (including advertising, hypertext, hypermedia and social media) overburden

the capacity of the language, memory and visual processing parts of the brain to operate effectively. Decision-making faculties – where should I navigate from here; what part of this page should I read; should I share this page on Facebook; should I "Like" this page – supersede the effectiveness of comprehension faculties. It appears that we cannot engage with a text while at the same attempting to make decisions forced upon us by the demands of online mechanisms attached to or surrounding it.

One of the best-documented examples of digital distraction is the hyperlink: a highlighted word or phrase allowing readers to navigate to a related location on the internet. A hypertext environment is made up of "network-like information structures in which fragments of information are stored in 'nodes' that are interconnected by electronic hyperlinks" (Gerjets and Scheiter 2003: 12). According to Carr, early commentators suggested that hyperlinks would be a "boon to learning", but in his review of a number of the studies, Carr concludes that "hypertext substantially increases readers' cognitive load and hence weakens their ability to comprehend and retain what they're reading" (2010: 126). Carr's review highlights the same finding for hypermedia (images, sounds and moving pictures) located within a text: it weakens comprehension and learning rather than strengthening these functions (2010: 128).

The hypertext and hypermedia studies that Carr (2010) reviews are convincing, but it should be mentioned that in the six hypertext studies to which he refers, none mentions the age of the participants, nor does he take into consideration the fact that hypertext – at least in terms of its accessibility to the masses – is nearly six hundred years younger than print text. Further, not one of the studies presented is less than ten years old, which raises certain key questions given the speed with which the digital revolution has moved over the past decade. Finally, there is a need critically to evaluate the instructional design concepts of hypertext, which in the context of his critique, Carr fails to do.

One reported study in *The Shallows* found that when readers were asked to read an electronic text containing hyperlinks, "comprehension declined as the number of links increased" (Carr 2010: 128). However, that particular study was conducted in 1999, almost thirteen years ago. Not only was hypertext technology less than ten years old, but true digital natives would have been too young to participate. In fact the participants of that study would most likely have been classified by Prensky (2001a: n.p.) as "digital immigrants": whilst dabbling in the digital reading space for certain purposes, they would have spent the majority of their time interacting with paper-based texts. Another study compared two groups' readings of a literary text (Carr 2010: 127). According to Carr, "one group read the story in a traditional linear-text format; a second group read a version with links, as you'd find on a Web page" (2010: 127). The findings showed that the "hypertext readers took longer to read the story, yet in subsequent interviews they also reported more confusion and uncertainty about what they had read" (Carr 2010: 127). That particular study was conducted in 2001, over ten years ago. Carr does acknowledge that "[e]ducation researchers have . . . found that carefully designed presentations that combine audio and visual explanation or instructions can enhance students' learning" (2010: 131) but his observation unfortunately stops there, and he does not provide examples.

A more careful review of hypertext and hypermedia technologies needs to take into consideration the fact that there is research (not all by "early commentators") suggesting that a combination of user-training and careful instructional design can "promote metacognitive strategies and augment learning outcomes" (Shapiro and Niederhauser 2004: 608). In their review, Shapiro and Niederhauser summarise three studies with the intention of demonstrating that while hypertext is still not bound by a set of universally accepted rules, certain strategies may reduce the risk of hypertexts promoting extraneous cognitive load (2004: 608).

One more variable important to hypertext technology is the profile of the user. Early (Chen and Rada 1996) as well as more recent (Graff 2005) research indicates that hypertext efficacy

cannot be separated from a conversation acknowledging that individuals have different cognitive profiles, each one responding in a different way to a range of instructional designs. For example, "active users" will benefit significantly more from hypertext than "passive users" (Chen and Rada 1996: n.p.) and, according to a study reviewed by Graff, "knowledge seekers" (those who pursue knowledge related to the content of the hypertext) will interact more effectively with hypertext than "feature explorers" (those who spend more time attempting to understand how the hypertext works) or "apathetic hypertext users" (those who are characterised by displaying no logical browsing strategy) (2005: 93). In addition, certain studies have classified individuals' cognitive profiles as either "verbalisers" or "imagers" (Graff 2005: 94). According to Graff's review, imagers "find concrete and readily visualised information easier with which to work than acoustically or semantically complex information, whereas the opposite applies to verbalisers" (2005: 94).

