EXAMINING READING PROCESSES AND ENGAGEMENT OF
STRUGGLING AND PROFICIENT READERS WHEN USING IPADS

by

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Abstract

This study investigated the influence of tablet technology on student motivation and engagement for online reading. An ethnographic approach was utilized to examine the case studies of six grade 8 students including three proficient and three struggling readers. In addition to motivation and engagement, their thought processes while conducting online research using an iPad was explored. Several research techniques were employed including, participant observation, standardized reading comprehension tests, questionnaires, and participant interviews. The results revealed a significant increase in motivation for reading by the three proficient readers. Results also revealed an increase of two grade levels in reading comprehension for two of the struggling readers. Several findings about students’ metacognitive strategies while reading and researching online along with factors affecting motivation and engagement were also explored. These results have the potential to inform classroom literacy instruction and teacher education programs in this rapidly evolving digital age.
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Chapter One

Examining Reading Processes and Engagement of Struggling and Proficient Readers when using iPads

Introduction

Today, our education system has become increasingly complex due to rapidly evolving social and cultural dynamics. While a prerequisite of national economic and social growth is a literate population (White, 2007), our understanding of a literate population is continuously evolving. Already at the beginning of the 21st century, being literate includes many more skills than just being able to read and write. These literacy demands will only continue to increase. Educators are now faced with the challenge of teaching complex curricula while integrating new technology in the classroom, and preparing students to be life-long learners who are engaged members of society.

The education sector has realized this influence and currently, school boards are investing thousands of dollars on various technological resources (Hixon & Buckenmeyer, 2009). As stated by Hixon and Buckenmeyer, “A common measure of a school’s technology level is the student-computer ratio, though perhaps a more appropriate measure in today’s world is the student-to-computer with Internet access ratio” (p. 131). Unfortunately, the wealth of technological resources currently available in some schools has resulted in very little educational impact (Bauer & Kenton, 2005; Cuban, 2001). A report by the U.S. Department of Education (2004) almost ten years ago stated,

We have not realized the promise of technology in education. Essentially, providing the hardware without adequate training in its use – and in its endless possibilities for enriching the learning experience – meant that the great promise of Internet technology was frequently unrealized. Computers, instead of transforming education, were often shunted to a “computer room” where they were little used and poorly maintained. Students mastered the wonders of the
Internet at home, not in school. Today’s students, of almost any age, are far ahead of their teachers in computer literacy (p. 10).

At the time that computers were being introduced into schools, teachers reported using the Internet predominantly for research and student use of computers as a reward when other work was completed; a free-time activity; and for ‘good copies’ of written work (Hixon & Buckenmeyer, 2009). While these skills are important, the ubiquity and affordability of mobile technologies has created an urgent need for the seamless integration of technology into today’s curriculum. Currently, policy makers and educational leaders continue to grapple with this problem.

There is no disputing the fact that evolving information and communication technologies (ICT) are changing the way we live and function in our society (Hixon & Buckenmeyer, 2009). According to a Futurelab report (Green, Facer, Rudd, Dillon, & Humphreys, 2005), “By the age of 21 the average person will have spent 15,000 hours in formal education, 20,000 hours in front of the TV, and 50,000 hours in front of a computer screen” (p. 4). Further, the mobile technologies (Smartphones, iPods, iPads, and game consoles) that young people carry with them on a daily basis have the ability to produce a variety of digital texts or ‘new literacies’ (The New London Group, 1996) that are different from print texts (Henderson, 2011). While educators are beginning to adopt and integrate digital literacy practices into their classrooms, certain obstacles must be overcome before the effective integration of technology into the curricula and classroom practice becomes ubiquitous. According to a recent publication of the Ontario Ministry of Education (2012), some of these obstacles include: infrastructure (networks and hardware); equity; security and safety of wireless networks; technical support; digital citizenship; training and professional development; exploiting technology in a crowded
curriculum; blended learning; and developing 21st century skills (p. 1). The proposed research will investigate how the use of an iPad2 may provide solutions to some of these barriers. In particular, the issues of technology and the digital divide (infrastructure); home and school literacies (digital citizenship); technology and implications for teaching (training and professional development); and iPads as an educational tool (developing 21st century skills) will be reviewed.

**Technology and the Digital Divide**

Technological advances continue to rapidly alter the ways we communicate with each other. Their potential impact on our current education system and literacy pedagogy, in particular, is extensive. Research by Jones-Kavalier and Flannigan (2006) has revealed that many of today’s classrooms contain digitally literate students being taught by linear-thinking and technologically puzzled educators who lack the skills to effectively integrate these new technologies into the curriculum. Embedded in the pedagogy of new literacies and multiliteracies in the 21st century, is an understanding that the definition of a literate person has changed and that a new set of literacy skills are required for active participation in a knowledge economy (Jewitt, 2008). By definition, a knowledge economy requires citizens to rapidly adapt to new technologies with a greater focus on intellectual rather than physical abilities (Powell & Snellman, 2004). Additionally, individuals will need to be skilled, self-directed learners beyond the traditional classroom setting.

Literacy is not defined by a set of skills learned independently in schools that are then transferrable to the outside world. Learning and teaching are now occurring in new digital landscapes that allow students to represent their ideas and thoughts using
multimodal formats to a global audience (Lam, 2007). In addition, literacy instruction is being modified to encompass the skills of creativity, innovation, critical thinking, problem solving, communication and collaboration (Potts, Schlichting, Prigden, Hatch, 2010). These skills are fundamental to a curriculum integrated with technology and encompass many of the essential learning goals deemed necessary for today’s learner (Ontario Ministry of Education, 2012).

With the advent of the Internet and the explosion of mobile technologies, literacy demands of the workforce have clearly changed (Lankshear & Knobel, 2006). At the same time, mobile tablet computers such as the iPad2 are becoming more fully integrated into current educational settings. As a result, a new language has been introduced that stems from these evolving technologies and will require current and future workers to become literate in this new world. According to Booth (2008),

The value of literacy education, both inside and outside schools, involves what we do with what we learn, and with whom live. If teachers do not prepare students for the literacies required in their future lives, what should they be teaching? (p. 14).

Educators need to teach students how to critically engage with these technologies (including an understanding of their benefits and limitations) so that they will be able to function successfully in the conditions of their future employment (Cope & Kalantzis, 1997).

Prior to the 21st century, individuals’ abilities to read and write print texts defined them as literate and separated them from the uneducated (Jones-Kavalier & Flannigan, 2006). Throughout history, people have sought methods that would allow for increased and improved communication. Andersen (2002) suggests that digital and visual literacies, that is, the ability to create, design, and manipulate, are the next development in the
specialization of communication. This “digital literacy enables us to match the medium we use to the kind of information we are presenting and to the audience to whom we are presenting it” (Lankshear & Knobel, 2006, p. 22). Currently, digital literacy has become an educational goal in many curriculum documents and some theorists fear the development of a ‘digital divide’ between those who are digitally literate and those who are not (Lankshear & Knobel, 2006).

Mason and Dodds (2005), define the ‘digital divide’ as the gap between those who have access to digital technology outside of school and those who do not. Factors resulting in this divide include socio-economic status, ethnicity, and geographic location. According to Mason and Dodds, in North America, this digital divide especially affects students who are black, Hispanic, Native American, and poor. For children without access to technology and the Internet at home, schools are often the only place they can access these various technologies and go online. This divide also creates an inequity in social capital, and creates a privileging of online texts, which can also affect educational development (Chih-Yuan Sun & Metros, 2011; Dika & Singh, 2002). For example, children who do not have this social capital, lack access to the “social freeways” that permit an individual to move up the socio-economic ladder (p. 157). Further, Dika and Singh (2002) found that social capital is positively related to: “(1) educational achievement; (2) educational attainment; and (3) psychosocial factors that affect educational development” (p. 36).

In a related study, Roberts, Foehr, and Rideout (2005) reported that students aged 8-18 years spend 48 minutes each day reading online compared to reading 43 minutes per day offline. They suggest that if this trend continues, it may signify a historical tipping
point for literacy as these adolescents may continue to privilege online texts throughout their lives. Clearly, the issues of the ‘digital divide’ and the privileging of online text will need further consideration as our education system continues to transition into this digital world.

Some researchers have suggested that it is not the ‘digital divide’ that is of concern; rather, it is the issue of the ‘home-school divide’ that has led to greater inequities in education (Honan, 2008). According to Merchant (2009), the “gaps between real-world uses of technology and new technology in the classroom are a cause for concern” (p. 253). Further, Henderson and Honan (2008), have suggested that the divide is a result of the limited technology practices that are used in schools and the rich literate (technology) practices that learners engage in at home.

**Home and School Literacies**

For over a century, educational researchers have understood the importance of the relationship between home and school environments. As so aptly stated by Dewey (1900), over 100 years ago but still relevant today,

> From the standpoint of the child, the great waste in the school comes from his inability to use the experiences he gets outside the school in any complete and free way within the school itself; while on the other hand, he is unable to apply in daily life what he is learning at school. This is the isolation of the school – its isolation from life (p. 67).

In fact, there is much evidence to suggest that many of the diverse literacy practices, which occur in the homes and communities of students, have not been typically valued in educational settings (Marsh, 2003; Kamler & Comber, 2005). Gee (2003) has conducted research that investigated the value of video games for learning a new type of literacy. In his book, Gee identified 36 learning principles that have been demonstrated by those
playing with high quality video gaming software. Stemming from the ‘new literacies’ theory (New London Group, 1996), the principles from gaming theory that are particularly relevant to a technology integrated curriculum include: video game players have shown high levels of active engagement; the development of a variety of non-linear problem-solving strategies; and online virtual experiences that provide students with opportunities to connect with multiple domains or “multiple literacies” (New London Group). Further, Gee referred to the problem solving skills exhibited by video game players as the “Multiple Routes Principle”. As explained by Gee, video games allow “…multiple ways to make progress or move ahead. This allows gamers to make choices, rely on their own strengths and styles of learning and problem solving while exploring alternative styles” (p. 209). These are the metacognitive and critical analysis skills deemed essential for all learners.

In addition to gaming, research related to the potential integration of social networking, including Facebook, blogging, texting, wikis, and online learning communities, into educational settings would seem particularly timely. Specifically, today’s ‘wired’ children have the ability to participate in global events; participate in global online gaming communities; share their ‘voice’ via YouTube; and share their thoughts, opinions, and perceptions through online blogs and wikis. According to Coiro, Knobel, Lankshear, and Leu (2008), the issue of new literacies must also be examined in relation to the development of the Internet;

No previous technology has been adopted by so many, in so many different places…and with such profound consequences. No previous technology for literacy permits the immediate dissemination of even newer technologies of literacy to every person on the Internet by connecting to a single link on a screen. Finally, no previous technology for literacy has provided access to so much
information that is so useful, to so many people in the history of the world (pp. 2-3).

What is of greatest concern is that most of these ‘new literacies’ are occurring outside of the school and often times without the assistance of a mentor who can assist learners in navigating and staying safe in this digital world.

In an effort to bridge the gap between the literacies of home and school, and to prepare students for their place in a rapidly evolving world, those responsible for curriculum policy recognize that this “… results in an urgent need for teachers and researchers to address the discrepancy between the types of literacy experiences that students encounter at school (paper, pencil, and print texts), and those they practice in their daily lives outside of the school environment” (Larson, 2009, p. 255). Daily practices involve mobile technologies and the Internet.

Steps have been taken in Ontario to address these issues and recently, a pilot project involving 46 school boards across Ontario embarked on a number of different projects using technology to determine the impact on student engagement and achievement and on 21st century instructional practices (Ontario Ministry of Education, 2012). The results of this project were categorized into three themes: pedagogy, technology, and change. Included in the theme of pedagogy were the issues of student engagement and achievement; teacher training and teacher practice (p.1). The theme of technology included learning environments and digital citizenship. Finally, the theme of change included the vision of 21st century learning and teaching from the various school boards, and implications for programming and policy. At the conclusion of the project, many school boards reported a greater connection to the community as a result of participating in their technology integration projects. The findings of this pilot project
seem initially promising for closing the home and school literacy gap since many mobile technologies such as iPads are the tools being used at home and now at schools.

**Technology and Implications for Teaching**

Currently, there are still teachers who need to be convinced of the value of connecting to the global community from their classrooms and of the need for a technology enhanced curriculum (Ontario Ministry of Education, 2012). Tierney, Bond, and Bresler (2006) suggest that the uncertainties described by educators may arise from a lack of professional development, an uncertainty about the connection between new literacies and the curriculum, and a lack of access to new technologies. Research literature refers to these issues as first- and second-order barriers to technology integration (Hew & Brush, 2007). First-order barriers include factors that are external to the teacher such as the lack of resources in the school. Second-order barriers are those expressed directly by teachers in their attitudes and beliefs about technology integration.

First-order barriers are those that are more easily addressed and supported. Many school boards are currently making significant investments in mobile technologies and installing the Internet in their schools. However, according to Fabry and Higgs (1997), teachers acknowledge the underuse of this technology in their classroom, citing lack of appropriate training in the use of the technology; lack of access to the technologies; lack of support to address technical problems as they arise; and lack of pedagogical instruction in the use of technology that may support existing teaching practices. Clearly, to overcome these first-order barriers, attention now needs to turn to the personalized, professional development of teachers in this domain.
Once teachers have the resources and appropriate training, the second-order barriers involving personal beliefs and attitudes can be addressed. Cuban (2001) has suggested that one of the greatest fears of teachers is that technology will dehumanize the processes of teaching and learning. Other fears may include the hesitation to relinquish more control to the students (something that is inherent in online learning) (Nisan-Nelson, 2001), and the fear of “looking stupid” in front of their students if they are not comfortable with the technology (Hixon & Buckenmeyer, 2009, p. 137). While these barriers are more challenging to overcome, a curricula for schools and teacher education programs that is seamlessly infused with technology integration may increase teacher confidence in the value of these evolving methodologies. One possible first step in this transition would involve providing tablets, such as the iPad2, to all teachers and students.

**iPads as an Educational Tool**

The iPad2 is a mobile tablet computer designed by Apple (Apple Canada website, 2012). More than a mobile computer, the iPad2 allows access to thousands of powerful educational applications (Apps) that allow for the creation of interactive lessons. Once selected, Apps are downloaded onto iPads for individual use. This device also boasts a built-in cameras and touch screen keyboard, and Wi Fi capabilities (Apple, 2012). One of the key features of the iPad2, that is relevant for the proposed research, is its ability to function as an electronic reader. With an iPad2, struggling readers are no longer limited in their selection of print material, as this tablet computer also functions as a text-to-speech reader. In this way, struggling readers can participate in conversations about ‘popular books’ with their peers and still work on independent reading skills at their own level. With technologies such as the iPad2, the stigma of being perceived a weak reader
can be lessened, as it is very difficult for classmates to see what is on their neighbour’s screen. This is an important consideration for the proposed research, as students in this study will be charged with the task of reading an e-novel and working collaboratively. This will be accomplished in a literature circle format through the use of a blog and a wiki. While reading or listening to their novel, students will be able to move between screens on their iPad2 to contribute to the literature discussion on the wiki in real time.

Equally important is the portability and flexibility of the iPad2 in any educational setting. When all learners have access to their own iPad2, the need to book sessions and travel to the school computer lab and/or library is no longer necessary. This allows educators to optimize learning opportunities as they arise in the classroom. Students can quickly access the Internet, Apps, and their previous notes to conduct research and/or answer their own questions, rather than wait for their designated computer time when that ‘teachable moment’ may long be forgotten. Many Apps such as ‘Show Me’ and ‘Story Lines’, designed for the iPad2, encourage collaboration among students. For example, to use the ‘Story Lines’ App, students must work in small groups to create a collaborative story. One student writes the title, and then the iPad2 is passed to the other group members who each write one additional line of the story. The iPad2 is then passed to the final group member to illustrate each line of the story. The entire narrative is then replayed for the enjoyment and motivation of all group members. This type of learning opportunity is not possible on a stationary desktop computer.

Another benefit of the iPad2 is that students can take notes, submit assignments, create and edit movies and podcasts, and record lectures. Instead of being the gatekeeper of knowledge, the educator’s role in a digital environment has evolved to that of a
learning mentor who is able to travel around the classroom and provide more individual instruction (Tate, 2012). It is important to acknowledge that these benefits would extend to all tablet computers but those companies that focus on educationally valuable Apps will have a distinct advantage in the area of literacy instruction. Currently, Apple with its iPad2 tablet is a leader in this domain.

Today’s students in North America have been raised with a variety of multimodal literacies and often report that they are disengaged by traditional classroom lessons involving print texts (Larson, 2009). Apple (2012) has recently developed apps such as iBooks Textbook and iBooks Author that have the potential to assist these disinterested students. For example, iBooks Textbook will allow these students to access thousands of interactive textbooks that can be updated each year and iBooks Author will allow publishers, teachers, and students to design media-rich books (Apple, 2012). Research by Larson, (2009); McKenzie, (2009); and Schmar-Dobler, (2003) suggests that students who report not enjoying reading print texts find it more satisfactory to read an electronic book (e-book). As described above, reading an e-book on an iPad2 is just one of a number of useful applications available to students users.

The benefits of new technologies such as the iPad2 have been realized in the corporate world, in a variety of industries, and in some university and college settings. To date, however, very little research has been conducted on the use of the iPad2 in the elementary school (kindergarten to grade 8) and secondary school settings (Johnson, Smith, Willis, Levine, & Haywood, 2011). In order to understand the potential benefits of tablet computers in these settings, it is important to thoroughly examine interaction of this type of technology in a personalized, classroom setting with individual students.
Therefore, the current study investigated the impact of the use of iPad2’s on student motivation and reading practices of six grade 8 students. The metacognitive processes of these students were also examined while they conducted online research using the think-aloud protocol (Coiro, 2011). Further, the ability to communicate their research findings was evaluated using a class Wiki. Finally, online reading comprehension scores were examined before and after using the iPad2’s in skilled and weak readers.

**Looking Ahead**

Chapter 2 expands on the literature already reviewed. I begin with a discussion of the history of literacy education and specifically, the role of technology in literacy. Next, I discuss the theoretical framework of *new literacies* as a framework for this study and the importance of Web 2.0 technologies and wikis. Previous research in the areas of reading instruction in *new literacies*, online reading comprehension, and student engagement and motivation will also be discussed. In chapter 3, I discuss the methodological considerations involved in carrying out quasi-experimental research. I discuss the research methods, the participants, the think-aloud protocol, the integration of iPads into the classroom, and data analysis.

In chapter 4, I introduce Joshua, Alexandra, Mary, John, Scott, and Addison through individual case studies. Embedded within each case study is a series of narratives that illustrate aspects of student engagement, motivation, and information processing while working on the iPad2. Finally, in chapter 5, I discuss how each of the case studies relates to student motivation, engagement, and thought process while working on the
tablet technology. The discussion draws on previous literature to support these findings, make comparisons, and to form conclusions related to the research questions.
Chapter Two

Reviewing the Literature

Role of Technology in Literacy: Historical Overview

Literacy has been driven by a wide variety of social and historical forces. It is a function of a society’s social maturity as well as its technological achievement. Generally, literacy has served as a means of communication, social control, and a mechanism for advancement: “The forms and functions of literacy, as well as literacy instruction itself, are largely determined by the continuously changing social forces at work within any society and the technologies these forces often produce” (Leu, Kinzer, Coiro, & Cammack, 2004, p. 3). Historically, literacy was primarily used as a tool for documenting business exchanges and literacy instruction was limited to the religious and the aristocracy (Manguel, 1996).

Some of the earliest forms of communication, known as cuneiform writing (pictographs) were recorded on clay tablets using a stylus (Manguel, 1996). It is thought that the inventor of these tablets recognized the limitation of the human brain’s capacity for information and the unlimited amount of information that could be recorded on the clay tablets. Additionally, for the first time, the “memory-holder” was not required to be present to deliver a message and communication could be distributed across time and space (p. 178).

Typically, these clay tablets were small so that they could be held in a hand and several tablets kept together in a predetermined order, were considered to serve the same function as a book (Manguel, 1996). Similar to the modern book, the rectangular shape of the codex, allowed a reader to hold an entire text in their hands and to flip pages (Cavalle
& Chartier, 1999). While books have taken on various shapes throughout our history, the most popular have always been those that can be comfortably held in the human hand (Manguel, 1996). It is interesting to note that even in the 21st century, hand held mobile technologies used for reading and communication with others (e.g., e-books, Smart phones, tablets), are all created in a rectangular shape to fit into our hands and the instrument used to record information on this technology is referred to as a stylus.

Since the information recorded on these tablets was intended as a means of documentation that could be re-visited and also passed on, it was at this same time that the creation of a reader came into existence: “The writer was a maker of messages, the creator of signs, but these signs and messages required a magus who would decipher them, recognize their meaning, give them a voice. Writing required a reader” (Manguel, 1996, p. 179).

During the fifteenth century, reading and writing were forever changed by one of the most revolutionary technological innovations developed, the Gutenberg printing press (Leu, et al., 2004). It can be argued that the invention of the printing press marked the beginning of an “Information Revolution”. For the first time, books were being mass-produced in a standardized format and literature became widely available to many commoners. This was an important step toward the democratization of literacy as more individuals had access to more information (Bolter, 2001). Before the invention of the printing press and the distribution of books, literacy was not a necessary skill in order to be a functioning and contributing member of society. The printing press also allowed people to teach one another literacy skills en masse and as a result, the skills of reading and writing became a requirement for productive citizenship and remains so today.
The printing press marked a turning point in the evolution of critical thinking and scholarship. Innis (1951) stated that, “the discovery of printing in the middle of the fifteenth century implied the beginning of a return to a type of civilization dominated by the eye rather than the ear” (p. 186). In addition, the printing press allowed for the preservation of knowledge, a significant advancement in many areas of scholarship. For the first time, knowledge gained in various academic fields could be recorded, and disseminated to others, and printed text could be studied, questioned, and added to, just as it can be today.

A system of formal education, that is, the separation of school and childhood from work and adulthood came into existence during the period of European industrialization (Logan, 1995). Schools ran (and continue to run) much like factories with the end result of producing standardized graduates able to find an appropriate place in the workforce (1995). This model has been challenged in the present education system as the change in technology, especially the introduction of the Internet, has created another powerful “Information Revolution”. Similar to the invention of the Gutenberg printing press, the Internet has shifted not only the landscape of the current education system, but society as a whole. It is clear that educators can no longer operate using the industrial-style model. In this period of technological advancement, teachers are no longer the only ‘source’ of information on various academic topics. In fact, many students today will enter the school system knowing much more about the digital and technological environments that they engage with outside of school.

The figure of the school, which has been slow to change, has taken on a new meaning because of the radical changes in the information environment in which it operates. The school system, once considered an engine of social mobility and fount of opportunity, is now regarded by many students as an
obstacle or a prison in which one must do time until one is released into the real world as an adult. In order to succeed, the figures of the school and workplace must change so that they are back in synch with the real world, a world that is undergoing continuous and rapid change due to the accelerated flow of information (Logan, 1995, p. 23).

Due to this ongoing challenge to the traditional systems of education and literacy, it is prudent to explore new and progressive ways of engaging students in their literacy education. One term that describes these new approaches is ‘new literacies’. The following section explores the various definitions of this term and discusses the theoretical framework that underlies this new area of research.

**Theoretical Framework of New Literacies**

To be successful, today’s students need to be critical, independent, creative, flexible and most importantly, effective communicators (Ontario Ministry of Education and Training, 2006). The ability to communicate in a world of rapidly evolving technology requires that a student be proficient at comprehending a diversity of communication forms. In a new literacies and technology position statement, the International Reading Association (2002) articulated that traditional definitions of best practice instruction in reading would no longer be sufficient to meet the needs of today’s students. For example, the introduction of the Internet and electronic texts that incorporate hypermedia and hyperlinks have led to some difficulties for student comprehension since they require very different skills from those required for print based texts (RAND Reading Study Group, 2002).

These new technologies are changing literacy instruction practices in significant ways (Larson, 2009). Surprisingly, it has only been during the last twenty years that ‘literacy’ has replaced the field known as ‘reading’ in education policy and curriculum
development (Lankshear & Knobel, 2006). The interesting distinction is the concept of reading in psychological terms as compared to literacy, which is grounded in a more sociological view. The central tenet of the new literacies studies is that literacy education cannot be viewed as a set of isolated skills that can be taught and then assessed (St. Clair & Phipps, 2008).

Instead, Gee (2003) suggests that any interaction with text (print or digital) involves a socially negotiated process that is informed by historical and personal experiences. In this way, literacy is viewed as a new social practice. According to new literacies theory, there are multiple literacies and multiple ways of demonstrating literacy (Lankshear & Knobel, 2006). Gee (2003) suggests that a literate individual is one who is able to use the ‘right’ language in the ‘right’ ways. Effective communication depends on our ability to communicate and the definition of a literate individual in this era of new literacies will in fact depend on one’s ability to communicate effectively using a variety of tools and in a variety of mediums. Today, this might include the ability to text message, blog, and contribute a wiki. In an educational setting, new literacies are essential for online reading comprehension, learning, and communicating (Coiro, 2003; Leu et al., 2004). Educators, then, have a great deal to learn from the observation of how students learn from and engage with multimodal texts using emerging technologies (St. Clair & Phipps, 2008).

In their explanation of new literacies, Lankshear and Knobel (2006) draw on the work of Green (1988, 1997) who has provided a framework for a literacy model that builds on a sociocultural perspective and incorporates three interconnected measures (operational, cultural, and critical) of learning and practice. According to Green, this
three-dimensional model integrates language, meaning, and context where all three dimensions have equal priority. The operational measure focuses on language but goes beyond the technical aspects of handling written language to include reading and writing in a variety of contexts. The cultural measure focuses on understanding texts in relation to the social contexts in which they are created. The critical measure focuses on an understanding that all literacies are socially constructed and selective. “The critical dimension of literacy is the basis for ensuring that individuals are not merely able to participate in some existing literacy and make meanings within it, but also that…they are able to transform and actually produce it” (Lankshear & Knobel, 2006, p.16).

Lankshear and Knobel (2003) have created the term ‘new literacies’ in consideration of the fact that, “being literate involves much more than simply knowing how to operate the language system” (p. 12). New literacies involve processes such as judging the value of various Web sites or maneuvering through hypertext (Kulikowich, 2008). For example, today’s students are interacting with new literacies on a daily basis, including Web based reading and writing, e-books, participating in social networking spaces, instant messaging, and blogging to name just a few (Lankshear & Knobel, 2003). In this world of new literacies, students are using a number of different technology systems (cell phones to Internet) in order to solve a problem or complete a task (Kulikowich, 2008): “All of these practices impact our conceptions of literacy and, ultimately, influence the definitions of literacies in the classrooms, at home, and at work” (Leu et al., 2004).

Finally, the association between the words new and literacies has helped define a new paradigm and ontology for research in this area. The new literacies research can be
viewed as a new theoretical and research paradigm for studying literacy as compared to previous paradigms, such as top-down (Goodman, 1967) and bottom-up theories (Gough, 1972) based on psycholinguistics (Lankshear & Knobel, 2006): “This paradigmatic sense of ‘new’ in relation to literacy is not concerned with new literacies as such but, rather, with a new approach to thinking about literacy as a social phenomenon” (p. 24). In contrast, the ontological sense of ‘new’ is intended to reflect the ‘nature’ of new literacies. Further, this ontology can be divided into two parts; digital technologies and the different technical components associated with this evolution.

Practices that are determined by ‘post-typographic’ texts include using and producing hyperlinks between documents, text messaging on cell phone, uploading images to the Internet, and creating websites (Lankshear & Knobel, 2006). In addition, the second part of this theory is reflected in the ‘technical stuff’ of new literacies that deals with things like screens, pixels, and digital codes that are very different from the paper, type, and material print of customary literacies (p. 25). Two good examples of this type of unconventional and interactive forms of new literacies are blogs and wikis, discussed below as Web 2.0 technologies.

The paradigmatic sense of new is concerned with the emergence and increased popularity of digital texts and ‘post-typographic’ forms of text and their differences from traditional print-based literacies (p. 24). According to this theory, new literacies have modified the social practices of work, home-life, education, and recreation, to name a few. As expressed by Lankshear and Knobel (2006), the impact of new literacies is changing the ways that individuals produce, exchange, and receive texts in multimodal formats.
New practices are often more ‘participatory’, more ‘collaborative’, more ‘distributed’…than conventional literacies” (p. 25).

In a review of new literacies research, Coiro, Lankshear, Knobel, & Leu (2008, p. 600) have identified that most new literacies frameworks share the following four elements:

1. New literacies include the new skills, strategies, dispositions, and social practices that are required by new technologies for information and communication.
2. New literacies are central to full participation in a global community.
3. New literacies regularly change as their defining technologies change.
4. New literacies are multifaceted, and our understanding of them benefits from multiple points of view.

While the broad definition of new literacies shares many common aspects, there are also many more specific domains within the broader new literacies framework. Research is being conducted in each of these areas and specific theories are being developed in each case. It is therefore very important to be specific when referring to and designing research studies in this area (Leu, McVerry, O’Byrne, Zawilinski, Castek, & Hartman, 2009).

**Web 2.0 Technologies**

The academic world has been paying close attention to the interactive technologies of Web 2.0 (Merchant, 2009). Researchers (Gee, 2004; Lankshear & Knobel, 2006) are questioning how students might learn in the new communicative spaces afforded by Web 2.0 technology. More specifically, they are interested in determining whether these new technologies are transformational for learners and if so, how? For
example, “before they hit the age of 20, they [the students of today’s Web 2.0 world] will have sent and received over 200,000 email and instant messages, but will have spent less than 5000 hours reading books” (Prensky, 2001, p. 2). It has been suggested that teachers of today should question traditional pedagogy and endeavor to access their students’ digital knowledge (Moll, Amanti, Neff, & Gonzalez, 1992) to optimize literacy growth.

Before re-examining established pedagogical principles to determine the efficacy of Web 2.0, it is important to identify the key features of new literacies in the context of this technology (Merchant, 2009).

The term Web 2.0 was coined by O’Reilly (2005) to describe the new directions of Internet usage including social networking sites, blogs, and wikis, to name just a few. These new interactive and collaborative spaces on the Internet have caught the attention of educators and researchers for two significant reasons. First, today’s students are spending considerable amounts of time on these interactive and collaborative spaces and second, these modes of interaction involve new literacies practices and new habits of mind (Lankshear & Knobel, 2006).

Web 2.0 spaces have several important characteristics that may or may not be present in any one space (Lankshear & Knobel 2006). While some researchers (Cagle, 2006; O’Reilly, 2005) have created lists of these characteristics, Merchant (2009) has listed and explained four features that are important to the proposed research as they promote a sense of interaction and community.

1. *Presence*: Web 2.0 allows users to present themselves online in various virtual forms. For example, users may develop an online profile and/or generate an avatar (a graphical form of the user’s character).
2. *Modification:* Web 2.0 spaces can be personalized in the design of the user’s home page and are interoperable. This flexibility allows users to link one application to another or to import various elements from one space to a different space. For example, embedding a YouTube video in a wiki.

3. *User-generated content:* Unlike traditional static web content, Web 2.0 allows for the creation of content by users. However, participation is also possible even if users do not generate content. In this way, Web 2.0 spaces permits users to be both consumers and producers.

4. *Social participation:* Web 2.0 spaces such as blogs and wikis invite others to participate.

As explained by Davies and Merchant (2009), while the preceding list is not exhaustive, it presents a starting point for the examination of the sense of community and interaction developed by users of Web 2.0 technology. Some researchers (Boyd, 2007; Carrington, 2008; Davies, 2006; & Merchant, 2007) have already described the learning that occurs on these web spaces but little attention has been given to the quality of that learning (Merchant, 2009). It is imperative that we begin to investigate this learning model since there is increased evidence of Web 2.0 technologies being used in today’s classroom (Lankshear and Knobel, 2006). In particular, student participation in wikis was a focus of my research.

*Wikis.*

A wiki is a free website generated by a community of individuals where members are responsible for the growth of the wiki by adding, modifying, or deleting content (Mindel & Verma, 2006). It is different from a blog since its primary focus is the joint
creation of content (Sanden & Darragh, 2011). A wiki can be a potentially valuable application tool for the classroom since it allows students to demonstrate their increasing understanding of a certain topic in collaborative and interactive ways (Sanden & Darragh, 2011). Godwin-Jones (2003) stated that a wiki is an excellent forum for the co-creation of knowledge through group problem solving and inquiry. For example, after a teacher creates the wiki site and delineates expectations for use, students can begin to contribute text, images, videos, and hyperlinks. Wikis are unique because of the ways in which community generated information can be stored and retrieved; the ways that modifications to the content pages are managed; and the opportunities afforded for online discussions (Sanden & Darragh, 2011). Further, wikis are organized by content, not by chronology and have the potential to improve learning through the creation of shared understandings across time and distance (Mindel & Verma, 2006).

In order to evaluate the learning potential afforded by participation in a wiki, Sanden and Darragh (2011) reviewed several studies and developed an evaluative framework for educators based on the three different perspectives. These include the work of The National Council of Teachers of English (NCTE, 2008), Lankshear and Knobel (2006), and Cummins, Brown, and Sayers (2007). Taking all of these different contexts into consideration, Sanden and Darragh’s (2011) framework was used to assess the effectiveness of incorporating new technologies such as wikis into classrooms as a way to build new literacies for students. Further, this framework accounted for both students’ sociocultural and pedagogical needs. In evaluating classroom implementation of technology, Sanden and Darragh’s (2011) framework focused on the way the technology was used in the classroom. Similar to Merchant’s (2009) list of significant features of
Web 2.0 technologies, this framework identifies the elements of presence, modification, user-generated content, and social participation as key components that can guide educators in their decisions about how and why to incorporate specific technologies into their classroom practice (Sanden & Darragh, 2011): “However, wikis alone cannot do anything; their potential to provide opportunities for literacy growth is dependent on their effective implementation by teachers” (p. 10). It is important then to review some of these effective implementation strategies.

**Using wikis in classrooms.**

In order to promote a sense of student ownership in their literacy learning, teachers must ensure that the wiki is a space where all members of the class are free to express their unique voices and perspectives (Sanden & Darragh, 2011). For example, students of AP Literature & Composition classes at Suffern High School in Suffern, New York created a wiki for literature reviews of books read that contained both print and online resources. Through topics of character development and literary themes, students in this class were afforded the opportunity to develop their own literacy learning by reading contributions of their peers and adding their own understandings (Sanden & Darragh, 2011). This provides a strong example of the potential of wikis to enhance literacy learning.

The Mules Reading Group Wiki is another successful example where fourth-grade students were provided with the opportunity to engage in authentic conversations about the books being read in their class (Sanden & Darragh, 2011). In this research, vocabulary development occurred naturally through an authentic discussion among classmates about the word ‘privy’. Through their conversation, the wiki allowed students
to work together to arrive at an understanding of this unfamiliar word rather than the
teacher providing the definition. Additionally, the fourth-grade students reflected on their
participation in the wiki and many commented that they loved the talking and writing
back and forth (Sanden & Darragh, 2011). It would appear that interactive spaces such as
the wiki provide opportunities for students to engage in authentic and meaningful
conversation where each student has a voice and collaboration leads to deeper literacy
understandings.

Wikis also allow students to participate in a community of knowledge where
learners need to acquire critical analysis skills (Siegle, 2008). By contributing to a
collective body of knowledge, students participating in a wiki must read, analyze, and
evaluate a variety of texts prior to making their contribution: “Providing a variety of
sources as well as letting students offer their own, followed by explicit instruction on
how to evaluate information and sources…can help to develop students’ critical literacy
skills” (Sanden & Darragh, 2011, p.13). These critical literacy skills are essential since
the wealth of information that students are confronted with on a daily basis (both offline
and online) can be overwhelming and they may lack the understanding to use this
information effectively (Loertscher, 2007).

Wiki spaces created and guided by a more experienced educator can foster the
critical management skills necessary for learners to sort through information presented in
both digital and non-digital formats (Sanden & Darragh, 2011). It is evident that new
technologies such as blogs and wikis have the potential to offer new educational spaces
where learning is a collaborative journey. These researchers have presented the
successful integration of technology and literacy learning. In this era of new literacies,
Sanden and Darragh (2011) suggest that educators must remain focused on involving their 21st century students in their own paths of learning and knowledge growth. This is the focus of my research, as young adolescent subjects participated in the creation of a class wiki to discuss their online research findings. Equally important is research that has evaluated best practices for reading instruction as related to new literacies. This important topic forms the basis of the next section.

**Reading Instruction and New Literacies**

Until recently, the majority of research on reading was an attempt to understand what worked best for reading instruction. In addition, this research was based on the assumption that reading was a skill involving the decoding of printed text (Levy, 2009). In an experiment designed to explore the effects of Internet Reciprocal Teaching (IRT) on a number of conventional and online reading assignments, Castek (2008) investigated the role of classroom instruction on helping students acquire new literacies skills through the use of the Internet. Eighty-nine seventh grade students representing four sections of science were the participants and each section was randomly assigned to one of four treatment conditions. These conditions included (a) Internet usage with intensive strategy instruction for 12 weeks; (b) Internet usage with moderate strategy instruction for 7 weeks; (c) Internet use with no strategy instruction; and (d) regular classroom instruction that did not include Internet use or strategy instruction (p. 198). The results of this study revealed that students who only received regular classroom instruction did not perform as well on an online learning task as students in the intervention conditions. Interestingly, no significant differences were found between each of the four sections on measures of traditional reading. Further, the results of this study revealed no significant correlations
between traditional reading and new literacies proficiencies. Castek (2008) concluded, that the sets of skills required for traditional reading tasks may be completely different than those demanded by the new literacies.

In an attempt to examine how experiences with digital technology influence young children’s perceptions of reading, Levy (2009) asked twelve children aged 3-6 about their perceptions of reading paper and screen-based texts in structured interviews that incorporated puppets and games. As part of the data collection, children were also provided opportunities to use computers. Participants of the study were competent users of digital technology who also acquired skills that allowed them to function fluently with new technologies; a transferable literacy (Levy, 2009). For example, Levy found that children who had never used a touch pad, were able to use it effectively once they understood its relationship to the PC mouse. Further, the results of this experiment also demonstrated that the children who were not yet print literate and could not decode print were able to use a variety of multi-modal cues in their use of screen-based texts.

Interestingly, these same results did not transfer to print-based texts. That is, children in this study reported that they did not see themselves as readers, yet, were quite comfortable in using print within the context of screen-based texts. Levy concluded that because children appear to possess digital ‘funds of knowledge’ before entering school, they would seem to benefit from continued practice with screen-based texts and the use of digital technology. This may allow young children the chance to “learn how to use and make sense of print, within a context that is meaningful, motivating and free from issues of proficiency grading” (Levy, 2009, p. 89). Further, the results of Levy’s study demonstrate that children may lose confidence in themselves as readers as they move
through the school system and their perceptions of readers narrow to include only those who are able to decode printed text only.

**e-books as a new medium.**

Some of the first media technologies introduced in schools were electronic books (e-books). While e-books have been in existence for almost 20 years, studies examining how children respond and interact with this technology are few. The new characteristics of electronic texts require educators to adopt new instructional strategies that will assist readers in developing the different comprehension skills demanded by engaging with this emerging technology (Coiro, 2003). Research by Fasimpaur (2004), for example, suggests that students found e-books to be a “new and unique medium” (p. 12). As a result, children tend to read more because of the novelty of the experience. While electronic books reflect the traditional format of printed books, they include a variety of tools that allow the reader to manipulate and interact with the text that, in turn, may provide a deeper and more engaging reading experience. In fact, the results of preliminary research in this area have demonstrated increased engagement for students who are deemed “at-risk” or who have a learning disability (Coiro, 2003).

Recently, Larson (2010) conducted an investigation into the integration of an e-book reader, specifically, the Amazon Kindle, with 17 grade 2 students. These children had prior experience with reading and responding to digital texts and were encouraged to share their ideas about books using a class blog. Results of this investigation revealed that these grade two students were adept at using many new literacies skills when using this technology. For example, subjects were able to adjust the font size, access the built-in dictionary, and activate the text-to-speech function to listen to unknown words or to
reread sections of the text. In addition, children who did not enjoy reading books before the study began later expressed their enthusiasm about this new reading experience (Larson, 2010).

There is now evidence that many young children enter the education system with experience in reading multi-modal texts (Carrington, 2008; Marsh, Brookes, Hughes, Ritchie, Roberts, & Wright, 2005). Further, Marsh et al. (2005), suggest that educators develop curriculum that permits students to engage with the social and cultural demands of the knowledge economy and evolve their digital ‘funds of knowledge’ (Moll, Amanti, Neff & Gonzalez, 1992). However, this type of curriculum cannot be developed until more research is completed to determine the differences between reading digital and print based texts for children (Levy, 2009). Before developing this curriculum, it is important to examine the differences between online and offline reading comprehension.

**Online Reading Comprehension**

In classrooms all over the world, students are seeking information, ideas, accessing multimedia, and communicating with one another using the Internet (Kymes, 2005). This rapid adoption has left many educators and researchers wondering if traditional print literacy skills are sufficient for those engaged in online reading activities. The acceptance of the Internet has required educators to reconsider the thought processes involved in comprehension (Coiro, 2003). Research indicates that online reading comprehension is not identical to offline reading comprehension and skilled readers offline are not always skilled readers online (Coiro & Dobler, 2007; Leu, Kinzer, Coiro, & Cammack, 2004).
**Teaching online reading comprehension.**

Instruction for comprehension of printed text has traditionally focused on the use of a specific set of skills that when employed correctly, lead to success. Those skills were typically comprised of cognitive and metacognitive methods that allowed students to control their own learning and includes strategies such as previewing, setting goals, predicting, asking questions, monitoring understanding, and making connections (Block & Pressley, 2002; Coiro, 2011; 2002; Kymes, 2005). While many of these skills are still valuable to the understanding of digital literacies, the Internet also allows an individual the opportunity to interact with new text formats (e.g., hypertext), and create new products (participating in synchronous chats). In addition, Web-based texts tend to include a number of media forms (e.g., audio and video clips, cartoons, icons) that are typically interactive (Coiro, 2003). Snow (2002) identifies a need to teach skills appropriate to the technology: “Using computers and accessing the Internet make large demands on individuals’ literacy skills; in some cases, this new technology requires readers to have novel literacy skills, and little is known about how to analyze or teach those skills” (p. 4). Mayer (2000) has suggested that teaching for online comprehension, will first require an understanding by educators and researchers about how students process material in multimedia and online environments and how mental representations of this information are constructed; in other words, an understanding of the thinking processes that occur during an online reading activity.

Green (2005) explains how the teaching of reading and the explicit teaching of thinking can reinforce one another. Similar to the teaching of effective reading comprehension skills, teaching thinking incorporates the teaching of planning, problem-
solving, and metacognitive understanding (2005). Green suggests that all learners can be assisted to develop their thinking skills and become more metacognitively aware by using explicit models that demonstrate the thinking that occurs while constructing meaning from print and linking it to prior knowledge: “A reader’s level of metacognitive awareness about which strategies are best suited to locate, critically evaluate, and synthesize diverse online texts is likely to foster a deeper understanding of the texts they encounter on the Internet” (Coiro, 2011, p. 108). Researchers have agreed that many students will continue to lag behind without explicit instruction in the reading and thinking processes involved in reading print and online texts for specific purposes (Block, 2004; Castek, 2008; Coiro, 2011).

One model that may assist in this understanding is the think-aloud strategy (Coiro & Dobler, 2007; Kymes, 2005; Pressley, 2000). Think-alouds (Davey, 1983) are informed by the instructional approach known as cognitive apprenticeship (Collins, Brown, & Newman, 1990). According to Collins, Brown and Newman, cognitive apprenticeship works to make thinking visible. In an educational setting, teachers can support learners by pointing out useful comprehension strategies that are often overlooked or hidden while engaging them in relevant and meaningful problem-solving activities (Coiro, 2011). During a think-aloud, a teacher verbalizes the thinking processes of a skilled reader when engaging with a text and provides insight on strategies being used. With practice, students will begin to internalize many of these explicit strategies and in time, will be able to handle reading activities with increased independence. Wilhem (2001) noted that when children engage in a think-aloud, they better understand that reading is a meaning-making process, and is a skill that can be developed and results
in reflective and engaged reading. While the success of this strategy is heavily documented for offline texts (e.g., Baumann, Jones, Seifert-Kessell, 1993; Block & Israel, 2004; Lapp, Fisher, & Grant, 2008), there is very little research to date that has examined how this approach might work with online reading experiences.

Kymes (2005) briefly reviewed the comprehension strategies for both offline and online reading using the think-aloud example. She outlined the successful strategies that are employed by skilled readers (when engaged in a specific task) and compared them for both offline and online tasks. In her analysis, Kymes explained how many of the strategies used by proficient readers such as awareness of purpose, skimming, and activating prior knowledge would also benefit readers in an online environment. Other strategies, such as new word meanings, rereading and note taking, interpreting text and conversing with the author, lend themselves to increased interactivity by students in an online environment. For example, when learners come across an unfamiliar word in an online medium, they may simply access the hypertext link to an online dictionary (Kymes, 2005). This would allow for increased attention on meaning-making and comprehension (Meyer & Rose, 1998).

When readers engage with a printed text, they are conducting a mental conversation involving the asking of questions, the clarification of ideas, and the connection of key concepts to existing knowledge (Kymes, 2005). Labbo, Reinking and McKenna (1998) suggest that in an online environment, learners can extend this internal conversation to include emailing the author to ask questions and/or participate in online blogging, or live chats. Further, educators have typically spent quite a bit of time teaching
note-taking strategies to their students with the goal of increased understanding and retention of information (Kymes, 2005).

Internet reading fosters efficiency and immediacy and diminishes the capacity to engage in deep reading (Wolf & Barzillai, 2009). Wolf explained that, “When we read online, we tend to become mere decoders of information. Our ability to interpret text, to make the rich mental connections that form when we read deeply and without distraction, remains largely disengaged” (p. 34). Additionally, Wolf and Barzillai suggested that although critical online reading presents the reader with a number of entry points into any given subject; it can also be the source of much distraction. This is an important consideration for today’s learners and emphasizes the necessity of educating students in the use of, “…executive, organizational, critical, and self-monitoring skills to navigate and make sense of the information” presented on the web (Wolf & Barzillai, 2009, p. 35).

Also in an online environment, students may print information and cut and paste information using the snatch and grab method which is obviously not possible for printed text (Sutherland-Smith, 2002). As with any think-aloud task, “snatch and grab” must first be modeled by the teacher who can give a voice to his/her thoughts when navigating through an offline or online text. To model a think-aloud for an online task, it is recommended that a teacher use a data projector and the Internet (Kymes, 2005). In this way, students are able to listen, watch, and assimilate and begin to learn about their own metacognitive strategies: “When explicit instruction occurs, students realize that these are the “secrets” of good searchers and good online readers” (p. 498).
Observing students’ online reading processes.

More recently, Coiro and Dobler (2007) conducted a qualitative study of the reading strategies and choices used by skilled readers to locate and read for information on the Internet. The sample was comprised of 11 sixth-grade students who were deemed to be skilled readers in print contexts and who also had experience using Internet search engines and reading websites. In order to gain insight into the thinking processes of the subjects, data collection for two reading sessions were gathered using a think-aloud protocol (Pressley & Afflerbach, 1995). Subjects were provided with a list of seven literal or inferential comprehension questions that could be answered by reading one multilayered website provided by the researchers. Data were collected through a number of verbal protocols, interviews and field observations (Coiro & Dobler, 2007). This study revealed that in many ways, reading online is similar to reading offline and yet, in other ways, is uniquely complex. Coiro and Dobler define these findings according to themes beginning with prior knowledge. The data from this investigation revealed that skilled readers relied on four major sources of pre-existing knowledge when they read for information online. Two of these pre-existing sources were linked to research grounded in reading printed text (prior knowledge of topic and informational text structures) and two additional sources were gained from reading on the Internet (prior knowledge of website structures and search engines).

A second theme emerged that involved the use of inferential reasoning and in particular, the use of forward, predictive inferences when locating information in an online setting (Coiro & Dobler, 2007). In addition to making, confirming, and adjusting inferences (as with printed text), subjects reading online informational text often
employed a greater degree of forward inferential reasoning (predictions) than typically used for offline informational text. Further, Coiro and Dobler stated that, “…we found evidence to suggest that the skilled readers in our study appeared to make forward inferences (e.g., predictions) within Internet text each time they were confronted with one or more hyperlinks on a given page” (p. 233). In this way, students were making predictions about which link would lead them closer to or further away from the information that they required. Along with a higher degree of inferential reasoning, subjects were able to orient themselves in a novel and active three-dimensional space where they realized that the answer may have been buried beneath numerous layers of links rather than the single visible layer of information in a printed text (Coiro & Dobler, 2007). As explained by Coiro and Dobler, inferential reasoning for online text involves added complexities.

A third theme that emerged from the data analysis of skilled online reading, revealed the use of a more complex degree of self-regulated reading involving the metacognitive processes of regulation and evaluation (Coiro & Dobler, 2007). More specifically, when reading for information on a multilayered website or using a search engine, the readers in this study demonstrated a repeated cycle of decision-making behaviours involving four steps; planning, predicting, monitoring, and evaluating. For example, when reading on the Web, students would begin with a plan of where to begin followed by a prediction of what link to follow to lead them to their answer. When the link had been selected, the learner then monitored the information they were presented with to see if their choice made sense. Finally, the reader then evaluated his/her decision and makes a conscious decision to go further, return to a previous link, or begin the
process all over (2007). It is also important to note that this cycle of decision-making behaviours happened quickly and for very short passages of text. As explained by Coiro and Dobler, this finding supports previous research findings that demonstrated self-regulated reading to be a compulsory activity in reading hypertext but may not be observed for linear text (Protopsaltis & Bouki, 2004; van Oostendorp & de Mul, 1996).

Additionally, Bilal (2000, 2001, 2002), designed a series of studies to determine the success of student online searches based on three different tasks; (a) fact-based search task; (b) research task; and (c) fully self-generated task. He found that students were most successful with online tasks that were generated by their own interests. Tasks that were assigned by others resulted in poor research results by the same students. In cases where students were not invested in the topic, they seemed to be searching the web for the one right answer for their teacher and did not explore the Internet any more than they needed to (Shenton & Dixon, 2003; Hirsh, 1999).

While many of the comprehension strategies of proficient readers can be transferred between offline and online text, it is evident that some of the strategies allow for increased interactivity by the participant in an online environment. Meyer and Rose (1998) have suggested that one of the most significant benefits of interactive technologies is the invitation for manipulation: “Electronic text invites student to enter a piece of writing and make themselves home in it, developing a sophisticated understanding of what text is all about through a hands-on experience” (p. 49). Clearly, we have entered a period where best practices in reading instruction for print based texts are not simply transferrable to online texts. As evidenced by this preliminary research, practitioners cannot continue to use new tools in old ways and expect similar results
(Meyer & Rose, 1998). Other distinct elements important to reading instruction are the 
more intangible aspects of student engagement and motivation. The following section 
daddresses these important components of learning to read.

**Student Engagement, Motivation, and Reading**

One of the greatest predictors of student success is student engagement and 
motivation for academic tasks (Fredricks, Blumenfeld, & Paris, 2004; Guthrie & 
Wigfield, 2000). It was reported recently in the Program for International Student 
Assessment (PISA) (Organization for Economic Co-operation and Development, 2010) 
that reading comprehension could be predicted by student interest in reading. In 
particular, those who enjoyed reading the most scored significantly higher than those who 
least enjoyed it. Further, as stated by Gambrell (2011), “if students are not motivated to 
read, they will never reach their full literacy potential” (p. 172). Reading instruction that 
only focuses on decoding and comprehension skills is not enough and consideration of 
student motivation and engagement must be included in discussions of student success.

Gambrell’s (2011) definition of reading motivation as the probability of engaging 
in or selecting to read has strong ramifications for educational instruction. According to 
Gambrell, engaged readers are intrinsically motivated, strategic, knowledgeable (about 
their understanding), and socially interactive with their teachers and classmates about 
their reading selection. For these reasons, Gambrell has recommended that top priority 
should be given in the curriculum to the promotion of the intrinsic motivation to read. 
Similarly, Brophy (2008) has suggested that the “sheer trivia included in most school 
curricula” be replaced with more authentic and meaningful activities and experiences (p. 
137).
Research has revealed engagement to be an equally important factor related to student achievement (Guthrie & Wigfield, 2000). A study conducted by Guthrie, Schafer, and Huang (2001) identified reading engagement to be the single most important factor in reading achievement, regardless of family background. More recently, Gambrell (2011) has provided educators with a list for the rules of reading engagement, which include access to authentic materials, sustained reading periods, and opportunity for social interaction. Further, Lutz, Guthrie, and Davis (2006) have suggested,

For example, a student who is highly engaged on a regular basis might be described as someone who is always looking at the appropriate book at the appropriate time, provides thorough response to thought-provoking questions, becomes excited by or takes pride in learning new things, and willingly discusses ideas with other students (p. 3).

Foundational research by Durik, Vida, and Eccles (2006) and Wigfield and Guthrie (1997) found that the important variables are involved in intrinsic motivation and engaged reading. Guthrie, van Meter, McCann, Wigfield, Bennett, Poundstone, Rice, Faibisch, Hunt, & Mitchell (1996) examined the use of concept-oriented reading instruction (CORI) as a framework for literacy instruction. This framework, which incorporates motivation and strategy use, also includes the key principles of customized education, instruction in the search for and retrieval of information and transfer of this information (by students) to novel situations. Following the implementation of CORI for one academic year, Guthrie et al., reported increased engagement for literacy in all measures of performance along with increases in achievement and motivation for students in grades three and five.

As a result of this study, Guthrie et al., were able to identify teaching practices that led to higher student engagement and achievement: (a) observational, encouraging
students to initiate learning by generating their own questions from real-world observation; (b) conceptual, with a focus on substantive topics rather than reading skills; (c) self-directing, supporting student autonomy and choice of topics, books, and peers; (d) metacognitive, with explicit teaching of reading strategies, problem solving, and composing; (e) collaborative, emphasizing social construction of meaning and communities of learners; (f) expressive, creating opportunities for self-expression through writing, debating, and group interaction; and (g) coherent, containing connections between classroom activities and tasks across the day, week, and month (p. 323).

Applying these principles for teaching is important, as underscored by Malloy, Marinak, and Gambrell (2010) who stated,

If motivation makes the difference between learning that is superficial and learning that is deep and internalized, it is critical for literacy professionals and classroom teachers to engage in practices that support not only the skill to read but the will to read (p. 509).