Instructional design, the extent of mentoring or co-regulation, and the cognitive profile of the user, must all be considered when evaluating hypertext, hypermedia, and the future of such technologies. These studies suggest that, under certain controlled circumstances, hypertext is capable of actively engaging readers, allowing them to "feel a greater sense of control over what they read and how they read it" (Shapiro and Niederhauser 2004: 607).

We do not dispute the fact that on-screen text formats provide a deluge of potential distractions, from hypertext to hypermedia to the connected software that lies outside of the text itself. Certainly while there is a level of hyper-activity encouraged by the on-screen reading environment, it should also be conceded that individuals have the choice to be distracted or not, to click on a hyperlink or not, to select a video or not.

We present an alternative view on the potential of hypertext, not simply to refute what Carr's (2010) critique suggests about the tendency of existing hypertext structures to manifest as extraneous cognitive loads. Rather, this discussion should be framed within a contextual acknowledgement that there is, as yet, no dominant or conclusive theory of hypertext or hypermedia utility demonstrating how an individual can use hypertext/media simultaneously to take advantage of both the prefrontal regions of the brain (decision-making and problem-solving) as well as areas associated with language, memory and situation model learning. And while research into such matters continues to be pursued, the fact remains that between 1999 and 2009, the amount of time a young person was spending on a computer per day increased by nearly 500% (Rideout, Foehr and Roberts 2010: 2). It is highly likely, then, that digital natives know how to be both active and passive users of hypertext. As far as their cognitive profile is concerned, while digital natives might be prone to a dominant style, it is more likely that depending on the activity at hand, they are capable of being knowledge seekers, feature explorers *or* apathetic hypertext users. Finally, given the fact that hypermedia dominates the layout of on-screen information, tentatively we might say that digital natives are, by way of practice, more likely to be imagers than vocalisers, and therefore more likely to be amenable to multimodal expressions of meaning, for example a webpage that makes use of a number media to communicate a single message. These are all assumptions, but they are useful in so much as they identify that while research might not agree on hypertext, what is certain is that it will be on a connected screen that future generations engage with text, and the brain has already shown the ability to adapt. The problems that arise from this scenario have already been identified, but most would agree that attempting to halt the technology as a solution is not a realistic possibility at all. Rather, there is a need to adapt the technology to better suit those faculties of our thinking that we do not want to see falling into extinction.

Carr's (2010) final conclusion is that the internet is encouraging in people a new kind of reading: one that is not based on deep attention, and one that does not encourage an intensive, linear engagement with the entirety of a text. In fact, many would argue that internet reading

cannot be defined as reading at all: rather it is simply browsing or keyword-spotting (Carr 2010: 138). Within an online environment, confronted with infinities of information, both on a particular webpage and connected to an exponentially increasing number of associated webpages, we have learnt to scan, which has become "an end in itself – our preferred way of gathering and making sense of information of all sorts" (Carr 2010: 138). According to Carr (2010) and Birkerts (1994), we increasingly struggle to engage with a text on a deeper level.

This is not just because we are increasingly "out of practice", though; rather, the precedence that digital reading is taking over traditional, paper-based reading is affecting the neural circuitry within the brain. Based on the evidence he presents, Carr postulates that "the neural circuits devoted to scanning, skimming, and multitasking are expanding and strengthening, while those used for reading and thinking deeply, with sustained concentration, are weakening or eroding" (2010: 140). In other words, the skills used to navigate the infinities of information online are overwriting the skills needed to engage deeply and "vertically" with text.