A similar study by Baker and Wigfield (1999) evaluated the dimensions of motivation that related to reading achievement and motivation. They collected achievement data and measured reading motivation for fifth and sixth grade students using the Motivation for Reading Questionnaire (MRQ), a self-report survey. The MRQ was designed to assess 11 facets of reading motivation including challenge, work-avoidance, self-efficacy, curiosity, importance, involvement, recognition, grades, social purposes, competition, and compliance. The results of this study revealed that reading motivation is multidimensional and include the following factors: competence and efficacy beliefs; intrinsic and extrinsic motivation; and purposes for achievement (p. 452). The strongest statistical correlation was reported between self-efficacy and challenge while the weakest correlation was reported between motivation and achievement.
Interestingly, the majority of students that participated in the investigation had reading scores substantially below grade level. Baker and Wigfield explained that this weak correlation does not mean that motivation and achievement are not related; rather, it may be the result of greater variability for weaker readers.

While the research reviewed clarifies the educational conditions for increased motivation, engagement, and achievement in offline reading, little research has been conducted to date that has examined these conditions for online reading. As Turner and Paris (1995) have explained, if “motivation does not reside solely in the child; rather it is the interaction between students, and their literacy environments” (p. 672), it is necessary that future research in student engagement and motivation for reading also consider the online literacy environment. The potential promise of this new form of literacy encompasses benefits for strong, skilled readers as well as those that struggle with foundational literacy skills.
Chapter Three

Research Methodologies

This research project used a mixed methods design combining both qualitative and quantitative aspects (Plano, Clark, & Creswell, 2008). Researchers in the social sciences have been combining research methods in their studies since the 1930’s but it was the pioneering work of Campbell and Fiske (1959) that led to triangulation techniques such as time, space, and person, common to all current mixed method approaches. The main strength of the mixed method design stems from the ability to work with large samples and to gain in-depth information about smaller samples within a single investigation (Creswell, 2002). For example, quantitative methods allow for statistical inferences from the sample examined, while qualitative approaches allow for open-ended examination of the phenomena under investigation.

The research outlined, employed a concurrent triangulation strategy (Creswell, 2009), the most common of the six typologies of mixed methods. In this approach, the researcher collects quantitative and qualitative data concurrently and subsequently compares the two data sets for similarities, differences, or a combination that can lead to well-validated and substantiated results (Creswell, 2009). Croninger and Valli (2009) have suggested that a mixed-methods design allows for “…a complementary relationship between the qualitative and quantitative streams…” (p. 543). Since both quantitative and qualitative data were collected in this study, it is important to begin by describing the characteristics of each of these research methodologies.
**Quantitative Research Methodology**

Quantitative research design, grounded in a post-positivist worldview, is often referred to as the scientific method, and is the basis of most traditional forms of research (Creswell, 2009). According to Creswell, post-positivists espouse a philosophy based on determinism, where causes are believed to determine effects or outcomes. Similar to the scientific method, the post-positivist researcher begins with a theory, collects data that confirm or disconfirm the theory, and makes necessary revisions to the theory based on research results. For example, this study is rooted in the theory that the use of iPad2’s will increase student engagement for reading and writing. Based on the results of previous research (Cairo, 2011), this investigation will also examine reading processes for both online and offline text with struggling and proficient readers in a naturalistic setting.

Quantitative methodology allows an investigator to test objective theories by exploring relationships between variables. Data are usually numerical (Creswell, 2009) and are typically gathered using either surveys or experimental methods. The data collected from each of these inquiry strategies can then be analyzed using statistical procedures. In this research, the quantitative data was comprised of the numerical results from the MRQ and the pre- and post results of the Stanford Diagnostic Reading test as outlined below. As the Stanford Diagnostic Reading test is standardized, it was also used to identify a subsample of three proficient and three struggling readers. In addition, using the results from these standardized tests allowed for greater objectivity than relying solely on teacher assessments and observations.
Survey research typically involves identification of a population of interest and then examining a sample of that population (Creswell, 2009). Data can be collected using instruments such as questionnaires, surveys, and structured interviews. These instruments provide numerical description of attitudes, opinions, and trends of a population. The intent of survey research is to make generalizations about a population based on the sample studied. This research study included structured interviews with all of the participants.

Experimental research generally involves providing a treatment or intervention to one group and withholding it from another (Creswell, 2009). By including a treatment and comparison/control group and then holding all other variables constant, a researcher is able, at least statistically, to determine that a specific treatment produces a specific outcome. Creswell provides an additional distinction in this type of methodology, differentiating between true experiments (random assignment of subjects) and quasi-experiments (non-randomized or single-subject designs). This study utilized a convenience sample and a quasi-experimental approach in the comparison of proficient and struggling readers.

Important to all quantitative designs are issues of validity and reliability. According to Creswell (2009), the validity of a quantitative study refers to the extent to which meaningful and useful interpretations can be made from the data collected. Further, Creswell distinguishes between three different types of validity: content, predictive and concurrent, and construct. To determine content validity, a researcher ensures that the items on a given instrument actually measure the content intended in the investigation. For example, in the current study, the MRQ and the Stanford Diagnostic Reading test
were directly related to student motivation and reading achievement. Importantly, these are exactly the intended measurement parameters. Predictive and concurrent validity were used to determine the predictability of scores in relation to an external criterion measure and the correlation of results. The MRQ and the Stanford Diagnostic Reading test were both standardized against external criteria during their development. Construct validity refers to the extent to which a score measures a certain hypothetical concept (Creswell, 2009). Again, all standardized measures included in the research were designed to test their intended construct. All of these various forms of validity are important in ascertaining whether a research design is able to answer the proposed research question(s).

At the beginning of any investigation, it is important to consider all possible threats to internal and external validity in order to limit and/or minimize their effects (Creswell, 2009). Internal validity threats include the treatment, intervention, or experiences of the subjects that jeopardize the researcher’s ability to make appropriate conclusions from the data gathered. These may include threats to the participants (e.g., maturation, mortality), threats to the experimental treatment (e.g., diffusion), and threats to procedures (e.g., testing and instruments). Additionally, external threats to validity arise when researchers make incorrect inferences from the data and extend them to other settings, people, or situations (Creswell, 2009). In all cases, this research attempted to minimize these threats through optimal research design and carefully conducted methodology.

Reliability refers to the extent to which a study or experiment is replicable or repeatable (Joppe, 2000). Three types of reliability are often referred to in quantitative
research; (1) the extent to which the results of repeated measures remains the same; (2) the dependability of a measure over a period of time; and (3) the comparability of measures within a specified time period (Kirk & Miller, 1986). Incorporating procedures such as the test-retest method, creating parallel forms, and measuring inter-rater reliability can reduce challenges to the reliability of the research (Charles, 1995). Human subjects in general, and children in particular, are notoriously variable in their responses and are often affected by factors external to those being studied. Simply being aware of these issues is the first step towards minimizing this concern. In the research outlined, being strictly consistent with all instructions given to subjects will help maximize reliability. Further, the use of standardized tests was also valuable since these instruments are designed to have internal reliability and can be a check against subjects providing unreliable answers. Finally, every effort was made to note and account for any external variables affecting subjects such as unpleasant life events.

**Qualitative Research Methodology**

Qualitative research designs employ a naturalistic approach where the phenomenon of interest unfolds in a natural (real-world) setting and there is no manipulation by the investigator (Hoepfl, 1997). Data are often collected by observing subjects’ behaviour and by participating in their activities (Creswell, 2009). Hoepfl described the uniqueness of this approach in the following manner: “Where quantitative researchers seek causal determination, prediction, and generalization of findings, qualitative researchers seek instead illumination, understanding, and extrapolation to similar situations” (p. 48).
Social constructivists believe that people seek understanding of the world in which they live (Creswell, 2009). In this paradigm, the researcher attempts to understand the subjective experience of each of the participants during the study. In addition, the researcher is aware that many factors need to be taken into consideration when studying individual perspectives. These include social, historical, and personal norms. An individual’s background is also an extremely important consideration, as it will shape the subject’s interpretation of the research situation.

There are many strategies of inquiry in qualitative research, including ethnography, grounded theory, case studies, phenomenological research, and narrative research (Creswell, 2009). Of these, this research was rooted in a case study approach that explored a phenomenon within a specific context and included a number of data sources (Baxter & Jack, 2008). This approach ensured that the topic being investigated was viewed through a number of lenses. This allowed for different aspects of the phenomenon to be exposed and understood.

Case study methodology is rooted in the constructivist paradigm where truth is relative and dependent on individual perspective (Yin, 2003). Further, constructivism is based upon the social construction of reality (Searle, 1995). Close collaboration of the researcher and the participant allows the participants to tell their stories and describe their views of reality (Crabtree & Miller, 1999). This in turn allows for a deeper understanding of the actions of the participants (Robottom & Hart, 1993). This research study was conducted in the naturalistic setting of an intermediate classroom during language class. In addition, the six participants in this study conducted their online research in the school library when it was not in use.
According to Yin (2003) it is also important to consider the type of case study that will be conducted. An explanatory case study is used when the research question implies causal connections between program interventions and outcomes. In addition, Stake (1995) describes case studies in three additional ways: intrinsic; instrumental; and collective. This study included both an explanatory and collective case study where more than one case was being examined. Specifically, the current research was an explanatory case study in that it examined the reading processes and engagement of struggling and proficient readers. Further, this research followed a collective case study approach by including a small number of proficient and struggling readers. This approach determined how the various iPad2 tools and online research questions differentially affected the reading processes in these two groups.

As explained by Lincoln and Guba (1985), the trustworthiness of a study is also a key factor in qualitative research. In order to establish this trustworthiness, it is imperative that qualitative researchers examine the standards of validation and evaluation for their research (Creswell, 2007). Here, validation refers to the extent to which the investigator has examined what they set out to examine and evaluation refers to assessing the quality of the research (Creswell, 2007). Lincoln and Guba (1985) suggested using the terms credibility, transferability, dependability, and confirmability as equivalent measures for validity, reliability, and objectivity for qualitative researchers.

Internal validity has traditionally referred to the extent to which research results accurately describe reality: “Assessing internal validity is the central means for ascertaining the “truth value” of a given inquiry, that is, the extent to which it establishes how things really are and really work” (Guba & Lincoln, 1989, p. 234). In naturalistic
investigations, the presence of multiple realities is assumed and it is up to the researcher to portray these realities appropriately (Hoepfl, 1997). One method that has proven very useful in establishing credibility is triangulation, a combination of methods or data that strengthens a study (Patton, 2002). Once the data is collected, the various results were compared in a process called “corroboration” (Creswell, 2009). In this way, the datasets work to counteract the weakness of the other and in effect, strengthen one another. Both numerical and descriptive information were incorporated in this study and therefore the research findings may provide greater credibility.

Guba and Lincoln (1989) suggest that transferability is parallel to the measure of external validity. The most common technique for ensuring a study’s degree of transferability is through the use of thick description. To facilitate transferability, detailed descriptions of the subjects, their backgrounds, varied sources of data collection, observations, and data analysis have been included in Chapter 4. Additionally, issues were identified that may have limited transferability. For example, this study included a convenience sample of one class of grade eight students. Thus, greater transferability would result from including more subjects from a variety of grades.

Reliability, which can be defined as the stability of data over a period of time, is again an important consideration. In qualitative research, “reliability” often refers to the stability of responses to multiple coders of data sets (Creswell, p. 210). Lincoln and Guba (1985) suggest that allowing reviewers to examine the process and product of the research for consistency, known as an “inquiry audit” or “audit trail”, may strengthen the dependability of a qualitative study (p. 317). In developing an audit trail, a researcher provides a detailed description of all decisions and activities throughout the study (Koch,
2006). In addition, the researcher clarifies all theoretical, methodological, and analytical decisions so that a second party can assess the significance of the research. In all cases, this research endeavoured to maximize relevance by considering various forms of validity and reliability.

**Research Methods**

Cresswell (2007) explains that one of the most important beginning steps in the research design process is the determination of the most appropriate sources for data collection. Two primary considerations include the site of collection and the subjects to be sampled. Other important phases of data collection include establishing rapport, purposeful sampling strategy, forms of data collection, recording procedures, field issues, and the storage of data. Careful consideration of the various facets of data collection will support the integrity of the results.

**The Site and Subjects**

One grade eight elementary classroom in northern Ontario was the primary site of the proposed research. The majority of students living in the relevant community are Caucasian and from middle to lower socioeconomic backgrounds. The specific class was selected based on low literacy scores as measured by the provincial standardized test Education Quality Accountability Office (EQAO). The grade level was chosen to avoid the early elementary years where basic reading skills are being acquired. This was important to the research since one of the factors that was investigated was the effect of technology with proficient readers. One female teacher (‘Beth’) was selected based on her reported comfort with using and incorporating new technology into her practice and her interest in the iPad2. Beth has 10 years of teaching experience. The subjects in the
grade eight class were the convenience sample investigated in all aspects of this study. All students were given the Stanford Diagnostic Reading Test in September. Using the results from this standardized assessment, six students (three proficient and three struggling readers) were selected to be part of the research. These six students (three males and three females) participated in the think-aloud protocol in the assessment of student engagement in reading processes and differences between online and offline reading comprehension.

**Selecting the Student Sample**

During my initial visit and following ethical consent, all students completed The Stanford Diagnostic Reading Assessment, Fourth Edition – Online (The Psychological Corporation, 1995) on day four of my observations. The Brown version (appropriate for Intermediate grades) of this test was administered online and took approximately 30-45 minutes to complete. This standardized test measures skills in phonetic and structural analysis, auditory vocabulary, literal and inferential comprehension of textual, functional, and recreational reading material and reading rate. For the purposes of this study, students only completed the parts of the test that measured auditory vocabulary and literal and inferential comprehension of textual, functional, and recreational reading because these components were the only ones relevant to this research. Specifically, this study focused on the differences between online and offline reading comprehension. These scores were then used to determine the stronger and weaker readers.

From the scores on the Stanford Diagnostic Reading Assessment, six students were selected to be part of the study. Each of the six students was then assigned a pseudonym that was used on all subsequent research materials for coding purposes and to
ensure anonymity. Students who agreed to participate were then asked to complete the Motivation for Reading Questionnaire (MRQ; see Appendix). The data from the MRQ was used to assess subject motivation for reading before and after participating in the study.

In this research, I attempted to more clearly delineate the effectiveness of the think-aloud protocol in supporting reading comprehension, engagement and motivation of particularly strong and weak reading students. Data for the online think-aloud sessions was recorded four times during the study, once at the beginning of each of the four months of the study. Additionally, classroom observations were conducted a minimum of three times weekly and for a minimum of two hours each visit. These weekly visits afforded me the opportunity to collect anecdotal notes, co-teach lessons, and interview subjects. One week before the conclusion of this study, subjects were asked to complete the post-test of the Stanford Diagnostic Reading Assessment. During the final visit, I re-administered the reading interest/attitude inventory (MRQ).

**Integration of iPad2 Activities in the Classroom**

After students’ baseline literacy skills were established using the described pre-assessment techniques, all students were then introduced to and provided with their own iPad2’s. The classroom teachers and I initiated the various iPad2 activities. At the start of the project, these included reading e-books, taking notes (both in print and audio form), and using educationally relevant Apps. By having the iPad2’s at their desk, students were able to read their e-books and quickly switch screens to post an entry on the class wiki site when they had something to contribute.
Think-Aloud Protocol

Similar to the method carried out by Coiro (2011), all six participants were provided with a meaningful and relevant problem to research on the iPad2. In order to record the decisions made by these students while researching their problem online, I sat beside each of the subjects. Each iPad was equipped with an Application entitled, *Display Recorder* that allowed for both screen captures of the students’ real-time online research activities as well as audio recordings of their verbal explanations of their decision-making. The participants were asked to complete four separate think-aloud sessions; each with a different research question. In addition, students were asked to complete their third think-aloud independently, without any support or influence from me. Interviews were also conducted on the last day of each student’s final think-aloud session.

Based on Coiro’s (2011) research, I used the four components of online reading comprehension that assess reading processes and products in each of the think-aloud tasks. These included, reading to locate tasks, reading to evaluate tasks, reading to synthesize tasks and reading and writing to communicate tasks (p. 8). Within these categories, Coiro listed four criteria that are integral factors to the purpose of online reading comprehension.

*Table 3.1 Categories for Online Reading Comprehension Assessment (ORCA) and Purpose (2011, p. 8).*

| Reading to Locate | 1. Use appropriate keywords to generate search.  
| | 2. Infer from search engine results.  
| | 3. Infer from different set of search engine results.  
| | 4. Locate and share address of two relevant websites with information that answers the question.  
| Reading to Evaluate | 1. Identify the author of the website.  
| | 2. Evaluate author’s level of expertise.  
| | 3. Evaluate author’s point of view or purpose.  

Reading to Synthesize

1. Identify two key details from two websites.
2. Identify key details from two additional websites.
3. Integrate information across four websites.
4. Make a claim and support with evidence (two relevant details).

Reading and Writing to Communicate

1. Access relevant information within a communication interface (email, wiki).
2. Use appropriate features of communication tools to compose message.
3. Demonstrate awareness of audience.

Data Analysis

*Quantitative data.*

Various components of the statistical package SPSS were utilized to analyze the quantitative data. The pre- and post Stanford Diagnostic Reading Assessment results between the proficient and struggling readers were analyzed using a split plot factorial to determine the pattern of change in performance for each group. Additionally, the pre- and post MRQ scores were analyzed using a paired t-test approach.

The open ended questions related to reading interests and attitudes that comprise this inventory allowed for a more inclusive understanding of the reading habits and perspectives of the involved students. Specifically, four of the eleven categories for reading motivation were particularly relevant to the think-aloud protocol. These included: reading efficacy; reading challenge; reading curiosity; and reading involvement.

*Qualitative data.*

Qualitative data were also derived from the think-aloud protocol. The main forms of this data were detailed descriptions (narratives) of the step-by-step thought processes of
students’ online researching behaviour. In order to facilitate this analysis, screen captures and audio recordings of their verbalized thought processes were saved on their iPad2’s while they conducted their research. Analysis of the students’ online research behaviours involved the transcription of all think-alouds and wiki postings for each student and the subsequent application of Coiro’s framework for online reading comprehension and assessment.

Each student’s think-aloud was recorded using the Display Recorder App on the iPad. After each session, I saved each of the student files to Dropbox (storage area that syncs with all my electronic devices) and also converted the file to a movie file to be stored in iTunes in an effort not to lose any data. When transcribing their think-alouds, I first sat down and listened to and reviewed each of their think-alouds word for word. This process involved listening to and reviewing each think-aloud a minimum of five times to ensure accuracy. After completing the transcriptions, I sat down and worked my way through each of the think-aloud protocols in an effort to assess online reading comprehension and assessment using the four categories of Coiro’s (2011) framework. When necessary, I reviewed the screen captures as well if I needed to remind myself of the sites that they visited. This allowed me to frequently transfer between print, visual, and audio representations of the participants’ work.

I began by reading the first protocol while searching for evidence of the students’ ability to read to locate. For this theme, I reviewed the transcript for words that were used in the keyword search and then used repeatedly for additional searches as the student’s continued in their research. I began by using one coloured highlighter to identify key word searches that included words from the research question assigned (e.g., video games
and harmful or helpful to eyes). I then used another colour when a participant chose a site that included one or some of their keywords (e.g., “Shoot-‘em up videogames may be good for eyesight”). I then chose another colour when a student chose two or more websites to gather information for their research question (e.g., www.gameinformer.com and www.vision.about.com).

For the reading to evaluate component of the framework, I re-read through each of the protocols and searched for evidence of the student’s ability to identify the author (i.e., www.kidshealth.org) using a coloured highlighter. Using a different coloured highlighter, I then read the individual transcripts searching for words that showed their ability to evaluate the author’s point of view, expertise, and/or reliability. For example, Joshua identified an author’s bias when he stated that a gaming website was published by Halo, a maker of videogames.

The reading to synthesize component involved the search for a student’s ability to identify two key details for their research question from two different websites. In this case, I matched the colour of the highlighter for the detail and the website. For example, when Joshua identified that video games may be beneficial for your eyes, I highlighted that phrase in green along with the website, www.gameinformer.com from which he read that information. This made the process of reviewing the transcripts for their ability to synthesize information across four websites much easier to see at a glance.

Finally, when I evaluated their ability to read and write to communicate, each student demonstrated their ability to access relevant information in the class wiki every time that they completed a think-aloud. I then printed out each of the student’s postings from the class wiki in order to highlight phrases that demonstrated an awareness of
audience, and was able to assess their general ability to craft an unambiguous response to the assigned research question. For example, the second research question posted on the wiki instructed students to, “…conduct online research and email the teacher’s class with their findings about how high volume levels on MP3 players impact hearing.” If a student addressed that specific audience in their wiki posting, it was highlighted.

Finally, each of the transcripts was read to identify keywords that could be related to the four specific categories from the MRQ. Examples of keywords for reading efficacy included strong and confident; examples of keywords for reading challenge included difficult and challenging; examples of key phrases for reading curiosity included “I am interested in,” and “I wonder if”; and key phrases for reading involvement (especially for the fourth research question included, “This is really interesting,” and “I want to find out more information about”.

Specifically, this deductive process involved several readings of the transcripts to identify exemplars of the four components of the framework. In essence, one set of case studies was analyzed using two different sets of codes; four from the framework; and four from the MRQ. While this analysis focused on individual case studies, the results also report comparisons across the various cases. In addition, structured interviews were conducted at the conclusion of the study with the participants to gain a more comprehensive understanding of their cognitive processes and reflections while engaging in this research.
Chapter Four

A Closer Look at the Impact of Using iPads Through Individual Case Studies

Introduction

In this chapter, I introduce Joshua, Alexandra, Mary, John, Scott, and Addison. To do so, I present six case studies that include the students’ words and examples of their work whenever appropriate to explain their story. Each case study begins with the finished product of an in-class writing activity that they completed using the iPad2. Each case study ends with student reflections and perceptions of reading and writing using technology.

Embedded within each case study is a series of narratives that illustrate aspects of student engagement, motivation, and information processing while working on the iPad2. Each of these narratives begins with an overview of the student’s background, followed by an unfolding of the narratives using excerpts from my field journals, data collected from the MRQ, Student Questionnaire about Reading on the Internet and Stanford Diagnostic Reading Test, notes from each of the four Think-aloud protocols conducted with the participants, and information collected during individual interviews. I conclude each narrative by illustrating its relation to student motivation, engagement, and information processing while working on the iPad2. However, since the purpose of this chapter is to profile these students and their experiences, I reserve discussion of the case studies for chapter 5, where I take a global look at the cases and draw connections to my research questions and the literature. Also, throughout this chapter, I include screenshots of student work exactly as it was written using the Wiki and word processing program that it is presented on.
Background on Students

Case Study One – Joshua

When I walked into the classroom on the first day of my observations, I immediately noticed Joshua. He was one of the tallest boys in his grade 8 class and as soon as he spoke, I was taken aback by his mature voice. He was generally a quiet boy but willingly participated when he had something to add. It was clear that he was one of the leaders in this class by the number of his peers who frequently circled his desk to ask him for assistance with their schoolwork. Although he paid attention to the lesson being taught, he frequently appeared disinterested and bored by the subject matter being presented on any given day. When discussing my reflections with the classroom teacher (Beth), she confirmed my suspicions that Joshua was indeed the strongest and most mature student in the class. Beth reported that he was a solid A student. Further, while he was generally respectful, Beth informed me that Joshua was aware of his status among his peers and that this sometimes caused difficulties.
Joshua comes from a two-parent, middle class family where he is the eldest of two boys. His father is employed in the technology field and this likely contributes to Joshua’s interest in computers and the Internet. Although he had never used an iPad2 prior to participation in this study, he did tell me that, “I am on the computer from the time I get home from school everyday until I go to bed” (which he reported to be around midnight). When I asked him how the majority of his time was spent on the computer, he reported, “I spend the most amount of my time playing video games but if I am not gaming, then I am researching information about gaming.” I then asked him how he did his research about gaming and he reported that he most frequently used Google and YouTube. “I use the Internet for everything and I am almost always on the Internet.” He also told me that he has his own computer and television in his bedroom and spends most of his evenings alone in his room.

**Reading Comprehension, Motivation, and Engagement**

The Stanford Diagnostic Reading Test Online measured reading comprehension. Joshua completed the vocabulary and reading comprehension sub-tests with no difficulty and finished in approximately 40 minutes. The results of his pre-test (September 2012) raw scores were 26 out of 30 for vocabulary and 50 out of 54 for reading comprehension. Calculated for grade equivalency, these raw scores revealed that Joshua was performing at a grade 8 level for vocabulary and a post high school level for reading comprehension. The results of his post-test (December 2012) reading comprehension scores remained at the post high school level. Post-test results were not collected for vocabulary for any of the participants.
Motivation and engagement scores were calculated from the pre- and post-test measures of the MRQ. These results revealed some interesting insights into Joshua’s motivation for reading. It is interesting to note that the largest increase for Joshua was the importance of reading score with other positive changes in his willingness to read challenging material, curiosity and involvement in what he is reading. It is also important to recognize a substantial decrease in motivation for reading for grades. This would suggest that following the study, Joshua was more intrinsically motivated to read.

Table 4.1. Percentage differences between pre- and post-test MRQ results for Joshua

<table>
<thead>
<tr>
<th>Reading Efficacy</th>
<th>Reading Challenge</th>
<th>Reading Curiosity</th>
<th>Reading Involvement</th>
<th>Reading Importance</th>
<th>Reading Work Avoidance</th>
<th>Competition In Reading</th>
<th>Recognition for Reading</th>
<th>Reading for Grades</th>
<th>Social Reasons for Reading</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 8.3%</td>
<td>+ 20%</td>
<td>+ 21%</td>
<td>+ 17%</td>
<td>+38%</td>
<td>-6%</td>
<td>+ 13%</td>
<td>0%</td>
<td>-31%</td>
<td>-4%</td>
<td>+5%</td>
</tr>
</tbody>
</table>

Data from the student questionnaire about reading on the Internet revealed that Joshua likes to read on the Internet and spends most of his time (more than 3 hours per week) on the Internet playing interactive games and browsing or exploring various webpages. Joshua expressed that he spends the least amount of time using e-mail, social networking spaces, and downloading music or software games. He reported that he is very good at understanding what he reads in books (including both stories and textbooks) and that he is very good at figuring out where to go on the Internet to find the information he wants in particular, using the Google search engine. In September, Joshua reported that most of his reading on the Internet was done at home and that two of his favourite Internet sites were Reddit and YouTube. Interestingly, these two sites are based on user-created content.

When I approached Joshua about participating in my study he was very keen and excited to be using the iPad’s on a daily basis. According to my field notes on
Observation Day 7, Joshua stated, “This will be great since we only get to go to the computer labs once a week, if we’re lucky.” I explained that while the whole class would be using the iPads, he would have the opportunity to work one-on-one with me for a variety of tasks involving the Internet. He reported that he would be very comfortable in explaining out loud (to someone else) what he was thinking while searching for information on the Internet. Joshua demonstrated high motivation, interest, and comfort with reading on the Internet and was confident about his ability to read and comprehend information both in printed format and online.

Thinking Processes while Working on the iPad

Think-aloud Protocol One

After observing the whole class for 15 days, I decided to begin my first think-aloud protocol with Joshua. The first scenario involved researching the conflicting information about the potential of video games to harm an individual’s eyes. As many of the students in grade 8 reported video gaming to be one of their favourite activities (outside of school), I thought this scenario would pique their interest.