Let us pause to acknowledge two crucial points. First, the way in which most on-screen information is currently presented is heavily weighted in favour of scanning and locating as much information as possible. This comes at the expense of a linear, progressive and logical text engagement that lends itself better not just to knowledge accrual, but also to forming meaningful schemas. Second, the often repetitive, intensive, interactive and addictive relationship humans have with the internet has in all likelihood led to adaptations in neural circuitry, so much so that print publications are increasingly modifying their layouts to provide readers with page design which mimics the digital reading space. The speed of this so called "neural-reprogramming", although quite startling, is hardly surprising. Whereas it was previously posited that the human brain was not malleable once it reached maturity in adulthood, the more widely accepted theory now is that throughout our lives the neural pathways within our brains are adaptable to change. According to Hayles, "human beings are born with their nervous systems ready to be reconfigured in response to the environment" (2007: 192). Hayles goes on explain that "[i]n contemporary developed societies, this plasticity implies that the brain's synaptic connections are coevolving with an environment in which media consumption is a dominant factor" (192).

Carr's review of the literature shows similar results, specifically that the internet offers a rich multi-sensory experience, a response and reward system that "encourages repetition of both physical and mental actions" and an interactive space that promotes young people's obsession with staying connected to friends, events and news (2010: 116-118).

The enormous significance of these points itself cannot reverse the digital revolution, nor can it stop the wave of first-generation digital natives. What it should do, though, is force us to ask how we can modify on-screen experiences to include the acknowledged and celebrated cognitive processes that traditional, paper-based reading has been shown to "kindle".

Inherent in the texts of Carr (2010) and Birkerts (1994) is a warning, an almost apocalyptic undertone, bringing to the reader's attention the fact that in 2012 most reading is not conducive to the ineffable wisdom made possible by traditional, paper-based reading. Both these scholars are, in a sense, "blowing the whistle", not in the hope that future surveys will show an increase in the number of individuals reading print – they know that such an outcome is most unlikely. Rather, they are – or should be – blowing the whistle in the hope that before print and the codex book get relegated to a kind of antiquity, humankind should reflect carefully on the cognitive mechanisms central to the reading process, and formulate ways to integrate these processes into the digital reading experience. Hayles adds her opinion that the schism is exacerbated because educational institutions have retained their traditional and long-standing belief in deep attention, even while an entire generation of young people are being re-wired predominantly to utilise their hyper-attention (2007: 188).

Not all technologists on the frontline of the debate are content to let the internet dictate the new relationship that humans have with information. For instance, in his influential essay "Digital Natives, Digital Immigrants", Prensky acknowledges the importance of the type of "reflection" encouraged by traditional text-based books. He argues that one of the most interesting challenges is "to figure out and invent ways to include reflection and critical thinking" in the education of digital natives, but that this should be done within the realm of the digital native's online space (2001b: n.p.). The resounding message of both Hayles (2007) and Prensky (2001a; 2001b) is that our minds are changing, but our education systems are not.

Literary theorist Alvin Kernan suggests that "individuals and societies want and need things to mesh and cohere, not pull in opposite directions, no matter how fruitful the tension is said to be" (1973: 40). This is exactly the problem in the case of print versus text today: prominent scholars, theorists, technologists and cultural commentators polarise the debate to such an extent that the development of online literary reading is in danger of being left in the hands of the "machine". In the absence of humans *guiding* an experience that is based on their wisdom, the machine – with mass media as its default operator – will take the wheel, leaving the literary theorists and the technologists to play out their battle in isolation.

Conclusion: A revised model of digital reading

In the following account, the younger of the two authors of this article describes, in the first person, his experience of accessing his first e-book using the iBooks application on an Apple iPad tablet:

> "After installing Apple's iBook software onto the tablet, I downloaded, for free, Oscar Wilde's *The Picture of Dorian Gray* (2011). The edition that I downloaded was not an enhanced e-book, so there were no hyperlinks, videos, audio clips or other hypermedia add-ons: this was simply a digital version of Wilde's original 1891 text. Although the content remained unchanged, the technology offered me several new experiences. My first decision was choosing whether to view the text in portrait with single-page layout, or landscape with double-page layout. Having decided on the former, I learnt that it was possible to turn the pages by touching the screen: on the top left to go back a page, and on the top right to go forward. By touching the bottom of the screen, I could activate a scroll bar that rapidly took me to pages of the text further away from my point of departure. Interestingly, if a reader is turning from page one to page two, the page does not simply refresh, it "turns" as a physical page would do in a printed book. In fact, using the touch screen functionality, it is possible to hold a page halfway through turning it, allowing the reader to view half of the page being read and half of the page overleaf. Aesthetically, the digital book – on this device – was not veering too far away from the book as we know it. At the far right-hand side of the screen the software mimicked the print book by showing a digital image of the remaining unread "sheets" of pages.
>
> Other new experiences included the option to adjust the brightness of the screen, to choose 11 different font sizes and six different font types, and to change the screen background from white to sepia. At the top right-hand-side of the screen a search function was located, which had the dual purpose of allowing the reader to search for a word within the text, or to search for a word or term on the popular online encyclopaedia, Wikipedia. However, the function I appreciated most was the electronic dictionary. The program's software allowed readers to touch any word and then instantly access its meaning via a digital dictionary. I, for one, have never before looked up so many words during the reading of any one novel. Ordinary dictionaries are cumbersome and filled with thousands of pages. To take one's attention away from the novel to look up a word in a print dictionary is a one-minute interlude at least, reserved in my case only for words upon whose definition the meaning of the text as a whole is dependent. In a digital text, a word's exact meaning, nuances, synonyms and antonyms can be found almost instantly.
>
> The benefit extends beyond adjectives such as "panegyrical" (Wilde 2011: 221), which Wilde uses to describe the infamous Lord Henry Wotton. In the first chapter, Lord Henry and the artist Basil Hallward engage in an extended dialogue about the function of art. In this conversation many allusions to Greek mythology appear, and also, interestingly enough, to botany. Threatening to alienate the

twenty-first century English-speaking reader further is Wilde's indulgent use of French, sprinkling the text with all the showiness for which his eccentric style was known. It is quite disorienting to read a number of words in a single sentence or passage that are unfamiliar, and so, as inconsequential as it may seem to some, it was a satisfying experience to be able to access the meaning of "laburnum" (Wilde 2011: 6) and "convolvulus" (48) as I read. I was able to follow the conversation by referencing "Adonis" (9), reminding myself what a "dryad" (72) was, and learning about the aged woodland deity "Silenus" (81). Further, the French, "moue" (36), "Bacchant" (81) and "Hautbois" (98) did not obstruct my flow of reading or my understanding of the text. The first chapter of Wilde's book is not an exception; the entire novel is filled with allusions to high art, opera, and classical far-eastern culture. Far from feeling that these references excluded me from *The Picture of Dorian Gray*, I was given broader access than ever before to a classic nineteenth century work of literature by a tool as simple as a digital dictionary.

The second tool particular to reading a digital literary fiction that proved most useful was my ability to search the internet within seconds of needing to do so. Thinking carefully about critical discussions on online distractions such as hypertext, and in particular how hypertext can distract from the focus of reading a novel, I made a point of never interrupting a reading session. However, as soon as I finished a reading session, I was able to close the iBook application and open my internet browser. After my first reading session I wanted to find out more about Oscar Wilde, including a biographical sketch and summary of his involvement in the rising philosophy of aestheticism. I thereafter became interested in exploring further how literary movements such as aestheticism and Gothicism are relevant to a reading of *The Picture of Dorian Gray*. This piloted the way to a more comprehensive "brush-up" on the history of literary movements. Finally, I was led to a question I had not yet asked myself since returning to an academic environment: is English literature still in a postmodern condition, or is there now a consensus among critics that it has moved somewhere else? Although the question is vague and perhaps imponderable, it arose from my reading of *The Picture of Dorian Gray* and the immediate access I had to information surrounding the novel after each reading session. Perhaps most importantly, the question led to my introduction to posthuman theory, of particular interest to me given the subject matter of my research. All of this happened late at night, and, based on experience, I am certain that had I been reading a print copy of Wilde's novel, the aforementioned research would not have taken place: who wants to get out of bed, sit at a desk and boot up a computer at 11pm?"