*Figure 5.1 Scenario One, Observation Day 15, Class Wiki ([www.wikispaces.com](http://www.wikispaces.com))
He began his research by searching on Google, “Are videogames harmful to your eyes?” He discovered a number of research sites and told me that he was not necessarily going to pick the first website in the list as that just meant that those people paid more money to have their website listed first. He scrolled down to try and find a ‘good’ website and told me that Yahoo did not always provide reliable information because anyone can post an answer. He discovered through his initial research that some video games (single shooting (shoot ‘em up) video games) are actually beneficial to your eyes. He took a few moments to jot this information down on the Pages App.

*Figure 5.2* Screen Capture from Joshua’s Initial Internet Search ([www.about.com](http://www.about.com))

**Shoot-em-up video games may be good for eyesight**

> Doctors may start prescribing a dose of violent conflict, if a trial confirms evidence that computer gaming improves eyesight.

Six years ago Daphne Bavelier at the University of Rochester, New York, exploded the myth that gaming is bad for your eyes by showing that expert gamers outperform non-gamers at a variety of visual tasks. Now she has demonstrated that playing action-packed video games improves a person’s ability to perceive contrast, a skill we rely on in dark conditions.

The finding raises the prospect that people with amblyopia, which affects contrast perception, could be treated with games. A trial has begun to test that theory.

Amblyopia, sometimes known as “lazy eye”, affects around 3 per cent of people in western populations and happens when the brain fails to correctly register signals from one eye. It can be treated in children but often goes undetected until adulthood, when there is no established fix.

As I watched him search for the information, I observed that he was very skilled at reading to locate the information that he was searching for. He had no trouble identifying keywords for his searches and they always led him to websites that he was able to filter through in order to find the information he was seeking. Also, after reading the articles, he began to ask himself deeper questions like, “I wonder if computers or television are worse for eyestrain? I am going to look that up.” While doing his research,
he did not tend to connect to any of the hyperlinks listed in the article he was reading, rather, he would return to the search engine and type in a new question. After visiting one website that was published by Halo, he decided that the information they were reporting about the harmful effects would be false because they are the makers of videogames and would want people to think that it was not harmful. Similarly, he visited one website that he was familiar with (www.gameinformer.com) as he mentioned that he had visited that website before when he was looking for information about particular video games. He believed this to be a fairly reputable website.

*Figure 5.3 Screen Capture from Reputable Website according to Joshua (www.gameinformer.com)*

He continued in this manner for approximately 40 minutes, searching, reading, asking deeper questions related to the topic and jotting down notes. Just when he thought he had gained enough information to answer the question, he discovered a website that provided solutions for eyestrain.
After this time, he decided that he had enough information to form a response to the initial question that he posted on the class wiki. Using his notes from Pages and the information he had learned, he composed a final posting to answer the question.

Video games are not bad for your eye sight in fact some of them can even help improve your eyesight. However computers are worse for your eyesight then television but they both still have no permanent effects. Some of the things that do have a effect on your vision are age, and genetics both of which are unavoidable. Some of the reasons it could be good for your vision would be you learn to pick up slight movements and colours you may not see on a daily basis. The effect that video games actually have on your eyes is called eyestrain which can result in pressure building and stress levels increasing. To avoid this simply take a break every half an hour and spend a couple minutes stretching and looking away from the monitor or television (Joshua, Observation Day 15).

At this time, I suggested that we stop the recording so that we could save what had already been done. Unfortunately, I did not know that the Display Recorder App could only successfully save information for approximately 10-minute segments. As a result, all of the data for the initial think-aloud was captured. However, I realized that while I would not have the complete audio recording of his think-aloud, I had collected on my iPad a history of all the sites that he visited along with my detailed field notes and I believed that this would be sufficient for this first protocol. For the rest of the think-aloud sessions, I stopped the recording every 10 minutes to ensure that the data would not
be lost. When I returned from the field, I was able to backup the files from the Display Recorder App to Drop Box and was confident that I would not lose any additional data for the duration of this study.

**Think-aloud Protocol Two**

On day 30, Joshua and I sat down again to complete the second think-aloud. Before proceeding to the class wiki to begin, Joshua asked me, “Did you figure out everything with the technology so that we don’t lose any of my information this time?” I assured him that I fixed the glitches and that all of his online research and audio recording would be captured. Joshua was able to link on immediately to the class wiki and read the second research question; can listening to high volumes on an mP3 player cause hearing loss? After reading the question he stated, “That’s a really good question. This information will be useful to me since I am plugged in so much at night.” He began with the following initial response that he posted on the wiki.

*Figure 5.5 Screen Capture of Joshua’s Initial Posting for Second Think-aloud on Wiki ([www.wikispaces.com](http://www.wikispaces.com))*

![Initial Posting](image)

He began his online inquiry by searching on Google, “Can loud sounds affect hearing?” He decided that he would choose a website published by [www.KidsHealth.org](http://www.KidsHealth.org) and informed me that this was a reliable site because he had seen them on television and were recommended in doctor’s offices. He stated that he was going to read through the articles to “see if he could find anything good here.” He discovered that prolonged
exposure to loud noises could cause hearing loss. Joshua wrote some notes on the Pages Application and then decided he would read further on the initial website and found that headphones and ear buds can increase the risk of hearing loss when listening to loud music.

*Figure 5.6 Screen Capture and Audio Recording of Joshua’s Think-aloud (Observation Day 30)*

Additionally, his research led him to discover some medical conditions that could also affect hearing and that this was called high tinnitus, which according to him was ringing in the ears. Joshua said, “I believe everyone has that, it’s just that people have it at different levels. It seems as if they are keen on the idea that it can cause both temporary and permanent hearing loss.” Further, he read that hearing loss is only caused by long exposure to loud sounds. Joshua then switched to the Pages Application to jot down some notes about his research. He then returned to the site to see if he could discover any additional information about how temporary hearing loss could happen. Joshua read that ear buds and headphones can increase the risk of hearing loss. He started
a second search to discover whether kids or adults are more susceptible to hearing loss from listening to loud music. Joshua did not find anything useful as a result of this search, just sites related to the description of hearing loss.

Joshua then started a new search, this time typing in, “How long would it take listening to loud music to cause hearing loss?” One site, www.time.com, presented information about the detrimental effects of iPods to your hearing. After skimming the site Joshua found that if you listen to the ear buds that come with any iPod for two hours each day, for five days a week, at 90% volume, you would likely develop hearing loss. At this point, Joshua said, “Wow, I didn’t know that. I definitely do this and so do most of my friends.”

*Figure 5.7 Screen Capture from Joshua’s Second Search (www.time.com)*

In his research, Joshua also found information that suggested genetics might play a part in hearing loss. He added some additional information to his notes about how in the 60’s and 70’s, some workers were not required to wear protective headphones when working on sites with loud noises (i.e., construction sites, factory, etc.) and how genetics could play a role for the children of people who worked in these types of occupations.
When reading further, he found that it is not the eardrum that is affected but the nerves in your eardrum that are becoming damaged; they essentially become overworked and exhausted. Further, Joshua also found that listening to music at 80% volume for 90 minutes per day does not increase the risk of hearing loss. At this point, he was ready to craft his final post.

Figure 5.8 Screen Capture of Joshua’s Final Posting on the Class Wiki (www.wikispaces.com)

Think-aloud Protocol Three

Day 45 and I decided that for this third session, I would ask Joshua to complete the think-aloud activity independently and informed him that I would not be in the room. He was provided with the instructions on how to save his work at 10-minute intervals and I told him that I would be in the classroom if he required any assistance. He began by visiting the class wiki to read the research question: Are energy drinks dangerous to teen heart health? Joshua then posted an initial response and quickly moved to Safari to begin his investigation. For his first search, he typed in the keywords, “energy drink side effects” to see if the results would lead him to information about the heart. His search led him to information about caffeine and health risks. Ultimately, Joshua chose to link onto the Huffington Post link (www.huffingtonpost.com) because the title referred to health risks. In his think-aloud, Joshua stated that he selected this site because it was a reliable source
and because the site appeared to include more information about health and not just caffeine.

*Figure 5.9* Screen Capture from Joshua’s Research ([www.huffingtonpost.com](http://www.huffingtonpost.com))

He stated that he was going to read this article very quickly and then decide if it had any good information. Before he read the article, it is apparent that he scrolled down to the bottom of the article to determine its length. Presumably, he did this as part of his decision making process in determining whether this article is worth his time. Also, before beginning to read, a number of ads appeared on the screen covering the article. Joshua stated, “blast the ads” and quickly closed them to get back to the article. He related the story of a 14 year-old girl who had a pre-existing heart condition but after drinking two energy drinks, was pronounced brain dead. While reading, Joshua identified some important information that he wanted for his research. This time, he highlighted the sentences he wanted, copied them, and pasted them directly to his notes on the Pages App. He had not used this tool in the previous two sessions.
Joshua said that he was going to begin his second search by using the keywords, energy drink side effects but part way through typing, decided to change it to, “energy drink effects on teens.” The results of this search led him to an MSNBC site (www.msnbc.msn.com) that he believed was reputable. From this site, he read that energy drinks could cause seizures, strokes, and sudden death. He stated, “Something tells me that sudden death is not a very common side effect of energy drinks.”

*Figure 5.10 Audio Recording of Joshua’s Think-aloud on Observation Day 45*

Joshua decided that he was going to keep this most recent finding out of his final answer because he had never heard of anyone dying suddenly from drinking an energy drink. Further, he explained that he believed that the purpose of this information from this site was to scare the reader into thinking something and move them away from drinking energy drinks. For his final posting, he also explained that he was going to emphasize that these were findings were for teens and not adults.

His third search began with, “How many energy drinks can you drink a day?” and while he was in the process of typing, he changed the word “you” to “teens”. This metacognitive process demonstrated his earlier reflection that the information he was
being led to in his online searches were for teens. This on the spot thinking is reflective of the decision-making processes that students in an online environment must continually make (Burke, 2002). He immediately found a report by Fox News (www.foxnews.com) and although he did not sound very convinced of the reputation of this source (he stated, “Fox, but…”), he believed that it would provide him with how much caffeine is in an energy drink and how many you could drink in a day and stay healthy. He did find that 2.5 billion cans of Red Bull are sold per year and Joshua stated, “That’s a pretty drastic amount.” After skimming the article, Joshua said, “It appears that I was wrong about this article, it is not giving me the information that I hoped it would.” He then proceeded to revise his keyword search to state, “How many energy drinks would it take to cause a problem?” Immediately, Joshua noticed a link to a website entitled energy fiend (www.energyfiend.com) and explained that he noticed a trend. “Every time I search for something energy drink related, this website pops up and it might be worth taking a look at.”

After skimming through the article, he decided that, “It was really starting to look like a good website.” He found information related to side effects of caffeine, sugar, taurine, vitamin B, and artificial sweeteners. Following this quick glance at the whole article, he decided he was going to read the bulk of the article to decide if there was any good information. Joshua found additional information related to side effects but determined that he did not need this new information: “I have a good side effects base built up right now, I really need to determine how much it would take to cause these side effects.”
After reading the article, Joshua realized that caffeine is always the number one thing that is mentioned in relation to energy drinks. He decided to start another search related to the amount of caffeine teens can safely consume.

The first link listed was published by the Yale Medical Group ([www.yalemedicalgroup.com](http://www.yalemedicalgroup.com)) and although Joshua stated he was unsure of its reliability, he decided that the name intrigued him and he selected this link. Immediately, upon clicking on that link, he realized that it was a survey and not what he was looking for. After returning to the initial list of sites, Joshua chose a site by Ask.com ([www.ask.com](http://www.ask.com)) and explained, “This what I am doing here is very risky because this answer can be posted by anybody and they don’t have to be approved so you gotta be kind of careful.” It did however provide him with a link to another article entitled, “Teens and Caffeine: How Much is Too Much?”

From this site, he learned that teens could become addicted to caffeine by drinking only 100mg. Joshua decided that he would record this information on his notes that he was keeping on the Pages App. While typing his notes, I observed that Joshua typed very quickly and would often return to his work to make the spelling corrections.
This is evidence of the continual monitoring that Joshua is engaged in while composing his notes.

While recording his notes, Joshua decided to add a line about how much caffeine a Monster Drink contains. While he did not know the answer at that moment, he returned to the Internet to search for this information. He noticed that the website Energy Fiend came up again and he linked onto it. After reading the article he did not find the number of milligrams contained in a Monster drink but interestingly, that information is actually located on the page. It appeared that Joshua was reading too quickly and did not notice that the information he was searching for was readily available.

*Figure 5.12* Screen Capture of Joshua’s Research about Monster Energy Drinks ([www.energyfiend.com](http://www.energyfiend.com))

As evidenced by the screen capture in Figure 5.12, the article stated that 160 mg of caffeine is contained in a 16-ounce Monster drink. With continued perseverance, Joshua returned to the Internet. He decided to visit the Wikipedia ([www.wikipedia.com](http://www.wikipedia.com)) site about Monster Energy and immediately found the information he sought. He was happy
with this new information and stated that, “I don’t believe Monster Energy drinks come in a smaller size.” Joshua drew a connection between his prior knowledge of these energy drinks and his assessment about the validity of this claim.

He then reviewed his notes to determine if he had enough information to craft a final posting. Joshua returned to the Wikipedia site one more time to see if there was any additional information that he wanted to include. He then visited the class wiki to post his final answer.

Yes, energy drink consumption can cause problems to everyone's health in the long run. The only thing that's stopping adults from being targeted is they have a higher caffeine intake daily and don't experience these issues like teens do. Energy drinks cause insomnia and an increase or irregular heartbeat. Also the average teenager shouldn't drink more than 100mg of caffeine each day. The average monster energy drink contains around 160mg of caffeine. This being said it would be very simple for the average teenager to overdose on caffeine and not even notice it until experiencing issues. However you should keep everything in moderation a teen drinking one energy drink will not experience heart issues where as if they drink 3 in an hour then a problem may be present but I believe it is their problem at that point for choosing to do such a thing (Joshua, Observation Day 45).

Joshua’s final answer revealed his strong critical analysis skills. In his post, he included information that compared caffeine intake between teens and adults and stated his conclusion that energy drinks should be consumed in moderation. I did not observe Joshua re-reading his written work before he submitted his answer and this is reflected in the spelling errors contained in the post.

**Think-aloud Protocol Four**

Day 60, the final think-aloud for Joshua. At this point, he was so knowledgeable about the expectations for this procedure, that he visited the class wiki and read the final research question before I had a chance to sit down. The final research question stated:
Do mosquito ring tones really work? A science teacher sends an email to his class to ask for information about special cell phone ring tones designed to be heard by teens but not adults. Students conduct online research and email the class with findings about whether or not mosquito ring tones really work (Joshua, Observation Day 60).

After reading the question, Joshua informed me that he had no idea what a mosquito ring tone was, nor had he even heard of them. With this in mind, he posted his shortest initial response, “I don’t know much about these forms of ring tones.”

He began his initial search with the keywords, mosquito ring tones, to see if there was any information “up front” that would describe what exactly these ring tones were. The results of this search led him to a website that could test an individual’s ability to discern these ring tones. Rather than visiting this site, Joshua chose to begin with Wikipedia (www.wikipedia.com), recognizing that “some people would view this as an unreliable source.” To defend his choice of sites, he also stated, “Anything you post can be corrected by a moderator within minutes, and some of the stuff you post has to be pre-approved in order to actually show up on the wiki.” This type of critical analysis is indicative of the deep reading that Joshua was engaged in (Wolf & Barzillai, 2009). He did not find the information he was looking for and returned to the list of sites from his initial search.

Joshua found a website entitled, “Noise Addicts” (www.noiseaddicts.com) where a person could download a mosquito ring tone. He stated that while he did not want to download this ring tone, the site might provide background information about these ring tones. At this moment, it is evident that Joshua drew upon his previous experience with online research to determine that there could be additional information on this site that could be useful. As mentioned earlier, the web literacy skills of reading to locate and
evaluate (Coiro, 2011; Kuiper, Volman, & Terwel, 2008) are two essential skills required to navigate the plethora of information available to learners using the Internet. According to Kuiper et al. (2008), effective technical and comprehension skills are required when navigating the online texts since the majority of these articles are not written for children. This idea seems to be one that is frequently forgotten by educators who provide children with Internet access to complete their research.

After reviewing the article, Joshua came across a piece of information that he considered valuable but was not sure of the notation in the sentence. He read the following sentence aloud: “The high frequency tones (or mosquito ringtones) are those above 17kHz.” It appeared that he read this sentence aloud a couple of times to see if he could make sense of the information that was presented. He stated that he thought it was kilowatts and I corrected him and informed him that it actually represented kilohertz.

*Figure 5.13 Screen Capture of Joshua’s Initial Search ([www.noiseaddicts.com](http://www.noiseaddicts.com))*
When I asked him if he was going to look up this term, he replied that he believed it was just the measurement of sound. He decided to copy this information to his notes on the Pages App so that he could use this information later in his final posting.

After discovering several websites that included a free download of this ringtone, Joshua decided to start a new search using the following keywords, “mosquito ringtones does it work?” He found many sites that included information about the mosquito ringtone. From these results he stated, “I am going to assume that many people use it and it is fairly effective.” He then returned to the Pages App to jot down a few more notes and was starting to feel as though he almost had enough information to write his answer. At this moment, Joshua decided to return to Google once more for a final search to find a review of the mosquito ringtone. He was quickly drawn to a review published by C Net (www.reviews.cnet.com). Joshua considered this a reputable site and used his prior experience with this site to make this claim. Following a quick read, Joshua discovered a new piece of important information; many adults can still hear this ring tone. He then decided that he was ready to craft his final answer.

*Figure 5.14 Screen Capture of Joshua’s Search for a Review of the Mosquito Ringtone (www.reviews.cnet.com)*

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A ring tone many adults can't hear

A ring tone many adults can't hear

by Nicole Lee | June 13, 2006 4:13 PM PDT

Several young students have caught on to a recent trend: a ring tone that only they can hear and most adults can't. Dubbed the *Mosquito*, the noise stems from an anti-theft technique in the United Kingdom, where it was used to deter youth crimes such as shoplifting. The idea is that most adults lose the ability to hear high-pitched sounds as they grow older, so this tone will reach the ears of only the young. Some enterprising unknown must have then copied this high-pitched tone and made it into a ring tone, which was then distributed to students in the United Kingdom and spread around on the Internet until it eventually reached U.S. shores. Teenagers who have downloaded the ring tone could then send and receive text messages and hear alerts without the knowledge of most, if not all, their school teachers.

But beware: Many adults may still have the ability to hear the tone--I know I could. You can click this link to see if you too can hear this alarmingly high-pitched sound.
Do mosquito ring tones really work? The answer to this question is yes. They work in a very simple and very easy and effective way. They use a higher frequency of noise that most adults have lost the ability to hear because of age however teens can hear because their ears are usually better because they are younger. Many people have been tested to see if they can hear the ringtone after age 30+ 45+ and 60+ and most from the age 45 and up have reported not being able to hear the noise. However this is also not always the case with adults some of them can always hear the noise no matter what age they are because they have better ears then the average human. So do not think if you have one it can go off anywhere and not be heard but do expect some people to not be able to hear it (Joshua, Observation Day 60).

**Student Reflections**

At the conclusion of the think-aloud session on observation day 60, I sat down with Joshua and conducted a brief interview to gain further insight into his reflections as a participant in this research study. He began by telling me how much he enjoyed the experience and that he really enjoyed the last question about mosquito ring tones. Since he had never heard of them, Joshua believed that he learned something really “cool” that day at school. Joshua also added that his favourite question was about the effects of energy drinks on teen heart health.

I then asked Joshua for his opinions about what a good reader does when reading for information on the Internet and without hesitation, he said,

Look at multiple sources; they don’t take the easy way out. For example, for the mosquito ringtone question, they (the good readers) will determine what it is, what does it do, how does it work, and is it effective, instead of just searching what it is and giving a quick answer.

When asked to provide me with a rating of self-efficacy (on a scale of 1 to 5) on the fourth think-aloud, Joshua gave himself a four and said he thought that “he didn’t capture the maximum amount of information that he could have,” but felt that he gave a reasonable enough answer. This was an interesting insight from Joshua since he was the only student who had not discovered the origin of the ringtone in his online research.
We then moved onto a discussion about how reading online differs from reading print text. Joshua told me that in an online environment, there are filters, and he can find the information that he is looking for a lot more quickly and that he can get information from multiple sources at one time. He continued by stating, “When you are reading a text, it is only that author’s opinion unless that author has considered multiple perspectives.”

He also told me that you could not conduct quick searches in a book very easily; on the Internet, he believed that a student could be lazier with their searches. Joshua then added that he believed the information in a text is usually, “better written and more reliable” than on the Internet where anybody can post anything. With respect to reading a printed text versus an online text, Joshua believed that they were two very different activities. He reported that he tends to read more from a webpage than when he is reading from a textbook because he does not even enjoy the format of a textbook. According to Joshua, he does not enjoy the layout of the textbook and told me that it is much more difficult to find the information that you are looking for: “It’s cumbersome and much more different than reading a webpage.”

When asked to provide advice to other students about his thinking processes while reading on the Internet, Joshua said that he would tell them to always be on the lookout for the information that they need and try to filter out the information that is not necessary because it is easy to get distracted. He then related this to the keyword searches and the importance of typing in exactly what you need, saying: “It’s much easier to look for the information that you need, instead of wasting your time reading a big, long article that may not include any important information.” Joshua told me that when he is reading online, he looks for keywords in the article because he does not read a full Internet
webpage. He said that he normally skims the article, searching for the keywords and then he will read a little bit ahead of that to determine if the article is useful.

Case Study Two - Alexandra

In my initial days of observation, Alexandra appeared to be a quiet, yet mature girl. She was well dressed and it was evident that she was a leader among the girls in her class, who seemed to copy many of her behaviours. She frequently participated in class discussions and was often called upon by the classroom teacher when none of her peers chose to participate. More often than not, her answers were thoughtful and carefully considered. Alexandra appeared to be a confident and well-spoken young woman. When discussing my observations with Beth (the classroom teacher), she informed me that Alexandra’s reading and writing scores fell much below grade level. Further, Beth believed that Alexandra possessed the ability to perform at a much higher level than she was currently achieving. When I asked Beth for her insights about Alexandra’s low

(Text-to-Media connection, Observation Day 15)
scores, she attributed them to a lack of effort and typical adolescent interests in areas other than school.

Alexandra comes from a two-parent, middle class family where she is an only child. Prior to participation in this study, Alexandra had never used an iPad and reported that she used the computer for less than an hour each week. In fact, she stated that she was more often, “Hanging out with my friends, talking on the phone, or watching television.” When I asked her what she was doing on the computer for one hour each week, she reported that she usually used the computer to browse and explore various webpages (for fashion, music, and celebrity news) and for social networking. Alexandra also informed me that she rarely used email, instant messaging or chat rooms and instead, used her smartphone daily to check Facebook and to text her friends. This information, along with that presented by her teacher supports the findings of Cooper and Weaver (2003), who stated that as the social needs of adolescent girls increases, time spent on the computer lessens since it no longer serves their needs. Additionally, Beavis and Charles (2007) have claimed that computers are considered to be toys for boys and tools for girls. Further, they found that girls tend to use the Internet to socialize and send email.

**Reading Comprehension, Motivation, and Engagement**

The results from the Stanford Diagnostic Reading Test Online revealed pre-test (September 2012) raw scores of 18 out of 30 for vocabulary and 30 out of 54 for reading comprehension. Calculated for grade equivalency, these raw scores revealed that Alexandra was performing at grade 4 levels for both vocabulary and reading comprehension. The results of her post-test (December 2012) reading comprehension
scores was 38 out of 54 revealing that Alexandra was performing at grade 5.7 at the end of the study.

Differences in motivation and engagement were calculated from MRQ before and after the think-aloud sessions. It is interesting to note that the largest increase for Alexandra was the reading work avoidance score. This indicates her desire to avoid reading activities despite an increase in self-efficacy for reading score. Alexandra also showed a decrease in motivation in reading for grades.

Table 4.2. Percentage differences between pre- and post-test MRQ results for Alexandra

<table>
<thead>
<tr>
<th>Reading Efficacy</th>
<th>Reading Challenge</th>
<th>Reading Curiosity</th>
<th>Reading Involvement</th>
<th>Reading Importance</th>
<th>Reading Work Avoidance</th>
<th>Competition In Reading</th>
<th>Recognition for Reading</th>
<th>Reading for Grades</th>
<th>Social Reasons for Reading</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 8.3%</td>
<td>0%</td>
<td>+ 4.2%</td>
<td>0%</td>
<td>+ 19%</td>
<td>+ 8.3%</td>
<td>+ 5%</td>
<td>-6.25%</td>
<td>+ 4%</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

Data from the student questionnaire about reading on the Internet revealed that Alexandra moderately enjoys reading on the Internet and spends most of her time browsing or exploring various webpages and reading specific websites to learn more about a topic of her interest. Alexandra reported that she spends the least amount of time using email, social networking spaces, and playing interactive video games. She expressed that she is “just ok” at understanding what she reads in books and that she believes that her ability to figure out where to go on the Internet to find the information she wants is only adequate. In September, Alexandra reported that most of her reading on the Internet was done at home and that two of her favourite Internet sites were YouTube and Wikipedia. Alexandra also told me that she preferred using the Internet to research information for projects because “it is easier than books.”

When I approached Alexandra about participating in my study she seemed interested but expressed her concern about not being able to use the iPads effectively. I
explained that I did not expect her to be an expert in using the iPads but that she would have the opportunity to work with me to learn how to use them for both her schoolwork and other activities. She was agreeable and reported that she would be comfortable with verbally explaining her thought processes while conducting research on the Internet. Alexandra demonstrated low to moderate motivation, interest, and comfort with reading on the Internet and reported that she was only somewhat confident in her ability to read and comprehend information both in printed format and online.

**Thinking Processes while Working on the iPad2**

**Think-aloud Protocol One**

Alexandra and I sat down to begin her first think-aloud session on observation day 17. After explaining the research activity, Alexandra visited the class wiki to read the exact question. After approximately five minutes, she posted her first response on the wiki.

*Figure 5.15 Alexandra’s Initial Posting, Observation Day 17, Class Wiki*  
(www.wikispaces.com)

She began her research by searching on Google, “The positive and negative effects of video games.” Alexandra decided to select the first site listed, which was entitled the positive and negative effects of video games. When asked for the author of the site, she scrolled to the top and provided the answer, Raise Smart Kids (www.raisesmartkid.com). I then asked if she believed this to be a reputable site and
instead of simply providing an answer, she scrolled through the page and instead of
skimming the article for information, she was interested in determining if there was a
place where anyone could correct the work found on this site. Since she could not locate
such a spot, she concluded that this must be a reputable source.

This initial search revealed some important information with respect to online
reading comprehension (Coiro, 2011). The keywords she selected for her first search,
demonstrated her ability to read to locate information. Alexandra was able to identify
appropriate keywords to generate her search and this led her directly to a site that
included her keywords as the title of the article. She also demonstrated her ability to read
to evaluate by scrolling through the article to determine if it was composed with user-
generated content (FitzGerald, 2012). While this in itself is not reading to evaluate, it is
an interesting evaluative process.

Figure 5.16 Screen Capture from Alexandra’s Initial Internet Search
(www.smartkid.com)

As Alexandra continued to explore this article, she explained that she was
scrolling the article to determine if it included any information about what she was
specifically looking for. She stated, “some of the information is talking about how video
games give wrong values to kids” but was not referring to the positive or negative effects
of video games. After this explanation, I noted that she did not consider the connection
between wrong values and negative effects to be salient and may have simply been a result of focusing on the research question. At this point, Alexandra decided to return to her Google search to locate other potentially valuable websites.

As I watched her search for the information, she was definitely not taking the time to read any of the detailed information about the sites. Rather, Alexandra spent more time trying to identify the keywords from her search. She decided to visit a user-generated content site, Answers (www.answers.com). I noticed that this link was located at the very bottom of the first page of her search and I asked her if she ever clicked on the subsequent pages of her Google searches. She told me that she would often go to page two but never past that. She provided the following reasoning, “I find that sometimes and only sometimes, that if you go four pages past, it does not really stay on topic.” She proceeded to read the Answers website.

Figure 5.17 Screen Capture from Answers (www.answers.com)

![Answer](image.png)

**Answer**

it really depends on how close your are to the tv screen. if your face is right up against the tv then you are way to close and you could go blind in a couple of days. a good distance is maybe your height or arm length from the screen to wherever.

After reading the site for approximately 10 minutes, she informed me that it was the rays that come off the computer screen that can damage your eyes. She did not choose to keep any notes while researching for information and stated that, “I can keep it all in my head.” Alexandra continued exploring this website and then decided that she had enough information to post a final response on the class wiki.
I think that by looking at different websites gave me a different take on video games because some websites said that video games are bad for your eyes and others said they were great for your eyes. To be honest I found some of the websites that said video games are good for you didn't really back up their answer. Some people I know sit right next to the tv or computer when they are playing video games but, they should be standing at least arms length away from the screen because studies show that if you are too close to the screen you could go blind for a few days because of the rays coming off of the tv. If you do love to play video games to yourself a favour stay arms length away from the screen (Alexandra, Observation Day 17).

**Think-aloud Protocol Two**

On day 31, Alexandra completed the second think-aloud activity. She was able to immediately link onto the class wiki and read the second research question. Like Joshua, Alexandra expressed her interest in this question. She posted the following initial response on the class wiki. It is clear from her response that she was able to use personal experience and information she had previously heard or read to form this posting.

*Figure 5.18 Screen Capture of Alexandra’s Initial Posting for the Second Think-aloud on Wiki ([www.wikispaces.com](http://www.wikispaces.com))*

She began her online research by searching on Google, “Can listening to music on an MP3 player cause hearing loss?” I immediately noticed that Alexandra chose not to include the words “high volumes” and was puzzled by this omission from her search. She decided to choose a website that was entitled, “Teen Hearing Loss Related to MP3 and iPod Listening.” After reading the article, Alexandra reported that 12.5% of kids between the ages of 6 and 19 have suffered hearing loss as a result of listening to music at high volumes with earphones. At this point, she was also able to identify the author of the
website to be Palo Alto Medical Foundation (www.pamf.org) and believed this was a reputable site because it was published by a health foundation. By making this connection, Alexandra demonstrated her ability to read to evaluate and make an informed decision about the quality of the material published.

*Figure 5.19 Screen Capture of Alexandra’s Initial Search Results (www.pamf.org)*

While reading this article, she discovered that being exposed to more than 85 decibels of sound for more than eight hours could damage a person’s hearing. For the first time, Alexandra decided to record this information on the Pages App for use in her final response.

She then returned to her initial list of sites and chose a site called, “Earbuds” published by Kids Health (www.kidshealth.org). After reading each paragraph on this site, Alexandra discussed her findings with me. She discovered that chainsaws and motorcycles create 100 decibels of sound and said, “That makes sense.” She also read that listening to an MP3 player at 70% of its highest volume produces 85 decibels of sound. Alexandra then stated, “So I know that both sites I have visited have the same type
of information, so it must be true.” She then decided that it might be important to find out how many hours you would have to listen to an MP3 player for the hearing damage to start even though that information was provided to her in the first site that she visited.

For her second search, Alexandra typed in the keywords, “How long does it take” and then paused for a few seconds. It appeared that she was not sure what to type in next. Finally she added the words, “to permanently loose your hearing.” She came across a website that answered this question and decided she would visit it even though, “I know it’s Answers on Yahoo but sometimes they have accurate stuff.” She told me that according to this site, it said that it depended on how loud and how long you listened to your music and that once you heard ringing in your ears and/or develop migraines, you should stop. Alexandra felt that this did not provide her with any new information so she returned to the Google search page.

She then clicked on another Answers site (www.answers.com) that was titled, “How many decibels does it take until you lose your hearing?” I was puzzled at this choice of keywords and wondered how they differed from the previous search. After skimming the article very quickly, she told me that the link just provided information on the decibel levels of various things like phones and subway trains but not the information she was hoping for. I observed Alexandra quickly scanning through the site while looking for the answer but after reviewing the recording, I discovered that the information she was searching for was in fact included in the article and was obviously overlooked by Alexandra.
Alexandra started a new search and typed in the question, “How long can I listen to my iPod?” She chose a site that stated, “Listen safely: Your ears and your iPod” (www.ilounge.com) and decided that this might provide some necessary information. Alexandra did not mention the source of the article and/or whether she considered this to be reputable. Also included in this article was the date of publication and the name of the contributing editor. All of this is important information that an online reader could use to critically evaluate the reliability of the information supplied. After reading this article, she learned that when hearing damage begins, an individual might experience ringing in the ear and/or fullness in the ears. Alexandra continued to read since she still did not know the answer to how long it would take for damage to begin; she told me: “I’m still curious.” She then explained her theory that listening to speakers would be better since listening to earphones is enclosed instead of all around.

After revisiting the initial page of sites based on her keywords, Alexandra chose another Answers site (www.answers.com) that contained information about the length of time an individual could listen to an iPod before damaging their hearing. She noted that listening to a blow dryer, which creates a lower decibel rating than an iPod, could cause
permanent damage after only 30 minutes. At this point, Alexandra believed that she had enough information to craft her final response.

*Figure 5.21 Screen Capture of Alexandra’s Final Posting on the Class Wiki (www.wikispaces.com)*

**Think-aloud Protocol Three**

Day 46, and Alexandra completed this think-aloud activity independently. After reading the research question on the class wiki, she posted her initial response and then switched over to Google for her first search.

*Figure 5.22 Screen Capture of Alexandra’s Initial Posting on the Class Wiki (www.wikispaces.com)*

She typed in the keywords, “are energy drinks dangerous to teen heart health?” Alexandra proceeded to click on a site entitled, “Energy drinks: Just how dangerous” (www.weau.com), to identify what kind of information it would give her. At this point, she did not question the author of the site, or the reliability of the information. The article informed her about a 14-year-old girl who almost died from drinking two 24 oz. Monster Energy drinks, which equaled 480 milligrams of caffeine. The recording revealed an additional piece of information included on this site; the same girl suffered from cardiac arrhythmia. Alexandra did not include this fact in her think-aloud. Instead she said, “That
girl almost died, and that’s not good.” Clearly she demonstrated some understanding of the severity of the facts presented but chose not to click on the definition of cardiac arrhythmia to gain further understanding.

Alexandra decided to start another search with fewer keywords so that she could see if she could get better results. She typed in, “Can energy drinks be harmful to teens hearts?” and although she intended to type in fewer words, she actually typed in the same number. It would be interesting to determine where she learned this skill and if it was something taught by the classroom teacher or a skill that Alexandra discovered from her own experience. She chose a site called “Energy Drinks” published by “Young Men’s Health” (www.youngmenshealthsite.org). In the recording, Alexandra began by reading the text aloud. As I reviewed this recording, I noted that she mispronounced two words (exciting and excess) and there was a break in her read aloud when she came across words and sentences she did not know.

She discovered that these drinks were not developed to boost teen energy but were originally created for adults. Alexandra then returned to Google and linked to, “Energy drinks harmful to kids and teens,” published by www.friendsandfamily.com.

Figure 5.23 Audio Recording of Alexandra’s Independent Think-aloud on Observation Day 46
Along with a list of side effects, Alexandra read that energy drinks are particularly harmful to individuals with pre-existing medical conditions. In actuality, this is not what the site claimed; rather, it stressed the fact that more research is warranted to determine the long-lasting effects of energy drinks on those with medical conditions. She chose not to record any of this information down in her notes and once again, returned to Google. This time she linked to a site that provided information on how energy drinks may affect kids’ hearts (www.myhealthnewsdaily.com). Alexandra noted that energy drinks are not good for kids’ hearts and have no benefits. She quickly scrolled to the bottom of the article and stated, “There’s lots of interesting stuff about energy drinks but they all say that.”

*Figure 5.24 Screen Capture of Alexandra’s Fourth Search (www.myhealthnewsdaily.com)*

Alexandra then visited a site dealing with energy drinks and their danger to teens (www.fitnhealthyschools.org) and discovered that energy drinks are frequently promoted for high-energy sports such as BMX racing and motorcross. She thought that was smart marketing and as she continued to read she said, “Oh, right here” and then after reading on she later said, “Oh, never mind.” During this search, Alexandra demonstrated the self-
monitoring skills that are necessary for today’s student to be able to navigate and make sense of what they are reading (Wolf & Barzillai, 2009). At this point, Alexandra stopped recording and began crafting her final posting. In this posting, Alexandra seems to have focused on the most recent information she read even though she visited a number of sites to gather information for this research question.

After reading a lot about how energy drinks can have long term damage to teens and even kids hearts i can say it honestly frightend me. I don't drink energy because I think they are gross and very unhealthy. I think it is 100% a money grab. They advertise to teens in motor cross and BMX because the teens think that it will help them win the races. It's not the energy drinks that help you win the race it all you. Some parents in courage it because they think it will make their kids or teens play more or be more active because let's be honest teens are getting lazy. No one wants that...well I don't anyway. Run off of your own steam don't use energy drinks! (Alexandra, Observation Day, 46).

**Think-aloud Protocol Four**

Day 61, the final think-aloud for Alexandra. At this stage, she was so comfortable with the routine of the think-aloud that I did not need to tell her to begin. Alexandra went right to the class wiki and read the final research question. After reading the question, she looked up at me and said, “I have no idea what mosquito ringtones are, I’ve never even heard of them.” In her posting, she stated that she was very interested in finding out what they were and why they were called mosquito ringtones.

*Figure 5.25 Screen Capture of Alexandra’s InitialPosting on Class Wiki* ([www.wikispaces.com](http://www.wikispaces.com))

Alexandra started her search with the keywords, “What are mosquito ringtones?” Her initial search led her to a number of sites that would allow her to download the
ringtone but then she clicked on a site by Noise Addicts (www.noiseaddicts.com) that was titled, “The mosquito ringtone.” She discovered that the mosquito ringtone emits a high frequency that only can only be heard by teens because, “as you get older, your hearing starts to go, I guess.” Alexandra also found out that they are the term mosquito ringtones is interchangeable with high-frequency tones that are 17 kHz. She asked me what kHz was and then decided that she would look it up herself. Alexandra typed in the keywords, “what is a kHz” and discovered that it was a unit of frequency.

She then returned to the original page of websites and chose a link entitled, “Mosquito Ringtone: Parent’s and Teacher’s Can’t Hear It but Teens Can,” published by www.tech.funtimesguide.com and once again Alexandra did not even try to determine who the author of this website was. After reviewing the information, she determined that it did not provide the information to answer the research question and she proceeded with another search, “Do Mosquito Ringtones Really Work?” She chose a site entitled, “How the Mosquito Ringtone Works” published by www.freemosquitoringtone.com that she thought would provide her with some of the information that she was searching for. After a short time, Alexandra told me that it was also called “teen buzz” and that humans could not hear frequencies that were too low or too high. She found this interesting and said, “I didn’t know you couldn’t hear really high or really low frequencies.”

She then returned to the original search page and looked for a link that would answer the question of whether they really work. Alexandra clicked on a page that had a very similar title to her initial search and began to scan the article, reading the sub-headings first. She finally found the answer she was looking for and told me that the article stated that 90% of adults cannot hear sounds between 18 and 20 kHz. Alexandra
compared this with the information that she had learned in a previous search. She said, “I
guess this makes sense if a mosquito ringtone is normally at 17 kHz; this would just be at
the low end that adults can’t hear.”

Although she had located most of the information that she was looking for, she
decided that she still wanted to know why they were called mosquito ringtones.
Alexandra did not display this pursuit of additional knowledge in any of the previous
think-aloud sessions. I wondered what led to this behavior; was it the comfort in using the
iPads and the Internet for four months; was it her interest in the topic or perhaps it was a
combination of both?

Alexandra started her final search with the keywords, “Why are they called
mosquito ringtones” and proceeded to scan through the list of sites that popped up. She
discovered that they could also be called “adult-proofing ringtones” and from the brief
descriptions provided about each of the sites, she concluded that they were called
mosquito ringtones simply because of the high buzzing sound given off by mosquitos.
Alexandra’s attention was caught by one site that described the technology of the
ringtone (www.streetdirectory.com). She discovered that a gentleman in the United
Kingdom who was trying to prevent teens from loitering around his shop developed the
mosquito ringtone. Alexandra found this fact interesting and said that she was going to
keep this tab open so that she could look back at it when she was writing her final
response.

I have learned that the mosquito ringtones are only herd by teens under the age of
30. 17kHz can only be herd by teens. It works, 90% of adults can't hear this
ringtone. This is not always good because that means that you can have you cell
phone a full blast and the teacher won't even know. it started in the United
Kingdom because they didn't want the teens around so they put out this high tone
that only teens can hear. In this case I think it was very helpful. More people
should be aware of this ringtone. I think it works but there is always going to be at least on an adult that can hear it (Alexandra, Observation Day 60).

**Student Reflections**

At the conclusion of the think-aloud session on observation day 61, I sat down with Alexandra and conducted a brief interview to gain further insight into her reflections as a participant in this research study. She began by telling me how much she enjoyed the experience and that she really enjoyed the last question about mosquito ringtones. The question really intrigued her because until she researched this topic, she did not know that hearing deteriorated with age.

I then asked Alexandra for her opinions about what a good reader does when reading for information on the Internet and after a few moments she said,

> They probably go to trustworthy sites that they think they can rely on. I type exactly what I want to know and try to include as few words as possible because the more words I type in, the more information Google gets. A good reader visits more than one site to see if what they are reading is good or if it’s just some person out in the world messing around. Good readers use their head and use critical thinking skills.

When asked to provide me with a rating of self-efficacy (on a scale of 1 to 5) on the fourth think-aloud, Alexandra gave herself a four and said she thought that “There’s always room to do more” but I think I got a lot of information on the subject. Further, she told me that by researching that topic, she found out the origin and how they came up with the name and what a kilohertz was.

We then moved onto a discussion about how reading online differs from reading print text. Alexandra explained that reading online is definitely different from reading a text because the information you are looking for “is right there.” She explained that unlike a text, you do not have to go through multiple pages to find the answer you are
looking for. Alexandra stated that sometimes the books you are getting the information from are so old that the information is not always accurate. She told me that if she cannot find the information that she is looking for in printed text, she becomes frustrated and then looks it up on the Internet. Alexandra also said that the Internet allows students to gain more research skills. According to Alexandra, “Having access to the Internet gives us access to all of the textbooks we’re ever going to need” and we learn more. Finally, she explained that with the iPads at their desks, they never had to wait to use the computer lab and that the school computers were much slower. Therefore, they were never at a loss for something to work on. When asked to provide advice to other students about her thinking processes while reading on the Internet, Alexandra said that she would tell them to always be asking themselves questions. Further, she explained,

> When you’re reading the Internet, you are constantly asking yourself questions and your brain is absorbing it. Questions like, is this site trustworthy, what does that mean, I don’t understand those words. When you’re reading online, your brain is very active.

> With respect to successful searches, Alexandra told me that she types in exactly what she wants to find out while trying to eliminate the unnecessary information. When she is reading online, she begins by reading the article titles because it tells her what she is going to be reading about. Alexandra’s advice to other students working on the Internet would be to make sure the website they are reading is reliable, ensure that words are spelled correctly for their keyword searches, and read the titles of the articles. She also told me that she thought the think-aloud strategy helped her a lot when reading online because she realized she was making predictions and connections while reading. “I think you’re doing these things all the time when you read but thinking out loud makes you realize how much you do it.”
Case Study Three – Mary

I can relate to Lina’s thought could mother call her own cousin “a crazy woman” because my mother has called her own relatives something. At that time I thought the exact same thing as Lina did, how could she call her that. However, a second thing that can connect about is where Lina, Jonas, there mom and many other people is about to get in the back of the truck wondering where they are going. Where could be going? I can relate by the movie I watched where people from a small town were about to be slaves. In this movie they got rushed into a truck but they don’t know where they are going.

(Text-to-Self connection, Observation Day 15)

In my initial days of observation, Mary was a quiet girl who exuded an attitude of being “too cool” for grade 8 and the class she was in. She was dressed in a style all of her own and always wore her long, dark hair over her eyes so that you could rarely see her face. Many of the other girls in the class seemed to understand that Mary was frequently unapproachable and they only made contact when invited. Even though she sat with a group of three other students, she rarely participated in their table discussions and spent much of her time working alone. She seemed disconnected from her group and the class as a whole. Mary almost never volunteered to participate in class discussions and was rarely called upon by the classroom teacher. More often than not, when she did speak, her answers were short and terse. Also, there were many days when Mary called home to be picked up early because she was not feeling well. When discussing my observations with Beth (the classroom teacher), she informed me that Mary was a very bright student whose reading and writing scores were above grade level but that her attitude and moods prevented her from excelling in this class. Further, Beth believed that Mary could be a leader among the students in her class but that her adolescent behavior had alienated
many of her peers. When I asked Beth for her insights about Mary’s attitude toward school and seemingly disinterest in being at school and making friends, she attributed this to her family, specifically, her mother who never said no to picking her up early and indulging all of her sullen behaviours. Her father was not mentioned in our discussion.

Mary comes from a divorced family, where her parents share joint custody. Mary’s family is middle-to-low class and she is the younger of two girls. Prior to participation in this study, Mary had never used an iPad and reported that she used the computer between one to three hours each week. When I asked her what she liked doing on the computer, Mary reported that she spent most of her time reading certain websites to learn more about a topic and that she also used email, instant messaging or chat rooms.

**Reading Comprehension, Motivation, and Engagement**

The results from the Stanford Diagnostic Reading Test Online revealed pre-test raw scores of 23 out of 30 for vocabulary and 49 out of 54 for reading comprehension. Calculated for grade equivalency, these raw scores revealed that Mary was performing at a grade 8 level for vocabulary and post high-school level reading comprehension. The results of her post-test (December 2012) reading comprehension was 42 out of 54 revealing that Mary was performing at grade 7.7 at the end of the study.

Differences in motivation and engagement were calculated from MRQ before and after the think-aloud sessions. It is interesting to note that the largest increase for Mary was in the reading for compliance score. This indicates her willingness to reading to satisfy others’ expectations (Baker & Wigfield, 1999). Also interesting were the positive changes in social reasons for reading score, competition in reading score, and
involvement in what Mary was reading. Conversely, Mary showed a decrease in her motivation toward the importance of reading score.

Table 4.3. Percentage differences between pre- and post-test MRQ results for Mary

<table>
<thead>
<tr>
<th>Reading Efficacy</th>
<th>Reading Challenge</th>
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<th>Reading for Grades</th>
<th>Social Reasons for Reading</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 0%</td>
<td>-5%</td>
<td>+ 4.2%</td>
<td>+ 12.5%</td>
<td>-12.5%</td>
<td>0%</td>
<td>+17 %</td>
<td>- 5 %</td>
<td>+ 6.3%</td>
<td>+ 14 %</td>
<td>+20 %</td>
</tr>
</tbody>
</table>

Data from the student questionnaire about reading on the Internet revealed that Mary moderately enjoys reading on the Internet and spends most of her time browsing or exploring various webpages and reading specific websites to learn more about a topic of her interest. Mary reported that she spends the least amount of time playing interactive games on the Internet. Her self-efficacy for understanding what she reads in books is very good and that she believes that her ability to figure out where to go on the Internet to find the information she wants is only adequate. In September, Mary reported that most of her reading on the Internet was done at school and her favourite Internet site was Google. Mary also told me that she preferred using the Internet to “communicate with people and to research and learn about topics.”

When I approached Mary about participating in my study she seemed disinterested and expressed her lack of desire to work with technology. I explained to her that if she agreed to participate in this study, she would have the opportunity to work with me to learn how to use the iPads for both her schoolwork and other activities. She was agreeable and reported that she would be somewhat comfortable with verbally explaining her thought processes while conducting research on the Internet. Mary demonstrated low to moderate motivation and interest for reading on the Internet. However, she did report
that she was very confident in her ability to read and comprehend information both in printed format and online.

**Thinking Processes while Working on the iPad2**

**Think-aloud Protocol One**

Day 18 of my fieldwork and Mary and I sat down to start her first think-aloud session. As with the others, I began the session by explaining the research activity that she would be participating in and what would be expected of her. She indicated that she understood the activity and began by visiting the class wiki, reading the first question, and drafting her first response.

*Figure 5.26 Screen Capture of Mary’s Initial Posting on Class Wiki (www.wikispaces.com)*

I found Mary’s response to the research question, “Are video games helpful or harmful to your eyes,” very interesting. Specifically, she made reference to boys (and not girls) and to how their brains shut down while playing video games. Further, she provided this reasoning as evidence for why playing these games is harmful to the eyes. This is an oversimplification of the issue, as Mary assumed that brain damage would directly lead to eye damage.

Mary began her search on Google with the keywords, “video games.” She chose a Wikipedia site to begin and explained that she knew that people could edit this information and she was not too sure if it was reliable. Mary also explained that sometimes she would read the whole article if it was interesting but mostly, she just
scanned the material. After reading the article for quite awhile, Mary decided that she would begin a new search. At this point she was stumped about what keywords to use and told me that she did not want to type the question in because she thought that it would not provide her with the answers she was looking for. After some consideration, she typed in, “Are video games harmful to your eyes?”

This led her to a number of relevant sites and Mary noted that the first site on the list was published by Answers (www.answers.com) but she informed me that she was not going to click on that site because, “It wasn’t published by a scientist.” She chose a site published by www.newscientist.com that was entitled, “Shoot-‘em up video games may be good for eyesight.” This was the very same site that Joshua chose in his first session.

*Figure 5.27 Screenshot of Mary’s Search (www.newscientist.com)*

After briefly scanning the article, Mary said, “It’s telling me that it’s bad for your eyes and then down here it says that playing action-packed video games improves a person’s ability to see contrasts.” The article did not state that playing video games was harmful, rather the opposite, and I was concerned that Mary was reading far too quickly and missing the message. As evidenced by the second part of her statement, she accurately deciphered some of the important information in the article but was omitting a
significant point; video games can be helpful for people suffering from “lazy eye”.

Mary read this article for quite awhile but never explained this point in her think-aloud. When I asked her if she ever clicked on the coloured words in the article, she said, “You mean the hyperlinks, no.” I was impressed that she knew the correct terminology but her statement is consistent with the research that has demonstrated that children rarely click on these hyper textual links to further their understanding (Dalton & Strangman, 2006). She continued to read and almost seemed to struggle with how to proceed. At this point, I prompted Mary with a few questions, asking her if she wanted to make notes or start another search. She chose the latter. When I asked her what she was typing in for her search, she said, “The same thing as last time but I am going to go down the list a bit further.”

She started by selecting the first website listed but found that the information was blocked and she continued to scroll down her list. Mary then found a site that was entitled, “The positive and negative effects of video games” (www.raisesmartkid.com), and she was hopeful that it would provide her with answers. While she was reading, she explained that some people blame video games for youth violence and corrupt behaviours while some scientists have found that video games can make some kids smart by teaching high-level thinking skills. As she continued to read this long article, she told me that it was divided into two parts, the positive effects and the negative effects of video games. She also told me that she thought that this was a reliable site because a scientist had written it but that it did not include information about the effect on eyes.

Mary started another search but revised her keywords a few times explaining to me that she wanted it to be as short as possible. When I asked her why, she told me that
she thought she would get a better result if she used fewer words. I found this somewhat intriguing since research has demonstrated that boys tend to use a single keyword more frequently when conducting a search than girls do (Large, Beheshti, & Rahman, 2002). Additionally, I wondered if this was something that she was taught or something that she learned from experience. At this moment, she stopped and wanted to discuss with me what she could type in for this search. Mary decided that she wanted to know what the difference was between a computer screen and a television monitor. It did not seem like Mary had a reason for why she was doing this and I was a little concerned because she seemed to be getting further away from the original research question.

Mary chose a site that described the difference between the two but while she was reading, she clicked on something that allowed her to read only the article and ignore the ads. I was interested in what she did to get to this screen and Mary told me that she clicked on “Reader” at the very right of the browser bar. Further, she stated, “It’s a lot easier to read this way and I can ignore the ads.” I was pleasantly surprised to learn about this tool and through this behaviour; Mary demonstrated her ability to deal with Web texts in a manner that would allow her to ignore the non-textual elements such as the advertisements. While the “Reader” option may not be available on all websites, it should be considered a valuable tool for children (especially struggling readers) to utilize when reading online and may assist those students who can become easily distracted.

Mary did not discover any useful information and proceeded with another search: “Is sitting too close to the television, bad for your eyes?” She chose a site that listed vision facts and myths published by Kids Health (www.kidshealth.org) and that she thought would be a reliable site. At the beginning of the article, she told me that sitting
too close to the television was not reported to do any damage to the eyes. Mary continued to scroll down the article and found a paragraph related to computer usage and damage to the eyes. She found out that playing on the computer for long periods of time could lead to dry eyes (from blinking less) and possible eyestrain and that frequent breaks should be taken. Mary told me that she had enough information to write her final post. While she was writing on the class wiki, she frequently went back to the pages she had visited to gather the information. Mary was the first student to engage in this type of online activity while composing her answer. Mary demonstrated a comfortable ease in both navigating and working in this online environment.

*Figure 5.28 Mary’s Final Post for the Second Think-aloud* ([www.wikispaces.com](http://www.wikispaces.com))

As indicated above, Mary was frequently stuck when deciding what the keywords should be used to generate her searches. In addition, I observed that she quickly scanned the articles and this led to the omission of some important information. During this think-aloud, I did not observe any evidence of reading to evaluate and the higher levels of critical analysis and metacognitive awareness that allowed her to gather information from two different websites and integrate the facts across all four. Mary’s final response was very brief considering the amount of time she spent online (50 minutes) gathering information for this question. She was not able to craft an explicit, unambiguous response to the question and her answer included many spelling and grammatical errors. While she
did not have any problems using the class wiki, this posting demonstrates the need for continued writing instruction in both online and offline environments.

**Think-aloud Protocol Two**

On day 32, Mary completed the second think-aloud activity. She was able to immediately link onto the class wiki and read the second research question. Like her peers, Mary expressed her interest in this question. She posted the following initial response on the class wiki and included her own opinions and experience.

*Figure 5.29 Screen Capture of Mary’s Initial Response ([www.wikispaces.com](http://www.wikispaces.com))*

Unlike the previous think-aloud, Mary had no problem generating keywords for her first search. “Could high volumes damage your ears?” She told me that the first thing that came up was Yahoo but she was not sure that she should visit that site so she continued to scroll down the list. Mary chose a site titled, “High volume, prolonged earphone use can damage hearing,” published by USA Today ([www.usatodayeducate.com](http://www.usatodayeducate.com)). She thought that this would be a good place to begin. Mary found out that noises that exceed 110 decibels could strip away the myelin sheath from nerve cells. She did not understand the term myelin sheath and, for the first time, she paused her search to Google this term in an effort to deepen her understanding. After discovering the purpose of the myelin sheath for the nerves in the eardrum, she returned to her initial search.

While reading the first article, Mary discovered that prolonged exposure to noise levels above 85 decibels could lead to permanent hearing loss. She then decided that she
would need to find out what the decibel level is for high volumes on an MP3 player.