In summary, a dictionary, novel and the internet were all contained within one compact device, allowing a disciplined reader greater access to the prose itself, as well as supplementary or associative media. Only a few years ago, the extent of such access would not have been possible without more time, a library and, perhaps, a professor of English literature. Admittedly, for a student of literature, this proposition may sound provocative, but for an individual without the benefit of academic guidance, someone who wants to read a nineteenth century classic of English literature, the potential of the digital tools surrounding an e-book is vast, to say the least. In particular, based on the reading experience described above, one could justifiably argue that the digital reading space may be conducive to a far more educative and integrated learning process than traditional print reading allows, with the advantage of speed, a feature not undervalued by the digital native.

However, in his discussion of standard e-books in particular (i.e. not enhanced e-books), Alexander remarks that one of the most lauded benefits of an e-reader (as opposed to a tablet) is that it "isolates the reading experience from the rest of the world" and "[n]either the Kindle nor other similar devices support multitasking" (2011: 147). Alexander goes on to make the point that "while the digital isolation has some drawbacks, it could well facilitate a classic model of reading, where the story and its audience connect by themselves, contextualized only by the imagination". We wish to suggest that, carefully handled, the imagination works just as well, if not better, when it is given contextual aids such as those described above in the reading of Wilde's novel. Although excited about the future potential of enhanced e-books, Janet Murray, ever the realist, explained in 1997 that "hypertext fiction is still awaiting the development of formal conventions or organization that will allow the reader/interactor to explore an encyclopedic medium without being overwhelmed" (87). More than ten years later, those

conventions have still not been formalised: the digital environment has not been stable enough to allow for that. However, publishers at the forefront of digital literature are beginning to show signs of utilising a standard set of conventions to make the technology easier to navigate, and they will seek to create an environment that is as immersive as possible. In this digital reading space, the correct distance between the story and the reader is still being negotiated, with indications that the distance, especially for digital natives, is now smaller than ever. Digital natives no longer have the problem of gimmicky technology standing between them and the story-world: their ability to navigate cross-media environments with ease is allowing experimentation but at the same time publishers are being careful to present literary works in such a way as to make it as easy for the reader as possible. In many instances the reader decides on levels of embedded media and interaction.

As a final word, it should be mentioned that developments in enhanced e-books during the last twelve months have been so rapid that even Evan Schnittman – the current executive vice-president of Hachette Book Group – has conceded that his vehement opposition to enhanced e-books is redundant. In December 2011, just eight months after he said that "the idea of innovating in the narrative reading process is just another non starter", Schnittman advised that publishers "should offer 'enhanced hardbacks' with print and digital packaged together" (Campbell 2011: n.d.). The veteran publisher went so far as to close down his popular blog, "Black Plastic Glasses", conceding that digital is far from dead (Schnittman 2011). In a follow-up article to this one, we investigate actual examples of digitally enhanced literary products, and consider how they facilitate or fail to facilitate, the project of reading. For now, though, and in the final analysis, let it be said that if the literary establishment can shift its focus from *how the technology (ab)uses literature* to *how literature can (ab)use technology*, and begin that investigation with a strategic vision, then authors like Doris Lessing and Zoë Wicomb, and literary theorists such as Sven Birkerts might find they have much less to worry about.

Notes

1. Released as an application for the Apple iPad tablet in 2010, *Alice for iPad* is an enhanced children's fiction: children can read Lewis Carroll's classic text and, at the same time, interact with the story in on-screen experiences of throwing tarts at the Queen of Hearts, tossing mushrooms around a room by twisting the tablet screen in their hands, or tilting the device to make Alice grow as big as a house.
2. In his 2001 essay, "Digital Natives, Digital Immigrants", Marc Prensky describes the generation of young people born since 1980 as "digital natives" owing to what he believes is an innate confidence in their ability to use new technologies (2001a: n.p.).

References

Alexander, B. 2011. *The New Digital Storytelling: Creating Narratives with New Media*. Santa Barbara: Praeger.

Amazon.com. 2012. *Kindle Page*. http://www.amazon.com/kindle (accessed 7 August 2012).

Atomic Antelope. 2010. *Alice for iPad*. [e-book] iPad: Atomic Antelope. http://itunes.apple.com/us/app/alice-for-the-ipad/id354537426?mt=8 (accessed 6 January 2012).

Birkerts, S. 1994. *The Gutenberg Elegies: The Fate of Reading in an Electronic Age*. New York: Faber and Faber, Inc.

Bradbury, R. 1976 [1953]. *Fahrenheit 451*. London: Panther Books.

Burdick, A., J. Drucker, P. Lunenfeld, T. Presner, and J. Schnapp. 2012. *Digital_Humanities*. Cambridge, MA, and London, England, Open access e-book: http://mitpress.mit.edu/sites/default/files/titles/content/9780262018470_Open_Access_Edition.pdf

Campbell, L. 2011. "Package print with digital to thrive, says Schnittman." *The Bookseller*. http://www.thebookseller.com/news/package-print-digital-thrive-says-schnittman.html (accessed 6 January 2012).

Carr, N. 2010. *The Shallows: How the Internet is Changing the Way We Think, Read & Remember*. New York: W. W. Norton and Company, Inc.

Chen, C. and R. Rada. 1996. "Interacting with Hypertext: A Meta-Analysis for Experimental Studies." *Human-Computer Interaction* 11 (2): 125–156.

Chiong, C., J. Ree and L. Takeuchi. 2012. *Print Books vs. e-Books*. [pdf] New York: The Joan Ganz Cooney Center. http://www.joanganzcooneycenter.org/upload_kits/jgcc_ebooks_quickreport.pdf (accessed 27 July 2012).

Dobson, T.M. and J. Willinsky. 2009. "Digital Literacy." In: D Olson, N Torrance (eds). 2009. *The Cambridge Handbook of Digital Literacy.* New York: Cambridge University Press: 286–313.

Elgan, M. 2007. "Why e-Books are Bound to Fail." *Computerworld*. http://www.computerworld.com/s/article/9017934/Why_e_books_are_bound_to_fail (accessed 11 November 2011).

Gerjets, P. and K. Scheiter. 2003. "Goal Configurations and Processing Strategies as Moderators between Instructional Design and Cognitive Load: Evidence from Hypertext-Based Instruction." *Educational Psychologist* 38 (1): 33–41.

Go! Magazine. 2011. "QR Codes." *Go! Magazine*, November(65): 20.

Godin, S. 2011. *Permission Marketing: Turning Strangers into Friends, and Friends into Customers*. New York: Simon & Schuster.

Gomez, J. 2008. *Print is Dead: Books in our Digital Age*. New York: Palgrave MacMillan.

Graff, M. 2005. "Individual Differences in Hypertext Browsing Strategies." *Behaviour & Information Technology* 24 (1): 93–99.

Grossman, R. 2011. "Why e-books fail to kindle bibliophile's desires." *Chicago Tribune News*. http://articles.chicagotribune.com/2011-11-15/news/ct-talk-grossman-ebook-1115-20111115_1_e-book-readers-book-lovers-bibliophiles (accessed 15 July 2012).

Hayles, K. 2007. "Hyper and Deep Attention: The Generational Divide in Cognitive Modes." *Profession* 87–199.

Hillesund, T. 2010. "Digital Reading Spaces: How Expert Readers Handle Books, the Web and Electronic Paper." *First Monday Peer-Reviewed Journal on the Internet*. http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2762/2504 (accessed 25 May 2012).

Johnson, J. 2010. *Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules*. Burlington: Morgan Kaufmann.

Kernan, A. 1973. "The Idea of Literature." *New Literary History* 5 (1): 31–40.

Krug, S. 2006. *Don't Make Me Think: A Common Sense Approach to Web Usability*. Berkeley: New Riders.