Mary decided to start an additional search and typed in, “How many decibels is high volume on an MP3 player?” Mary chose an article titled, “Your ears versus decibel levels” (www.noise-cancelling-headphones-review.toptenreviews.com). Mary was shocked to find out that half volume on an MP3 player is approximately 85-90 decibels. Further, she stated, “Wow, I’m pretty sure that all of my friends are listening to their music at a higher volume than that.” Although Mary was using her funds of knowledge to evaluate what she was reading, she once again, did not question the validity or reliability of the information presented on this website.

At this point, she returned to the initial page of websites and chose the first link on the list, “Can loud music hurt my ears?” published by Kids Health (www.kidshealth.org) and told me that, “It seems like an appropriate site.”

Figure 5.30 Screen Capture of Mary’s Search (www.kidshealth.org)

As I observed her reading the site, I noted that she clicked on the word tinnitus which was written in blue and was one example of a hyper textual link contained within this text.

She discovered that it was a term for ringing in the ears. Mary also discovered that there are two types of hearing loss; permanent and temporary. Following a little more reading,
she decided that she had the necessary information to craft her final response. In my observations, I noted that Mary did not record down any of the information that she located but did want to summarize it orally with me before moving over to the class wiki.

To begin with, I have learned that listening to loud music can damage your ears. However, it can still damage your ears when the volume is turned up half way. (85 to 90 db) If you listen to music more than half way in which that is over 110 db it can lead to permanent hearing loss. Once you are done listening to your music you know when you have had it loud. This is when your ears are ringing. This is called Tinnitus. I recommend that you keep your volume under half way (Mary, Observation Day 32).

Mary’s final response included evidence of some of the necessary components of online reading comprehension. Specifically, she demonstrated her ability to read to synthesize findings from two or more websites and was able to make a claim and support it with relevant details from her research. In addition, her written response indicated an awareness of audience.

**Think-aloud Protocol Three**

Day 47 and Mary completed this think-aloud research on her own. She had no trouble linking onto the class wiki, reading the research question, and posting her first response.

*Figure 5.31 Screen Capture of Mary’s First Posting on Class Wiki* ([www.wikispaces.com](http://www.wikispaces.com))

She then typed in the keywords, “Are energy drinks harmful to a teens heart?” to begin. As I viewed the recording, I noted that for the first five minutes, Mary did not actually verbalize her thinking. I was able to decipher her actions based on the video recording but
wondered why she had chosen not to talk when those were the instructions provided. It appeared that she clicked on a website called, “Research shows energy drinks can be harmful to teens,” (www.wptv.com). The recording showed that she spent a few minutes reading this article and then moved onto a new search.

For her second search Mary typed in, “Do energy drinks harm a teens heart?” I noted that this was very similar to her initial search and also observed that she did not delete the words from the previous search. This appeared to be some rather careless behaviour on her part which led me to suspect that her motivation for carrying out this research was very low and her focus was on finding an answer.

Mary decided to click on the first website that appeared, “Energy drinks are dangerous to kids” (www.articles.nydailynews.com) to see what it was about but she did not make note of the publisher and their reputability. From this, she read that too much caffeine could lead to seizures, strokes, and maybe sudden death. Mary stated, “I’m going to read on because it seems like the right site.” She did not spend much time reading this article before she returned to Google and started another search. The article that she quickly scanned included some significant information that either Mary did not read or decided that it was not relevant to the research question.

*Figure 5.32 Screen Capture and Audio Recording of Mary’s Think-aloud on Observation Day 47*
Mary chose to break the keyword search into smaller components to see if it would lead to better results. Her first search, “Energy drinks teen health,” took her to a site that dealt with the negative effects of energy drinks on teens’ teeth. After reading this site, Mary concluded that she had sufficient information to answer the research question and returned to the class wiki.

To begin with, after researching I have learned that energy drinks do cause heart problems in which I'm not too sure where it affects the heart. Such as a girl from Maryland drank only two monster energy drinks and died from a heart attack. However, I have learned that energy drink are not good at all. For example, if your drink them daily it can lead to enamel loss, seizures And many more unhealthy problems (Mary, Observation Day 47).

As evidenced by her writing, Mary did not spend any time organizing the information she had researched and her final piece was short, ambiguous, and contained many spelling and grammatical errors. While a few salient facts were listed in her answer, many other points were omitted. It appeared as though Mary was focused on only finding the answer and she did not engage in any of the critical reading skills that are central to reading both digital and print text. In this session, Mary did not exhibit any of these behaviours, which have been demonstrated to be necessary for successful online reading comprehension.

Think-aloud Protocol Four

Day 62, the final session for Mary. Although she was quite familiar with the routine by this point, she arrived to the room very unenthused to be there and had most of her hair covering her face. She started the session by stating, “I hope this is the last one,” and I could tell that her motivation and interest in this final session appeared to be very low. Without saying anything further to me, Mary quickly connected herself to the class wiki and read the final question. It was at this moment that things took a turn for the better. She explained that she had no idea what a mosquito ringtone was but that it
sounded “cool” and she wanted to know if they really worked. Mary began with her initial posting that expressed her interest in the topic.

Figure 5.3 Screen Capture of Mary’s Initial Posting on the Class Wiki (www.wikispaces.com)

Mary decided to begin by searching, “What is a mosquito ringtone?” She quickly chose a site entitled, “Mosquito Ringtones: The Ultrasonic Ring Tone Adult’s Can’t Hear” published by www.freemosquitoringtones.org. She read aloud that it was a tone that most people over the age of 30 could not hear. Mary also informed me that this article did not explain why people over this age cannot hear it and this was something she was interested in finding out. Her next search stated, “Why can people under the age of thirty hear a mosquito ringtone?” At this point, Mary said, “this is a really long sentence to type in” and when she began looking at the titles of the websites that appeared, she said, “Oh, I could have just typed in, how does the mosquito ringtone work?” Mary clicked on a site called, “The Mosquito Deive, Mosquito Tone, and Ultrasonic Ringtones,” published by www.noiselpel.com. I noted that this site contained comprehensive information that would provide Mary with all the necessary information. Instead, Mary read the first paragraph aloud, scrolled down the length of the article, and chose to go back to the original search page to see what else she could find. I wondered why she would choose this action and can only assume that the the length of the article was the deciding factor.
Mary decided to begin another search using the keywords, “How do mosquito ringtones work?” When I asked her why she chose to do this, she said that she wanted to type in a shorter question because, “If you put in too much information into the question, you might get confused and might not get as good answers.” Mary chose the first website in the list and read that the mosquito ringtone was also known as teen buzz. As she read, she came across the word kilohertz (kHz) and I asked her if she understand that term. Mary immediately referred to the measurement of sound that she read about in the previous think-aloud session and said, “What was that called when we were talking about volumes on an MP3 player?” I reminded her that volume levels were measured in decibels and she said, “Yeah, I think this is the same thing but measures the frequency of the ringtone.” I was intrigued that she was able to recall information that she had learned from the previous research question and used it to assist her with the understanding of this new information. This active construction of meaning is one that is demonstrated by proficient readers, “…as they grapple with text and apply their earlier knowledge as they questions, analyze, and probe” (Wolf & Barzilai, 2009, p. 34).

At this point, Mary decided to return to the class wiki in order to re-read the research question and then went back to the website. After a short time, Mary keyed in a
new search, “Where does the mosquito ringtone come from?” It was obvious to me that she was very interested in this topic since she continued to pursue the topic and demonstrated a high level of motivation to further her personal understanding of the topic. Mary mentioned to me that she remembered reading about where the ringtone originated and was trying to locate that site and decided that she would visit Wikipedia. We paused for a moment to save the recording and just before I pressed stop, I heard Mary say, “I really like this question though.”

On the Wikipedia website, Mary found the information she was looking for; how the mosquito ringtone originated. Not only did she discover who developed this ringtone but how the idea was born to the inventor. Neither Joshua or Alexandra had discovered this interesting fact in their research. Mary persevered in finding out the information that she was seeking and characterized herself as an inquiring online reader (Burke, 2002). Further Burke has suggested that inquiring readers, “…ask themselves questions that will help them set a goal, articulating what they want to find out and what type of information they most need” (p. 38). Mary then crafted her final response.

To begin with, after my research I have learned lots about the mosquito ringtone. The inventor was Howard Stapleton. Owever, there were some health problems with this ringtone especially for infants and young children due to the exposure of the sound. In addition, I have learned that this ringtone actually works. At age thirty you can hear 16khz and the ringtone itself can be 14-16hrtz (Mary, Observation Day 61).

After reading this posting, I was disappointed in the lack of interesting and important information that was not included in Mary’s answer. I was puzzled about why she did not include many of the facts that she had gathered since she had spent so much time researching this question. She demonstrated high motivation and interest in the topic, yet, she was unable to craft a response that revealed the depth of her new understanding
of this question. Also, as mentioned previously, Mary did not utilize any type of note-taking App while gathering her information.

**Student Reflections**

Following her last think-aloud session, I sat down with Mary to ask for her insights as a participant in this study. She began by telling me how much she enjoyed the last question about mosquito ringtones because she knew nothing about it. I then asked Mary for her opinions about what a good reader does when reading for information on the Internet and after a few moments she said,

> When I find something good on the Internet, I just keep that tab open and I go to many different websites. I keep searching sites until the information starts to say the same thing and that’s when I know that the information is true.

When asked to provide me with a rating of self-efficacy on the fourth think-aloud, Mary gave herself a four. Further, she told me that by researching that topic, she found out that the mosquito ringtone was a frequency between 14 and 17 kilohertz that very few adults could hear. She thought that her friends might really like this new piece of information.

When asked to provide advice to other students about her thinking processes while reading on the Internet, Mary said that when she’s reading on the Internet she sometimes finds it hard because of the amount of information that is available. Further, she explained,

> I would tell them to read one paragraph at a time because you might get confused. I did that a couple of times. I wouldn’t tell them to scan the information.

With respect to successful searches, Mary told me that she types in a shorter form of the question and that seems to get better results. When she is reading online, she almost always begins by reading the first article in the search results to determine its
relevancy to her question. Mary had a very difficult time providing any more insights with respect to this question and clearly did not want to continue. Finally, with respect to the differences between reading print and online material, Mary told me that she relied on the information in textbooks because, “It’s actual published material and people can’t edit them easily.” She told me that you do get different information from both sources and that you definitely get more information on the Internet. She did tell me that even when reading texts, she would make sure to use more than one source when looking for information. Mary concluded by telling me that while she preferred to read online, she believed that her understanding of information in both formats was the same. She also told me that she enjoyed changing the brightness and font of the e-books she was reading depending what room she was in. Finally, Mary explained that keeping track of all her schoolwork was much easier on an iPad.
In my initial days of observation, John appeared to be a quiet and polite young man. At first glance, it seemed as though John was carrying a heavy burden and frequently looked very sad. I was taken with his shock of jet-black hair and his warm and friendly smile. He was neither a leader, nor a follower among his peers but seemed to be comfortable in his role as “one of the guys.” John frequently participated in class discussions and I was struck by the respectful manner in which he addressed his teacher and his classmates. Although his answers were often not well thought-out, they were always received with great appreciation. When discussing my observations with Beth (the classroom teacher), she informed me that John’s reading and writing scores fell much below grade level. Further, Beth believed that with some extra work, John possessed the ability to perform at a higher level than he was currently achieving. When I asked Beth for her insights about John’s low scores, she attributed them to a lack of effort and perhaps even an undiagnosed learning disability.
John comes from a two-parent, middle class family where he is one of three adopted boys and two biological girls. I was informed that John was adopted at the age of six and I was unclear as to the birth order of children in his family. Prior to participation in this study, John had never used an iPad and reported that he used the computer for approximately one to three hours each week and only moderately enjoyed reading on the Internet. When asked what he was doing on the computer for this time each week, he reported that he usually used the computer to browse and explore various web pages and to play interactive video games. John also informed me that he rarely used email, instant messaging or chat rooms.

Reading Comprehension, Motivation and Engagement

The results from the Stanford Diagnostic Reading Test Online revealed pre-test raw scores of 26 out of 30 for vocabulary and 28 out of 54 for reading comprehension. Calculated for grade equivalency, these raw scores revealed that John was performing at a grade 8 level for vocabulary and a grade 3 level in reading comprehension. The results of his post-test (December 2012) reading comprehension was 28 out of 54 revealing no change in his performance by the end of the study.

Motivation for reading scores were calculated from the pre- and post-test measures of the MRQ. These results revealed some interesting insights into John’s motivation for reading. It is interesting to note that the largest increase in motivation for John was in the area of the importance of reading score. John also demonstrated a decrease in motivation based on his involvement in what he was reading score. This would suggest that while John viewed reading as an important activity, his enjoyment in what he was reading decreased over time.
Data from the student questionnaire about reading on the Internet revealed that John moderately enjoys reading on the Internet and spends most of his time browsing the Internet and/or playing interactive video games. He reported his self-efficacy for understanding what he read in books to be very good and expressed that his ability to figure out where to go on the Internet to find the information he wants is only adequate.

In September, John reported that most of his reading on the Internet was done at home and that two of his favourite Internet sites were Miniclip and Cool Math 4 Kids. John also informed me that he preferred using the Internet to research information for school projects and frequently used the Google or Bing search engines.

When I approached John about participating in my study, he seemed very interested and excited to have the opportunity to have the iPads. Additionally, he thought that he would be comfortable with verbally explaining his thinking while conducting research on the Internet. John demonstrated strong motivation and interest to participate in the project and to use the iPads daily. He reported a moderate level of comfort with reading on the Internet and was only somewhat confident in his ability to read and comprehend online text.

Thinking Processes while Working on the iPad2

Think-aloud Protocol One

On observation day 19, John and I sat down to complete his first think-aloud session. As with the previous students, I explained the procedure that I wanted him to
follow and assisted him with linking to the class wiki. John appeared eager and ready to begin. After reading the first question about video games, he quickly navigated his way around the wiki without any additional instruction and wrote his first post.

*Figure 5.35 Screen Capture of John’s First Post on the Class Wiki (www.wikispaces.com)*

John eagerly began his first search and told me that he was going to type in, “How video games are hurtful to your eyes.” He was the first student who had indicated any sort of premeditation of what key words might be helpful before moving over to Google.

John told me that the first site that popped up was published by www.sharecare.com and was called, “Is it Harmful to My Eyes to Sit too Close to the Television?” John told me that he had no idea about the reputability of the author but that when he goes to a search engine, “I just click on the websites in order and look through them to see which one gives me the best option.” This insight into John’s activities on the Web is consistent with the findings reported by Tapscott (1998) who stated that, “It’s not just point and click. It’s point, read, think, and click” (p. 63). According to Coiro (2008), links on a web page act as decision points for the online reader.

John explained that the information he read on this first link did not provide him with any new information so he clicked back on the class wiki (by mistake) and then said, “Where do I go now?” I provided John with some assistance so that he could return to his first page of searches. He then chose to visit the Answers website (www.answers.com), in pursuit of more information. After reading a few of the answers, John told me that he was
“pretty sure that this website is unreliable because anyone can post these answers and they are all different.” John scrolled down his list and clicked on a website titled, “Harmful Effects of Video Games” (www.buzzle.com), and thought that this site looked promising. Within the first few seconds of reading the article, John chose to click on a hyperlink that led him to more detailed information about the harmful effects of video games on children. As I observed his behaviours on the Web, I noted that John was very comfortable navigating his way through a webpage and along with his peers, used the correct terminology when referring to the various tools on the Web.

He hardly spent any time reading this new online text and he appeared to simply scan the list of subheadings in the article to see if he could identify any of his keywords. John then returned to the Google search engine and said that he was going to visit www.ehow.com. Apparently this was a website that he was already familiar with and had often visited when searching for new information yet, he did not speak to its reputation. His search was successful and led him to a page entitled, “The negative effects of video games on eyes.” In his think-aloud, I was really impressed at his understanding of the material that he read and his ability to summarize the content presented. After reading this information, John informed me that he was ready to write his final answer.

When I was on google I decided to look up some stuff about how video games can be affective to your syes and it just like I said in the first pst it's because your probably sitting to close to the television or the brightness is to high. But another thing that I saw was, it said to take ten second breaks every ten minutes and that's if you have eye pain or not, also when I was scanning through it said that if you start to have a pain in your eye then it is damaging the cornea and it said if you have to much pain in your eye then it can cause migraines and nausea (John, Observation Day 19).

While I was shocked at how quickly he finished this task, I could not dispute John’s efficiency in his choice of keywords for the searches and his use of time and the
fact that he discovered some key facts in less time than his peers. Similar to the online behaviours of his peers, he chose not to verify his information by searching on additional websites and noticed that this was a trend with this group of students.

**Think-aloud Protocol Two**

On day 33, John completed his second think-aloud session. This time, he was able to link onto the class wiki with no trouble and read the second research question. After reading the question, he looked up at me and said, “This is a really interesting question.” He then took a moment to post the following response.

*Figure 5.36 Screen Capture of John’s Initial Response on the Class Wiki (www.wikispaces.com)*

John then began with the following search, “How can the volume on an MP3 affect your hearing?” He quickly selected a site called, “MP3 players: Are they damaging to your hearing health?” published by Healthy Hearing (www.healthyhearing.com). John then began to read the article aloud as he had in the previous session. He summarized the article by stating that adults do not usually listen to MP3 players at high enough volumes to damage their hearing and that this is more of a risk to children and teens. John then read a little more of the article aloud and explained it to me by drawing on his own experience. Before he reached the section on volume level, he returned to the previous webpage and then when I asked if he was finished with that article, he clicked back. It is evident from this behaviour that students must be made aware of what they are doing when
they click on a link and how this might affect their understanding of the information presented (Coiro, 2003).

Even though there was a section on volume level in the article that explained the various decibel levels and the length of time it would take to affect one’s hearing, John could not seem to locate this information. I then decided to ask him if there was any information in the article on volume levels; to which he responded, “No, I am trying to find that,” as he continued to quickly scroll through the web page. This online behaviour was consistent with the observations of Sutherland-Smith (2002) who explained that students often use the “snatch and grab” technique to locate certain keywords in an online text.

John then returned to Google and keyed in a new search; “What volume levels on an MP3 are damaging?” He chose to visit an Answers (www.answers.com) web page that would answer his question but also informed me that this site “isn’t the best choice.” He read the information aloud and seemed to find the answers that he was looking for but again, did not question the reliability of what he was reading. John then decided that he wanted to know the decibel level for something at high volume and typed in, “What is the decimal level for high volume?” I noted that he made a spelling error and was interested to see if this would affect the search but it did not.

John selected the first site listed and told me that this article was published by NDRI (www.ndri.com) as if he knew about this site but really, he could not even determine what NDRI stood for nor did he try to find out. He just continued reading the article about high volumes and the risk of lifetime hearing loss for kids. According to this article, John reported that most teens listen to their music at 110 to 120 decibels and
hearing loss can happen after only 15 minutes. At this time, John told me that he had enough information to post his final answer to the class wiki.

How can mp3 players affect your hearing. The can affect your hearing if you turn the volume up to high and i did some research and it said that all it takes is fourty to sixty decibels to start impacting your hearing and I read that some kids actually like the pain it causes to the ears because they get the satisfaction of listening to the mp3 more clearly. It also said that it just doesn't affect kids it affects adults to so for (e.g) if your kid is playing guitar or video games and you walk into his/her room and you start listening to it, it will affect your hearing to. I read online that 80% of teens listen to their music more then 110 decibels so imagine what happens if you listen to music and it can damage your ears at foury to sixty then relate that to 110 decibels (Jordan, Observation Day 33).

John’s final posting revealed some interesting information about his online reading comprehension. He began by restating the question and responding to it, almost as if were addressing his peers but then halfway through his piece, he began to address parents. While this still remains somewhat disjointed, this posting demonstrated that he had taken his audience into consideration when composing his answer, and is indicative of his improved ability to read and write to communicate (Coiro, 2011). During this session, John also demonstrated his ability to read to locate and his sporadic attempts at reading to evaluate the author’s credibility for a given web page. Finally, John’s answer revealed his beginning ability to read to synthesize information on the Web by including two key details from two different sites and to make a claim that is supported by some evidence.

**Think-aloud Protocol Three**

On day 48, John completed the third think-aloud session which was to be completed independently. John expressed his confidence in being able to navigate his way between the class wiki and Safari and also to control the Display Recorder App. He posted the following initial response that included his own experience, on the class wiki.
John then switched over to Safari and typed in his first question for Google; “How can energy drinks be affective to teenagers?” This search led him to many links to articles about energy drinks and teens. John decided to select an article that was published by *Psychology Today* and tried several attempts at pronouncing the word psychological. After three attempts, he gave up and said, “hmm” and then after a pause, correctly said, “Psychology Today.” The title of the article was, “Energy drinks: What do they really do?” and he began to read aloud. The article was divided into subsections and he began with the section, “What’s inside energy drinks.” John paused and said, “it would tell us on the can but anyways,” and continued with his reading. I also noted that he did question the authority of the website he was reading even though the information about the contributing editor (along with a short biography), was listed right under the title. It appeared that John was more interested in finding the correct answer than considering the reliability of the answer.
After reading through approximately half of the article, he decided that the information was not relevant and returned to the initial search page. I then noted that John chose a link because it included the name of a doctor in the title. He also stated that it was published by Huffington Post (www.huffingtonpost.com) and that he had read good information on that site before. I wondered what made John consider the author of this piece when he had not considered it previously. Does simply adding the name of a doctor into the title of a webpage make it a reputable source for students?

As suggested by Kuiper and Volman (2008), the ability to assess and evaluate the relevance and reliability of all information is a key skill no matter how the text is presented. Using the Web may require a greater demand of this skill due to the sheer volume of information that is accessible to students. Shenton and Dixon (2003) have suggested that learners may not even realize that verification of material on the Internet is required, especially when they are very young. According to Hirsh (1999), this behaviour does not improve with age.

The article was written with a focus on the effects of energy drinks on blood pressure. While he was reading, John had to deal with a pop-up advertisement that covered the whole screen but I observed that he had no trouble closing this screen and
returned to his article. As John was reading aloud, he discovered that along with elevated blood pressure, energy drinks could cause heart palpitations, arrhythmias, anxiety, and insomnia. John had great difficulty pronouncing the words anxiety and insomnia and when he reached the end of that sentence, I noted that he scrolled down the page to the bottom of the article. I speculated that perhaps he was trying to determine its length or perhaps he was scanning the article very quickly to determine its level of difficulty. Also, John did not make any effort to determine the definitions of the words he could not pronounce.

*Figure 5.39 Screen Capture and Audio Recording of John’s Think-aloud on Observation Day 48*

Further on in the article, John was reading about a study that measured the heart rate of young adults at 15, 30, and 90 minutes after consumption. John read this to be fifteen hundred and thirty, and ninety minutes, paused, and then said, “I don’t know.” Clearly he knew that what he had read did not make sense but continued on anyways. When he finished reading this article, John said, “Ok, this is all the information that I need for now and began to write his post on the class wiki. He stated,

In the research I have done on the iPad it clearly states that it's no the drink itself but it's the caffeine in the drink and I looked on the internet and it actually said
that you can die from too much caffeine because your heart will beat too fast and you could get a heart attack, it also stated that there are more dangerous chemicals in energy drinks. Then I went back on the internet and it said that if a kid drinks 2 energy drinks a day instead of 2 beats a second it goes into 5 to 6 beats a second (John, Observation Day 48).

Employing Coiro’s (2011) framework for successful online reading comprehension, it is evident that John is in the process of developing online reading comprehension skills as defined in each of the four areas. As evidenced by his thought processes and his pre-planning, he is skilled at determining keywords that might lead him to the information required. However, instead of scanning the information provided to determine its usefulness, John read each of the articles aloud. I am not sure that he would engage in this practice if the activity were not a think-aloud, however, I could assume that he would read silently to himself. John did not engage in any of the metacognitive skills of questioning and answering that have been identified in the reading comprehension literature to be one of the most effective comprehension strategies used by skilled readers (Kamil, 2003; Raphael & Pearson, 1985). Additionally, John was able to evaluate some of the websites he visited by locating the author and providing evidence for the reputability of the article. Finally, as demonstrated by his final post, John is developing his ability to craft a final response based on the information gathered and for a specific audience (Coiro, 2011).

Think-aloud Protocol Four

On day 62, the day of the final think-aloud session for John, he arrived in the room as eager as he had on the first day and also reported that he was very tired because he had not gone to bed until 2:00 a.m. because he was playing online video games. By this time, he was very familiar and comfortable with the routine and said, “Can I just go
on and see what the final question is; I heard that it is really interesting” but then after reading it, he did not seem that interested in the topic.

John began with the sentence, “Mosquito ringtone does it work?” He told me that he was going to click on a site entitled, “How the mosquito ringtone works: Why adults can’t hear it.” John also informed me that it was located on a site called, “Free Mosquito Ringtone” (www.freemosquitoringtone.com) and also happened to be a site that Mary chose in her think-aloud. He discovered that the mosquito ringtone was also called “teen buzz” and that it emits a sound wave around 14-17 kHz. He did not know how to read the term kilohertz and then proceeded to tell me and then reported that it was 17,000 kHz. When I asked him to look over that piece of information, he did not realize that the article actually stated, “…17 kHz (17,000 hertz)” and then said, “Oh, ok.” I wondered how students in a similar research situation, with no previous experience about what they were reading, might make sense of the online text. Clearly, this illustrates the need for scaffolded online language instruction with the goal of gradual release of responsibility for the learner (Northrop & Killeen, 2013).

*Figure 5.40* Screen Capture of John’s Search (www.freemosquitoringtone.com)
While John thought he had gathered some valuable information, he told me that he wanted to check with another website to see if he could find the same type of information to make sure it was true. John selected a link called, “The mosquito ringtone: This adult can hear it!” and stated, “Maybe this website has information that proves the mosquito ringtone doesn’t work.” As described by Tapscott (1998) and Coiro (2003), this provided evidence that John was making decisions and predictions before clicking on the site. What John did not seem to realize was that it was a personal blog written by Alec Saunders (www.saunderslog.com). He began reading the information aloud and then when he arrived at a part where the author was writing in first person, John said, “I’m pretty sure that this is the guy talking.” I found this statement very surprising as he had not even glanced to see who the author of this article was and yet John declared it was a male. John continued reading the article to a point where he either became bored, disinterested, or did not understand it and began a new search.

This time, John searched, “Does the iPhone 4S have the mosquito ringtone app available?” He discovered that the mosquito ringtone worked for all types of smartphones but at this point, he did not know how to proceed with his research. I watched John scroll back and forth through the article as he was trying to make a decision of what to do next. He then typed in, “Would people pay for a mosquito ringtone?” It was clear that John was now taking the question in a new direction and was veering a little off topic. This online behaviour is consistent with the results of research conducted by Fidel, Davies, Douglass, Holder, Hopkins, and Kushner (1999), and Large and Beheshti (2000), who found that students ranging in age from 12 - 18 had great difficulty selecting keywords.
and preferred to browse. Kuiper and Volman (2008) have suggested that creating student assignments that are specific and concrete might assist with the formulation of keywords.

The results of this search led him to Wikipedia and while he commented, “that it was not the best to go on,” he found some new information that he considered useful. This included facts about the origin of the mosquito ringtone, hearing differences between teens and adults, and different names for the ringtone. When I asked him why he thought it might be called a mosquito ringtone, John was able to accurately infer that it might be due to the annoying buzzing sound that mosquitoes make. He decided that he had gathered enough information to create his final posting but once again, he was relying on his memory as he did not record any of his search results on the Pages App.