Landow, G. 1989. "Hypertext in Literary Education, Criticism, and Scholarship." *Computers and Humanities* 23 (3): 173–198.

Lessing, D. 2007. "On not winning the Nobel Prize." *Nobelprize.org*. http://www.nobelprize.org/nobel_prizes/literature/laureates/2007/lessing-lecture_en.html (accessed 11 May 2012).

Levy, S. 2007. "The Future of Reading." *Newsweek*. http://courses.ischool.utexas.edu/marylynn/2008/spring/INF180J/readings/future-reading.pdf (accessed 21 October 2011).

Liu, Z. 2005. "Reading Behavior in the Digital Environment: Changes in Reading Behavior Over the Past Ten Years." *Journal of Documentation* 61 (6): 700–712.

Malikhao, P. and J. Servaes. 2011. "The Media Use of American Youngsters in the Age of Narcissim." *Telematics and Informatics* 28: 66–76.

Murray, J.H. 1997. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. New York: The Free Press.

National Endowment for the Arts. 2004. "Reading at Risk: a Survey of Literary Reading in America". [pdf] Washington DC: National Endowment for the Arts. http://www.nea.gov/pub/readingatrisk.pdf (accessed 25 September 2011).

National Endowment for the Arts. 2007. "To Read or Not To Read: a Question of National Consequence." [pdf] Washington DC: National Endowment for the Arts. http://www.nea.gov/research/toread.pdf (accessed 25 September 2011).

Penguin.com. 2012. *Penguin Amplified & Enhanced eBooks*. http://us.penguingroup.com/static/pages/ebooks/amplified-ebooks.html (accessed 7 August 2012).

Prensky, M. 2001a. "Digital Natives, Digital Immigrants." *On the Horizon* 9 (5): n.p.

Prensky, M. 2001b. "Do They Really Think Differently?" *On the Horizon* 9 (6): n.p.

Richtel, M. 2012. "Silicon Valley Say Step Away From the Device." *New York Times*. http://www.nytimes.com/2012/07/24/technology/silicon-valley-worries-about-addiction-to-devices.html?_r=1&hp (accessed 24 July 2012).

Rideout, V.J., U.G. Foehr, and D.F. Roberts. *Generation M^2: Media in the Lives of 8- to 18-Year Olds*. [pdf] California: Henry J. Kaiser Family Foundation. http://www.kff.org/entmedia/upload/8010.pdf (accessed 2 October 2011).

Rosen, R. 2009. "In the Beginning was the Word." *The Wilson Quarterly* Autumn Issue: 50–51.

Schnittman, E. 2011. "The Day Digital Died." *Black Plastic Glasses*, [blog] 1 August. http://www.blackplasticglasses.com/2011/08/01/the-day-digital-died/#more-605 (accessed 20 January 2012).

Scholastic. 2010. *2010 Kids & Family Reading Report: Turning the Page in the Digital Age*. [pdf] Harrison Group. http://anatomiteca.com/wp-content/uploads/2011/05/2010_KFRR.pdf (accessed 2 October 2011).

Selwyn, N. 2009. "The Digital Native – Myth & Reality." *New Information Perspectives* 61 (4): 364–379.

Shapiro, A. and D. Niederhauser. 2004. "Learning from Hypertext: Research Issues and Findings." In: D. Jonassen (ed.). *Handbook of Research for Educational Communications & Technology*. New Jersey: Lawrence Erlbaum Associates: 605–620.

Steinhauer, J. 2009. "A Literary Legend Fights for a Local Library." *The New York Times*. http://www.nytimes.com/2009/06/20/us/20ventura.html (accessed 15 July 2012).

Wicomb, Z. 1987. *You Can't Get Lost in Cape Town*. London: Virago.

Wilde, O. 2011 [1891]. *The Picture of Dorian Gray*, [e-book] iPad: Bookbyte Digital. http://itunes.apple.com/us/book/the-picture-of-dorian-gray/id429558135?mt=11 (accessed 15 September 2011).