John concluded,

When I heard a out a mosquitoring tone I thought it was suppose to be a ringtone that would be good for teenagers and not adults but it turns out when I was on the web searching about the mosquito ringtone it turns out that it was invented because teenagers wouldmlike to loiter around places and if you know teenagers then they wont listen to a word you say so they invented the mosquito ringtone so that the teenagers would run off because of the high pitched frequency (John, Observation Day 62).

John’s response did not demonstrate significant improvement in any of the four areas identified to assess online reading comprehension (Coiro, 2011). His final response was disjointed and similar to his previous postings, included many spelling and grammatical errors. However, it was obvious to me from my discussions with John (as he searched for the online information) that he understood quite a bit of what he was reading. However, John did not demonstrate any strategies for dealing with text that he had difficulty understanding. In fact, John did not keep any notes during his online searches and never used the hyper textual links that could have assisted him with definitions of
terms. Finally, for all of the research questions, it appeared that John was focused on finding the right answer and not concerned with new knowledge creation.

According to Kuiper and Volman (2008), “…the development of valid and meaningful knowledge assumes that students are actively involved in the learning process, that they construct knowledge by connecting new information to already acquired knowledge, and that they reflect on this process and its results” (p. 261). I did not observe John engaging in any of these behaviours during this session and noted that his research this session seemed quite confused. Perhaps a contributing factor was his demonstrated lack of engagement with this question and the issue of task characteristics will be explored in the Discussion section.

**Student Reflections**

At the completion of the fourth think-aloud session, John and I continued on with a brief interview where I asked for his insights into using the iPads since September. He began by telling me how much he enjoyed the last question about mosquito ringtones because he had never heard of it. I then asked John for her opinions about what a good reader does when reading for information on the Internet and after asking for the question to be repeated he said,

They try and find a website that gives them more information but sometimes the reader doesn’t realize that if it gives you good information, like how do we know it’s the right answer. So, like, I’m guessing of what they would do, is they would see if, well, what I would do is go onto Google or Bing, search up the research question and then visit three or four sites and if one or two of them said the same information, then I would believe it. That would be the right answer because it would be there more than once. That’s what I think good readers on the Internet do.

When asked to provide me with a rating (on a scale of one to five) about how much he enjoyed the fourth research question, John said five. He then added that it was
not just today’s questions but that he enjoyed all four-research questions because they provided him with new information that he previously knew nothing about. Further, he rated himself a five on self-efficacy for the fourth think-aloud. He believed he provided a comprehensive answer including the origin of the mosquito ring tone.

When asked to provide advice to other students about their thinking processes while reading on the Internet, John said that when he’s reading on the Internet he tries to find more than one answer. Further he stated: “Instead of just finding one answer, try to find multiple answers that you can add, so try add as much information that you can about that thing that you want to search up.”

With respect to the differences between reading on the internet and reading printed text, John told me that when reading a book, you only get information about what that one thing is about. He then used the example of reading his e-book, *Between Shades of Gray*. John explained that when reading the printed text, you only get the author’s point of view as written in the story but when reading it as an e-book, you can search why the author chose to write about the topic. He told me that, “Online, you are able to find out more information about the book than just by reading the book itself.” John continued by explaining that he was able to find out much more information about Stalin from the Internet than a textbook because it provided him with many more options.

Additionally, John told me that he preferred to read on the Internet because he felt it was more reliable. He explained that he might read longer passages in a printed text in order to find the information that he was looking for. On the Internet, he told me that he was able to look for keywords but that once he found an article that interested him, he
usually read the whole article. He also told me that when he is reading online at his home, he would add websites that are reputable to his ‘Favourites’ tab for future reference.

**Case Study Five - Scott**

My connection is Text to world.

My connection is about Holocaust when Hitler was taking people from their houses and taking whole towns and killing them and making them fear death.

First, I made this connection because when I read about soldiers taking people away in trucks I thought about Hitler taking children, adults and even new borns away to slave camps. In the book they also take people away in trucks to were I think is slave camps.

Secondly, I picked Text to world because I grimly thought about the slave camps. I mostly thought about how they took them from their houses like in Between shades of grey.

(Text-to-World Connection, Observation Day 15)

When I walked into the classroom on the first day of my observations, I immediately noticed Scott. One of the tallest boys in his grade 8 class, Scott is an attractive young man who appeared to be very conscious of his appearance. He was dressed in name-brand clothing and his hair was cut in a trendy style. It appeared that he was very popular with both the males and females in his class and was often trying to act as the comedian in the class. Scott frequently participated in class discussions and was very confident when speaking. Often, Scott had difficulty paying attention and completing the task at hand as he was busy chatting with his friends. While not rude to the teacher, it was apparent that Scott’s friends and social life were a little more important than the lessons being taught on any given day. When discussing my reflections with the classroom teacher (Beth), she confirmed my observations that Scott was more interested in his appearance, sports, and his social life than his studies. Beth reported that his
reading and writing scores were at or above grade level but that she had begun to notice a rapid decline in his grades and his general attitude toward school.

Scott comes from a two-parent, middle class family where he is the eldest of two children (younger sister). Prior to participation in this study, Scott had never used an iPad and reported that he used the computer for approximately one to three hours each week and only moderately enjoyed reading on the Internet. When asked what he was doing on the computer for this time each week, he reported that he usually used the computer to browse and explore various web pages and to play interactive video games. John also informed me that he rarely used email, instant messaging or chat rooms. I then asked him how he did his research about gaming and he reported that he most frequently used Google and YouTube: “I use the Internet for everything and I am almost always on the Internet.” He also told me that he has his own computer and television in his bedroom and spends most of his evenings alone in his room.

**Reading Comprehension, Motivation, and Engagement**

The Stanford Diagnostic Reading Test Online measured reading comprehension. Scott completed the vocabulary and reading comprehension sub-tests with no difficulty and finished in approximately 45 minutes. The results of his pre-test raw scores were 26 out of 30 for Vocabulary and 46 out of 54 for Reading Comprehension. Calculated for grade equivalency, these raw scores revealed that Scott was performing at a grade 8 level for vocabulary and a grade 9 level for reading comprehension. The results of his post-test (December 2012) reading comprehension was 40 out of 54 revealing that Scott was performing at grade 7.2 at the end of the study.
Motivation for reading scores were calculated from the pre- and post-test measures of the MRQ. These results revealed some interesting insights into Scott’s motivation for reading. The largest increase in motivation for Scott was in the construct of reading for grades score followed closely by the compliance score and his desire to read challenging material. Scott also showed a decrease in his motivation to avoid reading activities while also experiencing a decrease in his reading self-efficacy for reading score. This would suggest that Scott was extrinsically motivated to read at the end of the study but his beliefs in his own reading abilities decreased over time.

*Table 4.5. Percentage differences between pre- and post-test MRQ results for Scott*

<table>
<thead>
<tr>
<th>Reading Efficacy</th>
<th>Reading Challenge</th>
<th>Reading Curiosity</th>
<th>Reading Involvement</th>
<th>Reading Importance</th>
<th>Reading Work Avoidance</th>
<th>Competition in Reading</th>
<th>Recognition for Reading</th>
<th>Reading for Grades</th>
<th>Social Reasons for Reading</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 8.3%</td>
<td>+ 15%</td>
<td>+ 8.3%</td>
<td>+ 12.5%</td>
<td>+ 12.5%</td>
<td>- 19%</td>
<td>+ 8.3%</td>
<td>- 10%</td>
<td>+ 44%</td>
<td>- 4%</td>
<td>+ 20%</td>
</tr>
</tbody>
</table>

Data from the student questionnaire about reading on the Internet revealed that Scott only moderately likes to read on the Internet and spends most of his time (more than 3 hours per week) on the Internet playing interactive games or downloading music and/or software games. Like the other males in the study, Scott expressed that he spends the least amount of time using e-mail, social networking spaces, or chat rooms. He reported that he is only okay at understanding what he reads in books (including both stories and textbooks) and believed his Internet searching skills were only fair. In September, Scott reported that most of his reading on the Internet was done at school and that two of his favourite Internet sites were Miniclip and Facebook. This was actually a contradiction to what he had reported earlier; that he rarely used social networking spaces. Scott also reported that he mainly uses the Internet to, “Search for things I need to know.”
When I approached Scott about participating in my study he appeared very happy
to have been selected and to be using the iPad’s on a daily basis. According to my field
notes on Observation Day 7, Scott stated, “I can’t wait to use the iPads, I’ve been dying
to try one out since I only have an iPod.” I explained that while the whole class would be
using the iPads, he would have the opportunity to work one-on-one with me for a variety
of tasks involving the Internet. He reported that he would be very comfortable in
explaining out loud what he was thinking while searching for information on the Internet.
Scott demonstrated high motivation, interest, and comfort with reading on the Internet
and was confident about his ability to read and comprehend information both in printed
format and online.

Thinking Processes while Working on the iPad2

Think-aloud Protocol One

Day 20 of my fieldwork and Scott and I sat down to start his first think-aloud
session. Similar to the previous sessions, I began by explaining the research activity that
he would be participating in and what would be expected of him. He seemed highly
motivated to begin the task and had no trouble navigating his way to the class wiki in
order to read the first question and posted his first response.

Figure 5.41 Screen Capture of Scott’s Initial Response on the Class Wiki
(www.wikispaces.com)

Before beginning his search, Scott told me that he was going to divide the
question into two parts. For his first search he was going to type in, “Can videogames be
harmful to your eyes” and for the second, “Can videogames be helpful to your eyes?”

After Scott entered his first search terms, he scrolled through the list of related websites and chose one that was published by Dark Station (www.darkstation.com) and was called, “How bad are videogames on your eyes?” Scott noted the picture of the boy playing his Nintendo DS located at the very top of the article and said, “This must be good; here’s a picture of a kid playing videogames.” This comment is similar to those made by students in a research study conducted to determine the importance of the appearance of a website to children’s decision-making processes (Agosto, 2002). Agosto found that students that websites that are more attractive and include more pictures, were more likely to evaluated more positively by students and held their attention for longer periods of time.

Figure 5.42 Screen Capture of Scott’s First Search (www.darkstation.com)

When I asked Scott if the author of a website had any influence on him when searching for information, he thought about it for a few seconds and then said, “No.” Scott then did something that none of his peers had done; he typed his keyword search into the search bar of the article. He told me that he was going to use this to look for information in the article. Rather than reading through the article and possibly gaining...
some additional information related to the question, Scott’s actions demonstrated that he
was clearly interested in only locating the answer.

*Figure 5.43 Screen Capture of Scott’s Search within the First Article (www.darkstation.com)*

Scott’s search within the article led him to the result in Figure 5.46 but only
partially downloaded. From the information that did download, Scott read that extended
videogame playing could lead to eyestrain but he was uninterested in waiting for the
remainder of the article to download. This behavior was consistent with the behavior of
similarly aged students, reported by Watson (1998). In his study, Watson interviewed
several eighth-grade students and discovered that time was a significant consideration for
students when judging the usefulness of a particular site. That is, the longer the download
time, the less useful the site.

Scott then decided to return to the previous screen and after reading the article he
told me that playing videogames could be stressful for the eyes and lead to blurred vision,
headaches, double vision, and general fatigue. I asked Scott if the article included any
recommendations for people who play videogames and he replied, “No, it didn’t.” When
I quickly glanced at the article, I saw that the author recommended taking frequent breaks
and that Scott had not read this piece of information even though it was located only one
or two sentences below the location where he stopped. At this time, he told me that he was done and was going to return to the wiki to post his answer. I then reminded him that he initially told me he was going to search the harmful and helpful aspects of videogames and he said, “Oh yeah, I forgot.” Obviously Scott was not interested in this question and was only focused on finding an answer so that he could be done with this online task.

We then had a brief discussion about how Scott decided whether a website was reputable. He told me that he usually scrolled down the list to look for sites that were not “bogus”. I asked him if he considered Wikipedia to be a “bogus” site and he said, “No because once the information is posted onto the site, it is only there for 45 seconds before someone reviews it” but was unable to tell me who that someone was. Scott then opened a new tab and searched, “Can videogames be helpful on your eyes?” He chose a link published by Science Daily (www.sciencedaily.com) that was entitled; “Video games may be helpful in treating lazy eyes in adults.”

As he was reading, he found out that this article was a summary of an article published in the June 2012 edition of Optometry and Vision Science, the official journal of the American Academy of Optometry. When I asked him what he knew about these types of journals, he said that he knew it had to be a “pretty big finding” to be published in a journal. He continued to read and discovered that the work of one scientist, Dr. Levi, showed that playing videogames could actually help adults and older children who suffered from “lazy eye”. Scott realized that this was important information for one very specific group of the population but was not interested in researching the question any further and posted his final response. Scott wrote,

First I do think video games can be helpful or even used as a tool because it is shown in studies that playing specialty made video games can help your eye if
you have lazy eye. Also playing long sessions of video games can be harmful on your eyes because if you play for too long it can strain your eyes or cause blurriness etc. (Scott, Observation Day 20).

Using Coiro’s (2011) framework as a measure of successful online reading comprehension, it is evident that Scott continues to improve in his ability to read to locate and had engaged in some premeditated thought before beginning his first search. Both my observations of Scott and the recording of this session confirmed that he still continued to scan information very quickly which led to the omission of some important information. Also, Scott chose to only visit two websites and seemed anxious to find the answer and finish the task. During this think-aloud, I did not observe any evidence of reading to evaluate and the higher levels of critical analysis and metacognitive awareness that allowed him to gather and integrate information from four different websites. In fact, on two separate occasions during this think-aloud, I had to prompt Scott with questions that allowed him to reconsider his online search and perhaps look for additional information.

Think-aloud Protocol Two

Day 34 of my fieldwork and Scott and I sat down to complete his second think-aloud session. He had no trouble navigating his way to the class wiki in order to read the research question. After reading the question aloud, he said, “That’s a really cool question.” He began typing and after what seemed like only 30 seconds, he said he was done.

Figure 5.44 Scott’s First Response on the Class Wiki (www.wikispaces.com)
Scott began his first search on Google and typed in, “Can lissing to high volumes on an mp3 player cause hearing loss?” Unlike his peers, Scott did not spend any time correcting his spelling as he was typing in the search engine. When the results of his search appeared, I noticed that Scott read the titles of each of the links aloud until he came across one that interested him. In the case of this first search, Scott selected a site entitled, “Loud iPods: Most common cause of hearing damage” published by the Daily Mail (www.dailymail.co.uk). This was a site that none of his peers had actually come across in their searches, yet, provided a new and interesting piece of information. He did discover that people who listen to iPods at work at high volumes in order to drown out workplace noise, are at the greatest risk for hearing damage. Without reading too much further into the article, Scott decided that he wanted to start a new search. This time, he typed in, “How long does it take an mp3 player cause hearing loss at high levels?” By the length of this question, it is clear that Scott had not yet learned that selecting a few keywords might lead to improved search results.

*Figure 5.45 Screen Capture of Scott’s First Search (www.dailymail.co.uk)*

Scott told me that he was scrolling through the page of results, reading each of the titles, “Looking for one that seems like a legitimate website” but did not tell me about the
criteria he uses to evaluate them. He selected one called, “Beware! MP3 players may cause hearing loss” published by Health Online ezine (www.healthonlinezine.com). Scott began to read the information aloud and stumbled over many words including, continuously, research, and decibels (he pronounced it “dead bells”). Again, he never slowed down or re-read the sentence in an attempt to improve his understanding. When he arrived at a section that he considered important, he said, “Ok, I’ve got it.” This insight into his thinking led me to believe that he was simply searching for one correct answer and was consistent with the behaviour demonstrated by John. While similar behaviours were exhibited by students in a study conducted by Fidel et al., (1999), it would seem that more work must be done to move students away from the idea that the right answer must be found for the teacher. Instead, educators need to move students toward finding the answers to their own authentic questions, which in itself will result in greater motivation and engagement in the research process. It is important then to consider the characteristics of the online task itself.

From this article, Scott learned that listening to music at 85 decibels for eight hours could damage a person’s hearing, according to a doctor at Boston Children’s hospital. Scott then turned to me and said, “Ok, I think I’ve done it.” Before he left the Internet, I asked him how he could be sure that this one article was providing reliable information. Scott immediately searched for the author of the article but could not locate this information. He decided that it might be a good idea to look up one more article before crafting his response.

This time Scott selected an article titled, “Risk of an iPod generation developing hearing loss” published by the Better Hearing Institute (www.betterhearing.org). After
scrolling through the article, he said, “Ok, here it is again,” and proceeded to read the piece of information that he located. Scott read that listening to music over 80 decibels could lead to permanent hearing damage and is different from the deafness that can occur in old-age. Then he looked at me and said, “So, I think it’s true that listening to music between 80-85 decibels can cause hearing damage,” since I have read it in two different articles. Scott then moved over to the class wiki to post his final response and stated,

Now I strongly believe that listening to any iPod over 80 desibals can cause hearing damage. Because having hearing the head phones directly to the hearing canal can hurt the ear lobe because of the vibration of the music bouncing on the inside of the ear (Scott, Observation Day 34).

Employing Coiro’s (2011) framework for successful online reading comprehension, it is evident that Scott is in the early stages of developing online reading comprehension skills as defined in each of the four areas. Scott demonstrated his ability to read to locate information on the Internet and was able to use appropriate keywords for his searches that led him to two different Web sources that provided answers to his research question. As evidenced by his long keyword searches though, Scott could benefit from continued practice with shorter keyword phrases to determine their success with his online tasks. When prompted, Scott was able to identify the author of a website, yet, rarely considered the reliability of the information presented. It appeared that he considered the information to be true on the Internet simply because it was on the Internet. Kuiper and Volman (2008) have suggested that younger students may not have the necessary research skills that allow them to discern between reliable and unreliable information. From my observations, I do not think that Scott lacked the ability to question the authority of the information but lacked experience in questioning information in this milieu.
Scott’s online behavior also demonstrated that he is at the beginning stages of reading to synthesize and while able to identify key details from two websites, he was not able to synthesize information across four different sites. As evidenced by his final posting on the class wiki, Scott was unable to read and write to communicate his findings to the selected audience. In fact, Scott posted the first sentence of his response and then returned to the class wiki to compose the second sentence and this resulted in two, very short postings.

**Think-aloud Protocol Three**

On day 48, Scott completed the third think-aloud session which was to be completed independently. Scott expressed his confidence in being able to navigate his way between the class wiki and Safari and also to control the Display Recorder App. He posted the following very brief, initial response on the class wiki.

*Figure 5.46 Screen Capture of Scott’s First Response on the Class Wiki (www.wikispaces.com)*

![Image](https://example.com/image.png)

Scott started by typing into Google, “Can energy drinks be harmful to teen heart health?” As I observed the recording, I noted that Scott scrolled down the list of sites and I realized that some of the links were written in purple (instead of blue), and were websites that his peers had selected during their think-aloud sessions. Scott did not choose any of those sites and instead he stated, “Ah, here we go; this will be a good one because teens drink.” The site, published by Daily Mail ([www.dailymail.co.uk](http://www.dailymail.co.uk)), was entitled, “Alcohol mixed with energy drinks can raise risk of heart problems and other
conditions.” After reading a brief excerpt from the article, he determined that this information was not what he wanted and returned to his initial search page.

Figure 5.47 Screen Capture and Audio Recording of Scott’s Think-aloud on Observation Day 48

Scott then chose a link published by Live Strong (www.livestrong.com), read the title, “All about the effects of energy drinks,” and said, “This looks good.” Scott appeared to stumble over many of the words in the article such as adrenaline and physiologists and did not make use of any strategies to assist himself in his understanding of these words. He continued to read a section about the effects of exercise, cold drinks, and heart attacks, which was not relevant at all to the research question. After reading a little further, Scott gave up reading this article and returned to the original search page. He continued to scroll through the list of sites and did not choose to type in new keywords. Scott then selected a site entitled; “Can energy drinks kill,” published by Forbes (www.forbes.com). He spent very little time reviewing this article before he moved over to the wiki to post his final response.
Scott’s posting and in fact, his whole independent think-aloud was very brief and did not provide any additional insights into his online reading comprehension. Without me there to scaffold his online research, he proceeded as quickly as he could through the research to find an answer he considered sufficient for the posting. I noted that he had not kept any notes on the Pages App for any of his think-aloud sessions thus far, and his think-aloud revealed that he only read enough information in the article to achieve his desired result. It appeared as though Scott had very low motivation to complete the task and this was reflected in his short think-aloud session and in his responses on the class wiki. In fact, research (Ford, Miller, & Moss, 2001) has demonstrated that students who focus on finding the correct answer have a tendency to judge the reliability of websites based on easy access and other superficial criteria. Not surprisingly, those learners who are highly motivated for a specific online task are more likely to engage in more expansive searches and strive to understand a topic in greater depth (Limberg, 1999). Motivation, along with the effects of learning styles will be explored further in the Discussion section.

Think-aloud Four

On day 63, the day of the final think-aloud session for Scott, he arrived to the session with his hair almost completely covering his face and was clearly anxious to be
done with this activity. He said hello and then sat down and went right to work, reading
the question and writing his first post. Not unlike the others, his posting reflected his
lack of knowledge about the mosquito ringtone.

*Figure 5.49 Screen Capture of Scott’s Initial Response on the Class Wiki* (www.wikispaces.com)

Scott began his online search by using the keywords, “What is a mosquito
ringtone” and watched a YouTube video about the mosquito ringtone. He was the first in
this group of students to actually view a video as part of his online research. This video
played the various frequencies that different age groups should be able to hear but did not
provide any additional information about the mosquito ringtone. Scott returned to his
previous search page and began looking through the titles of the article listed.

*Figure 5.50 Screen Capture of the YouTube Video about Mosquito Ringtones*

Scott selected a site called, “The mosquito ringtone tech-FAQ” published by
(www.tech-faq.com) and began to read the information aloud. He discovered that the
mosquito ringtone was the first secret ringtone and that a secret ringtone is one that is
recorded above 15 kHz. Scott completely skipped over the kilohertz term and did not ask
any questions about it. As he kept reading, he learned about the inventor of the ringtone but was the first student to actually find a definitive answer about why it had been titled the mosquito ringtone. Scott read that the sound of this ringtone is similar to the sound of a swarm of mosquitoes. When I asked him to summarize the information that he found, he said, “that the ringtone attracts mosquitoes to the teens” but this was not what the article had stated. He went back and re-read the sentence and said, “Oh, the sound it creates is like a swarm of mosquitoes.”

Scott also discovered that the mosquito ringtone gained popularity in schools, where cellphones are usually required to be turned off. The mosquito ringtone can usually only be heard by teens and he learned that something that had been developed to annoy teens, was actually very popular with them. Scott then paused and said, “That’s pretty cool.” When I asked him if he was going to start another search, he replied, “Nope, I think that this one gave me everything that I need.” Before returning to the wiki though, he looked at a section in the article about hearing high ringtones and came across the term kilohertz again and told me that he did not know what that was. He decided to conduct another search in order to understand what it was. According to the results of previous research (Bilal, 2002), perhaps it was his increased interest in the question that led to this behaviour. At this point, Scott began working on his final posting.

I have learned that misiquito hearing is a ringtone that when between 15 kHz only people at the age lower than twenty four can hear the sound so that is why most adults cannot hear the misiquito ringtone. So one person copied the noise and put it as a ringtone (Scott, Observation Day 63).

Scott’s response did not demonstrate significant improvement in any of the four areas identified to assess online reading comprehension (Coiro, 2011). His final response was disjointed and similar to his previous postings, and while slightly longer in length,
included some spelling and grammatical errors. Scott had discovered some very interesting details about the mosquito ringtone but did not keep any notes during his online searches and never used the hyper textual links that could have assisted him with definitions of terms, such as kilohertz. Finally, for all of the research questions, it appeared that Scott (like John) was focused on finding the right answer and not concerned with new knowledge creation.

**Student Reflections**

At the completion of the fourth think-aloud session, Scott and I continued on with a brief interview where I asked for his insights into using the iPads since September. He began by telling me how much he also enjoyed the last question about mosquito ringtones because he had never heard of it. I then asked Scott for her opinions about what a good reader does when reading for information on the Internet and without hesitation he said,

“They go to three or four different sources to make sure that the research that they found or the answers that they found are legit or real. Good readers on the Internet also don’t click on the very first link, unless it’s good. I usually read four or five below them to see which one is better.”

When asked to provide me with a rating (on a scale of one to five) about how much he was interested in the fourth research question, Scott said five. He then added that he was going to go home and download the mosquito ring tone onto his own cell phone. Further, he rated himself a four on self-efficacy for the fourth think-aloud. He said that he did not think that anyone could get perfect because there is always some information that is missed. Scott did say that he thought he completed the task well, he researched four or five different sites, and he believed that he finished the task properly.

When asked to provide advice to other students about her thinking processes while reading on the Internet, Scott said that when he’s reading on the Internet he tries to
scan the information to see what is the best and what seems to be fake. Further he stated that,

You don’t want to go to a fake website and find out that you were wrong and end up getting wrong answers. I would also tell them to click more than one site to make sure that the information seems real. Also, if there’s a word they don’t understand when they are reading, they can just click on the word and it should provide them with what it means.

With respect to the differences between reading on the Internet and reading printed text, Scott told me that when reading on the Internet, “you can always look for more information instead of just what’s given to you.” Additionally, Scott told me that the information on the Internet was probably more up-to-date than in a textbook. He did inform me that he preferred reading the hard copy of Between Shades of Gray to the e-book because he likes being able to hold a book and if he dropped it, it would not cost as much as an iPad. However, Scott did tell me that he enjoyed the hyperlinks included in an e-book and the ability to change the font size. He concluded by telling me that he enjoyed participating in the study and that he felt much more comfortable with electronics as a result of using the iPad.

Case Study Six – Addison

In my initial days of observation, Addison appeared to be a very quiet and innocent young girl. She was well dressed but did not stand out among her peers in any
Addison just seemed to be a content student in this class. She rarely participated in class discussions and when called upon by the classroom teacher barely spoke above a whisper. More often than not, her answers were disjointed and I almost thought that she had some sort of speech delay (which was not the case). When discussing my observations with Beth (the classroom teacher), she informed me that Addison’s reading and writing scores fell much below grade level. When I asked Beth for her insights about Addison’s low scores, she expressed concern about her very quiet and almost timid nature. Addison was a very pleasant young lady but her behaviours demonstrated a lack of self-confidence.

Addison comes from a two-parent, middle class family where she is the youngest of three girls. I was also informed that only Addison’s mom is employed outside of the home and her dad is on a disability pension. Prior to participation in this study, Addison had never used an iPad and reported that she used the computer for less than an hour each week. When I asked her what she was doing on the computer for one hour each week, she reported that she usually used the computer to send emails, use instant messaging and/or chat rooms. Addison also informed me that she rarely played interactive video games on the Internet. Addison’s report of how she spends her time on the Internet is reflective of the research about gender differences for online behaviour (Charles & Beavis, 2007).

**Reading Comprehension, Motivation, and Engagement**

The results from the Stanford Diagnostic Reading Test Online revealed pre-test raw scores of 22 out of 30 for vocabulary and 25 out of 54 for reading comprehension. Calculated for grade equivalency, these raw scores revealed that Addison was performing at a grade 5 level vocabulary and a grade 3 level for reading comprehension. The results
of her post-test (December 2012) reading comprehension was 34 out of 54 revealing that Addison was performing at grade 4.2 at the end of the study.

Motivation for reading scores were calculated from the pre- and post-test measures of the MRQ. These results revealed some interesting insights into Addison’s motivation for reading. It is interesting to note that the largest increase in motivation for Addison was her interest in reading challenging and interesting (curious) material scores. Addison also demonstrated a decrease in motivation in almost all other areas. Of particular concern was Addison’s decrease in motivation for the importance of reading. This data suggests that Addison’s motivation for reading declined during the study.

Table 4.6. Percentage differences between pre- and post-test MRQ results for Addison

<table>
<thead>
<tr>
<th>Reading Efficacy</th>
<th>Reading Challenge</th>
<th>Reading Curiosity</th>
<th>Reading Involvement</th>
<th>Reading Importance</th>
<th>Reading Work Avoidance</th>
<th>Competition In Reading</th>
<th>Recognition for Reading</th>
<th>Reading for Grades</th>
<th>Social Reasons for Reading</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>+ 10%</td>
<td>+ 4.2%</td>
<td>0%</td>
<td>- 37.5%</td>
<td>0%</td>
<td>- 8.3%</td>
<td>- 5%</td>
<td>- 6.3%</td>
<td>- 4%</td>
<td>- 5%</td>
</tr>
</tbody>
</table>

Data from the student questionnaire about reading on the Internet revealed that Addison moderately enjoys reading on the Internet and spends most of her computer time using email, instant messenger and/or chat rooms. Addison reported that she spends the least amount of time searching for a topic on a search engine, and playing interactive video games. She expressed that she is very good at understanding what she reads in books and that she believes that her ability to figure out where to go on the Internet to find the information she wants is also very good. In September, Addison reported that most of her reading on the Internet was done at home and that two of her favourite Internet sites were YouTube and Google.

When I approached Alexandra about participating in my study she seemed interested but somewhat hesitant. I explained that she would have the opportunity to work
with me (on an individual basis) to learn how to use them for both her schoolwork and other activities. I also assured her that she would not be graded on any of the activities that we did together and they would not be reported on any of her report cards. Following this debriefing, she was agreeable and reported that she would be comfortable with verbally explaining her thought processes while researching online. Addison demonstrated moderate to high motivation, interest, and comfort with reading on the Internet and reported that she was confident in her ability to read and comprehend information both in printed format and online.

**Thinking Processes while Working on the iPad2**

**Think-aloud Protocol One**

On day 21 of my fieldwork, Addison and I sat down to complete her first think-aloud. As we began to discuss the task, Addison spoke barely above a whisper and I told her that she would need to speak quite a bit louder when she was working on the iPad. After she read the first research question, she posted the following response.

*Figure 5.51 Addison’s First Response on the Class Wiki ([www.wikispaces.com](http://www.wikispaces.com))*

Addison began her first search by typing in, *Are videogames harmful on the eye?* She selected the first site on the webpage entitled, “How Bad Are Videogames on Your Eyes” published by Darkstation ([www.darkstation.com](http://www.darkstation.com)). I observed that this website link was coloured purple as it was previously selected by Scott. When I asked her to explain why she chose this site, Addison said, “Well, it was the first site and it talked about videogames and eyes.” After approximately thirty seconds, Addison told me that the
article stated that if you stare at a videoscreen for too long, you will go blind. At this moment, I peered over her shoulder to look at the screen and observed that she had misread the information presented. Addison continued to read silently for three more minutes and decided that instead of taking notes, she was just going to keep the tab open for future reference. Also, at this time, she reported that the article stated that children could develop lazy eye and that they could go blind from playing videogames. Addison told me that she believed all of this information to be true. When I asked her why she believed this information to be valid, she could not provide me with any reasons. She also told me that when she is reading for information in her schoolwork, she tries to find more than one opinion. At this point, Addison decided to return to her initial page of search results.

*Figure 5.52 Screen Capture of Addison’s Search ([www.darkstation.com](http://www.darkstation.com))*

She then clicked on a Wikipedia site ([www.wikipedia.com](http://www.wikipedia.com)) but was aware that this information is not always reliable. Addison told me, “You can’t always trust the information on there because people can change it all of the time.” After reading the
article for a couple of minutes, Addison decided that the article was not providing her with any of the information that she was looking for and she decided to start a new search.

This time she used the keywords, *Are videogames harmful to the eyes?* I realized that this really was not a new search but waited to see what the result would be. Addison scrolled through the results page very quickly and then selected the first link published by Yahoo ([www.yahoo.com](http://www.yahoo.com)). Once again, Addison told me that Yahoo was only sometimes reliable but that she was going to read it anyways. She did not spend very much time reading the article before returning to the initial search page and clicking on a link entitled, “Are Videogames Bad for Children?” published by Debate ([www.debate.org](http://www.debate.org)).

*Figure 5.53* Screen Capture of Addison’s Second Search ([www.debate.org](http://www.debate.org))

Addison told me that the article did not really provide any information about the harmful effects of videogames but focused more on the effects of specific videogames such as *Call of Duty*, on the brain. She thought this information might be helpful to her when composing her final posting and decided to keep that tab open. I then decided to ask her a few additional questions to help her determine the validity of this site. Addison was able to tell me that the site was published by *Debate.org* and when we discussed the
meaning of debate, she told me that it meant, “Going back and forth on an issue.” After she re-read the article, she told me that maybe this information was not useful in answering the research question.

Addison returned to the results page and clicked on a link entitled, “Negative Effects of Videogames on Eyes” published by Ehow (www.ehow.com). When I asked her if she considered the author of a website to be important, she said yes and informed me that the ‘e’ in Ehow stood for expert. Addison read the article for approximately five minutes and then reported that she had enough information to write her final answer. I noted that while this article provided her with information about the negative effects of videogames, there was also a link to an article about the positive effects of videogames. Addison did not click on that link. She then returned to the class wiki and posted her final response.

I think video games are harmful to the eye because you can go blinded from it. How this happen is when your playing video games you don't blink as much so you get headaches and Dry eyes. Ways you can stop this is by looking away every ten minutens for ten second (Amelia, Observation Day 21).

**Think-aloud Protocol Two**

On day 35, Addison completed the second think-aloud. When she sat down at the desk, she opened the iPad and proceeded to find her way to the class wiki where she read the second question. After reading the question aloud, Addison composed her first response.

*Figure 5.54 Screen Capture of Addison’s Initial Posting on Class Wiki* (www.wikispaces.com)
It took Addison a few minutes to think about what she was going to type into the search engine to begin. She started typing in, *How can high*, then she erased the word high and typed in *How can loud*, then she erased the whole phrase and decided on, *How can high levels of music hurt your ears?* Addison chose to click on the first link entitled, “Hearing Loss and Music” published by the Medline Plus Medical Encyclopaedia (www.nlm.nih.gov) but did not provide any reasoning as to why she chose this site. She read the webpage for approximately two minutes and then told me that the article provided her with some information about loud music and hearing loss but did not specifically refer to the MP3 player. She did state, “I guess I didn’t include the word MP3 in my search.” I noted that actually all the information she required was listed on that page, yet Addison decided that she was going to start a new search.

*Figure 5.55 Screen Capture of Addison’s First Search (www.nlm.nih.gov)*

For her second search, Addison typed in, *How can high levels of music on an MP3 player hurt your ears?* She chose a site published by Ear Info (www.earinfo.com) and told me that this site “sounds pretty good.” I found it interesting that she selected this site based on the publisher and not the title. Only when she clicked on the link did she
realize the title of the article was, “MP3 Players: Are they Damaging Your Hearing Health?” After reading the site for only 30 seconds, she reported some of the information contained in the article and it was obvious that she was only commenting on the various bolded headings in the text. Before leaving the article, Addison told me that the article stated that a person should only listen to an MP3 player at 70% of the volume for 60-90 minutes per day and this would prevent hearing loss when listening to music with earbuds. A few seconds later, she told me that if you listen to music at 50% volume, you can listen for as long as you want without it damaging your hearing. I asked Addison if she knew how music volumes were measured and she did not. I informed her that music volumes are measured in decibel levels and she decided that she would do a search about decibel levels and MP3 players. Again, I noted that the information was located in the article that she had just read but she did not see it.

Rather than begin a new search, Addison decided to revisit the titles of the links on her initial search page. This time she chose an article entitled, “Unawareness: Loud Music Can Damage Your Hearing,” published by Hear It (www.hearit.com). After reading through the article, Addison informed me that next year in Britain, all MP3 players would have a maximum default setting of 85 decibels. However, she did not look at the date of publication to determine if this had already happened. I also observed Addison zooming into the article at various points while reading in order to increase the font size. After a couple more minutes Addison told me that MP3 players could play at volume levels over 100 decibels. She then decided she was going to search for information to determine how high 85 decibels were.
Addison began her next search by typing in, *How loud is 85 decibels?* She immediately clicked on a link titled, “Decibel (Loudness) Comparison Chart” published by [www.gcaudio.com](http://www.gcaudio.com). This brought her to a really nice chart that depicted the sounds of everyday noises (i.e., train whistle) with their corresponding decibel levels. Addison glanced at this chart very quickly before returning to the previous search page. She then clicked on a “Yahoo Answers” ([www.yahooanswers.com](http://www.yahooanswers.com)) site and did not find anything useful. After visiting only two sites, she turned to me and said, “It’s really hard to find any information about this.” We then discussed how she could modify her search to assist her in locating specific information related to decibel levels and MP3 players.

For her next search, she typed in, *How loud is 85 decibels on an MP3 player?* Again, Addison selected the first site that popped up entitled, “It’s A Noisy World We Live In” published by the American Tinnitus Association ([www.ata.com](http://www.ata.com)). As soon as she was linked to the article, Addison zoomed in on the text again to increase the font size. She scanned the article for approximately one minute before she stated, “This one’s giving me information but at the same time it’s telling me something that would sound
like it. Like it says that 85 um, whatever, sounds like average traffic. So, that’s not really helpful.” Following a brief discussion of what she had learned thus far, Addison decided she would conduct another search.

This time she typed in, *How can a teenager listing to music?* I observed that she did not make any attempt to go back and correct her spelling, she just proceeded. She quickly realized that these keywords did not lead her to any useful sites so she modified her search to, *How can a teenager listening to music without hurting there ears?* Addison chose a link entitled, “Teenagers warned iPods can cause hearing loss” published by CBC news ([www.cbc.ca](http://www.cbc.ca)). After reading the article for approximately four minutes, Addison said, “Wow, this really makes you think because you don’t want to lose your hearing.”

*Figure 5.57 Screen Capture of Addison’s Fourth Search ([www.cbc.ca](http://www.cbc.ca))*

At this point, she told me that she had enough information to post her final answer even though she had not taken any notes throughout this think-aloud. After returning to the class wiki, Addison posted the following response,
Hearing Loss can happen from listing to music to loud because teens and adults will listing to music at 100db which over years of doing this your ears will not be able to handle it anymore. Ways to make this not happen is to have your music set at 85db and ever hour take a break (Addison, Observation Day 35).

**Think-aloud Protocol Three**

On day 49, Addison completed the third think-aloud session which was to be completed independently. She expressed her confidence in being able to navigate her way between the class wiki and Safari and also to control the Display Recorder App. She posted the following very brief initial response on the class wiki.

![Figure 5.58 Screen Capture of Addison’s Initial Posting](www.wikispaces.com)

Addison began her first search using the following keywords, *Is it healthy for teens to drink energy drinks?* She chose a site titled, “Energy Drinks and Sport Drinks Rotting Teens’ Teeth” published by Yahoo ([www.shine.yahoo.com](http://www.shine.yahoo.com)). Although this article did not have any information about teen heart health, Addison learned that energy drinks can rot teens’ teeth and said, “That’s not good.” She then returned to her original Google search page and selected another article.

I noticed that she selected an article that was coloured purple, meaning that one of her peers had already chosen it in a previous session. This article was published by MSNBC ([www.msnbc.com](http://www.msnbc.com)) and was titled, “Energy Drinks Can Be Dangerous for Teens.” She soon found some of the negative effects of drinking energy drinks but was scrolling through the article very quickly. Addison chose to return to her initial search page and selected an article entitled, “The Buzz Over Energy Drinks” ([www.npr.com](http://www.npr.com)).
Figure 5.59 Screen Capture and Audio Recording of Addison’s Think-aloud, Observation Day 49

After glancing through the article for approximately one minute, Addison stated that this article told her that teens get an energy boost when they consume these drinks throughout the day. After a total of five minutes spent researching this question, she stated that she was going to create her final post.

Energy drinks are un heathly teen because they have to much cafeine in them and just because teens are drinking too much of they because there saying it help get thought there day. Form the ener gy drinks teen are having strokes and Hart palpitations and death (Addison, Observation Day 49).

Think-aloud Protocol Four

Addison arrived on day 64, the last day of our think-aloud sessions, appearing more confident and happy than I had seen her over the last several months. She was anxious to get started as she had heard from her peers that this was an interesting question. Addison began by visiting the class wiki to read the final question and post her first response.

Figure 5.60 Screen Capture of Addison’s First Posting (www.wikispaces.com)
Addison started by telling me that she was going to search, *What is a mosquito ringtone?* She initially chose a site entitled, “Free mosquito ringtones” ([www.freemosquitoringtones.org](http://www.freemosquitoringtones.org)) but the site was blocked so she returned to her original search. Addison then chose to visit the Wikipedia website ([www.wikipedia.com](http://www.wikipedia.com)). When she could not find the information that she was looking for, she decided to click on a link published by Noise Addicts ([www.noiseaddicts.com](http://www.noiseaddicts.com)) entitled, “Mosquito Ringtone.” She began to read some of the information to me from the article but had great difficulty pronouncing words like ‘emit’ and ‘inaudible’. When I pronounced the word ‘inaudible’ for her, Addison was able to tell me that that it mean that, “They can’t hear it.” Addison then told me that the mosquito ringtone could be heard by teens but not by adults. When I asked her why teens might like this, she said, “I don’t know.”

*Figure 5.61 Screen Capture from Addison’s Initial Search ([www.noiseaddicts.com](http://www.noiseaddicts.com))*

Addison decided to return to her initial search page and look for additional articles. While she was scrolling through the page of links, she said, “I’ve never heard of this, so it’s kind of cool.” She clicked on a link entitled, “The Mosquito Ringtone: This Adult Can Hear It,” a blog by Alec Saunders ([www.saunderslog.com](http://www.saunderslog.com)). After skimming through
this article, she told me that she thought it had something to do with 17 but she was not able to read the word kilohertz.

She returned to the Google search engine to begin a new search, *What age do you stop hearing the mosquito ringtone?* Addison selected another site published by Noise Addicts titled, “Can You Hear Like a Teenager?” She discovered that it is normally over the age of 25 when you cannot hear that ringtone any longer. Addison read the article for two more minutes and then informed me that she had all of the information that she needed to craft her final posting.

Yes I think mosquito ringtones really work because science have found out that at the age of 25 you can stop hearing this ringtone. I think that kids would use this ringtone at school so there teacher wouldn't hear the ringtone (Addison, Observation Day 64).

**Student Reflections**

At the conclusion of the think-aloud session on observation day 64, I sat down with Addison and conducted a brief interview to gain further insight into her reflections as a participant in this research study. She began by telling me how much she also enjoyed the last question about mosquito ringtones because she had never heard of it. I then asked Addison for her opinions about what a good reader does when reading for information on the Internet and without hesitation she said,

They go back and re-read the question first. Then they search the actual question and visit more than one site. Normally, I visit the first link but if there’s nothing in it, I will go look at other ones. I would tell them to stop when they thought they had the right amount of information.

When asked to provide me with a rating (on a scale of one to five) about how much she was interested in the fourth research question, Addison said four. Further, she rated herself a four on self-efficacy for the fourth think-aloud. She said that she was
happy with the information she had found and what she had learned. When asked to provide advice to other students about her thinking processes while reading on the Internet, Addison said that when she’s reading on the Internet she looks at the website to see if it matches what she is looking for and to see if it answers the question. She could not provide any additional information.

With respect to the differences between reading on the Internet and reading printed text, Addison told me that when reading a text book, “It only gives you a certain amount of information and if you wanted more information on the research topic, you might have to go and get more books. With the Internet, the information is all there.” Addison told me that she preferred reading on the Internet and that she has learned to how to read online. She also explained that if she were using books to research a topic, she would stop as soon as she found the answer but by using the Internet, she would search longer. Addison told me that it is more fun to read on the iPad because of its touchscreen interface and because it is faster to find the information that you are looking for on the Internet. Addison concluded by telling me how much she enjoyed being part of the project and also learning about the topics that were presented as research questions for the think-aloud sessions.

**Combined Stanford Diagnostic Reading Test Results**

The Stanford Diagnostic Reading Test Online was administered at the beginning of the study to pre-assess the students reading comprehension and to place them in the proficient or struggling reading group. The test was administered again at the end of the study to assess any changes in reading comprehension that may have occurred as a result of participating in this study. Analysis of this data revealed a significant difference
between the two reading groups $F(1,4) = 19.31, p < 0.05$. The proficient readers displayed a mean grade level of 10.27 while the struggling readers performed at a 3.75 grade level. No other difference including pre- versus post-scores were statistically significant.

**Combined MRQ Results**

As previously stated, motivation and engagement scores were calculated from the MRQ which indicates student motivation for reading. When comparing the pre- and post-scores for all students, several differences were found. A paired t-test for the three proficient readers revealed a significant increase in motivation for reading following the think-aloud sessions; $t(2) = -13.04, p < 0.05$. When individual questions on the MRQ were considered, reading involvement ($t(2) = -10.00, p < 0.05$) and reading competition were also found to significantly increase in the proficient readers. No other group differences were significant including those for the struggling readers.

**Online Reading Comprehension and Assessment**

Using Coiro’s (2011) framework for the assessment of online reading comprehension, I evaluated participating students’ abilities in each of the following four areas: reading to locate; reading to evaluate; reading to synthesize; and reading to communicate. In his responses, Joshua demonstrated the qualities of a proficient reader (Lewis, 2000) while deconstructing the technological texts. He was able to search for alternative theories to corroborate his suppositions concerning eyestrain, in online text form. In his research, Joshua ascertained that other factors could contribute to eyestrain such as age and genetics. In this way, he went beyond the assigned task and extended his understanding of the problem. With the ongoing integration of technology in literacy
education, the sophisticated skills of critical thinking and self-reflection that he exhibited will become even more important (Pacino & Noftle, 2011).

In case study two, Alexandra demonstrated that she was able to read information online in order to locate and to conduct some cursory evaluation of the websites that were visited (Coiro, 2011). She was not able to evaluate the author’s level of expertise or point of view. Alexandra was able to evaluate the reliability of information that she researched with a logical explanation and evidence of her decision. Unfortunately, Alexandra only visited two websites and exclusively used the information from one of the sites to compose her final answer. She did not appear to engage in any of the sophisticated skills of critical thinking and self-reflection that are necessary for proficient readers (Lewis, 2000). She was able to read and write to communicate her findings but was unable to provide a definitive answer to the research question. In her final response, Alexandra stated, “To be honest I found some of the websites that said video games are good for you didn't really back up their answer,” but did not explore this finding. After observing her during this think-aloud session, I am not sure that she was able to make this claim based on the limited information that she read. Also, in her posting, Alexandra stated that her opinion of video games had changed because of the information that she read on different websites. This is interesting since she actually only visited two sites and focused on conceptual structures rather than detail.

Additionally, Joshua was able to identify the authors of the various websites he selected and evaluate the author’s point of view. He was able to discern the bias that a supplier of videogames may have related to eyestrain. Here, he demonstrated his ability to evaluate the validity of the online information presented with thoughtful explanation
and evidence (Coiro, 2011). Joshua also demonstrated his ability to synthesize information from multiple websites and draw relevant conclusions. He made a claim that playing videogames could actually be beneficial and provided evidence to support this assertion. Further, he determined possible causes and ways to reduce eyestrain by combining information from multiple sources. By posting a final response to the research question, Joshua demonstrated his ability to read, write, and communicate his findings to his intended audience; skills necessary for 21st century citizenship (Pacino & Noftle, 2011).

It is evident that throughout the study, Joshua and Alexandra continued to develop their proficiency in each of the four areas. As evidenced by his thought processes, Joshua was skilled at determining keywords that might lead him to the information required; effectively scanned the information provided and self-monitored to determine if the material presented was useful in answering his questions. Alexandra demonstrated improvement in her ability to read to locate and her ability to synthesize information from the first think-aloud session. Further, Joshua’s ability to identify reputable authors and reliable online information (evaluation) and his ability to integrate information across a number of websites and make assertions based on sound research (synthesis) are similar to the traditional tasks that students are confronted with when working with printed material (Coiro, 2011). However, one of the significant differences between reading and processing online and printed information is the amount of information that is readily available on the Internet.

As evidenced by Joshua’s thinking, learners in the 21st century will not only require the reading behaviours of proficient readers but will also require the ability to
critically and quickly discern reliable sources from the vast number of Internet sites available to them (Coiro, 2011). Compared to the first think-aloud session, Joshua completed the task more quickly but with the same depth of analysis, perhaps due to his prior knowledge and expectation of the task. This confirms the findings of Cromley and Azevedo (2009) who found that increased prior knowledge does lead to increased speed in locating information within extended hypermedia. However, my observations of Alexandra and the recording of the third think-aloud session confirmed that she still continued to scan information very quickly which led to the omission of some important information. Also, Alexandra frequently visited websites that were created by user-generated content (i.e., Answers) to provide the answers to her questions. During this third think-aloud, I did not observe any evidence of reading to evaluate and the higher levels of critical analysis and metacognitive awareness that allowed her to gather and integrate information from four distinct websites.

Her response also demonstrated her ability to read and write to communicate for a particular audience (Coiro, 2011). In her answer, she provided evidence of her own experience and opinions (i.e., “Run off your own steam…”), and it was written to address her peers. While she did answer the initial research question, she did not provide any supporting evidence from the material that she read. In addition, she visited a number of sites but did not engage in the deep reading skills that have been demonstrated by proficient readers (Wolf & Barzillai, 2009). It is also important to note that Alexandra did not evaluate the reliability of any of the websites that she visited. Interestingly, Alexandra’s final posting for the fourth question was comprehensive and included evidence from each of the four areas of the online reading comprehension assessment as
outlined by Coiro (2011). Specifically, she was able to read to locate, evaluate, and synthesize information from a number of websites. While her writing still contains some spelling and grammatical errors, she was able to craft and communicate a response that was reflective of her new knowledge.

Mary and John did not engage in any of the metacognitive skills of questioning and answering that have been identified in the reading comprehension literature to be one of the most effective comprehension strategies used by skilled readers (Kamil, 2003; Raphael & Pearson, 1985). They were both able to evaluate some of the websites they visited by locating the author and providing evidence for the reputability of the article. Finally, as demonstrated by their final posts, Mary and John continued to develop their ability to craft a final response based on the information gathered and for a specific audience (Coiro, 2011).

Using Coiro’s (2011) framework as a measure of successful online reading comprehension, it was evident that Scott continued to improve in his ability to read to locate and had engaged in some premeditated thought before beginning his first search. Both my observations of Scott and the recording of the final session confirmed that he still continued to scan information very quickly which led to the omission of some important information. Also, Scott chose to only visit two websites for the fourth question and seemed anxious to find the answer and finish the task. During this think-aloud, I did not observe any evidence of reading to evaluate and the higher levels of critical analysis and metacognitive awareness that allowed him to gather and integrate information from four different websites. In fact, on two separate occasions during the
last think-aloud, I had to prompt Scott with questions that allowed him to reconsider his online search and perhaps look for additional information.
Chapter Five

From Offline to Online: Individual Paths to Engagement

Introduction

In chapter 4, I presented the stories of each of the six participants, including the challenges they faced as they navigated their online world. At the conclusion of each of the case studies, I summarized the reflections of each of the students with respect to their experiences as participants of this study and I was surprised by their insights regarding the differences between the offline and online environment. In this chapter, I highlight each student’s path to online engagement and their thought processes as they conducted online research, using themes that emerged from my analysis in chapter 4. These themes include: student motivation and engagement for online reading tasks; online reading comprehension and assessment; metacognition and web searching; critical and intensive online reading and learning. Drawing upon what I have learned from these students, I offer a framework for online literacy engagement to build research potential. I conclude with implications for teaching practice and future directions for research.

Student Motivation and Engagement for Online Reading Tasks

One of the greatest predictors of student success is student engagement and motivation for reading (Gambrell, 2011). The results of this study demonstrated that increased motivation and engagement for online reading tasks led to better search results and understanding of online material. Specifically, Joshua demonstrated high interest for all tasks assigned and this engagement with the topic led to increased motivation to find not only the answer to the original question but also the answers to his own questions. In comparison, Mary and Scott’s lower levels of engagement with three of the research
questions resulted in decreased motivation, very quick think-aloud sessions, and disjointed responses.

It is widely recognized that an engaged reader is one who is intrinsically motivated to read for their own personal goals, employs a variety of strategies while reading, and monitors their understanding of new text (Gambrell, 2011). The results of this study revealed that the same skills are essential when reading online text. In particular, students in this study who had a personal interest in the topic were more likely to be engaged in strategies while reading online, to monitor their own understanding, and develop a more comprehensive understanding of the topic, which they could then communicate to their peers.

**Online tasks.**

Another important factor contributing to student motivation and engagement that was identified in this study was interest in the actual online task. After recognizing the similarity in their positive responses toward the mosquito ringtone research question, I noted that interest in a topic might play a significant role in their motivation to complete the tasks assigned in this study. Specifically, during the fourth think-aloud protocol, Mary experienced a sudden switch in mood after reading the research question. She was interested in the topic and as a result, delved deeper into the topic than she had during the previous tasks.

The six students who participated in this study demonstrated different online behaviours depending on their own interest in the research question assigned. Specifically, all six students were interested in the mosquito ringtone question and therefore they continued their online research for longer periods of time and in more detail than for
some of the other questions. The only student who demonstrated interest in all questions was Joshua and this was evidenced by his search results and his ability to communicate his new knowledge.

While Mary had no trouble identifying the keywords that she used in her initial search in the first think-aloud session, she struggled after reading the first set of articles that she selected. I had to prompt her with questions to re-engage her with the task and it was obvious that she wanted to complete the task as quickly as she could. Further, even with my prompts, Mary did not want to do any more research than was required to find the answer. Similar behaviour was exhibited by Mary for the subsequent two think-alouds. When charged with completing the third think-aloud independently, Mary completed the task in only 25 minutes. Similarly, during the first think-aloud, Scott demonstrated his interest only in finding the right answer when he typed his keyword search into the search bar of the article that he selected. This indicated to me that Scott was only focused on finding the specific information he was looking for and not interested in potentially gaining additional information related to the topic. Additionally, Scott spent the least amount of time completing the third (independent) think-aloud. After reviewing his recording, I noted that he only spent 15 minutes completing his research, including the posting of his final answer to the class wiki. This behaviour lends validity to the research that has found that the meaningfulness of the task has a great influence on the task results (Bilal, 2002; Schacter, Chung, & Door, 1998). In addition, these results emphasize the need for future research to consider the difficulty, authenticity, and motivation factors for the online tasks being presented to learners.
**Summary of student online research behaviours.**

In all cases and for each of the online reading comprehension assessment measures as defined by Coiro (2011), Joshua was the only student who consistently demonstrated the qualities of a proficient reader. Specifically, his abilities in reading to locate, evaluate, synthesize, and communicate were stronger than any of his peers. It should be noted though that his online posts still contained spelling errors. Further, the only time that Joshua appeared to skim the online information too quickly was during the third think-aloud. When searching for the amount of caffeine in an energy drink (higher level critical analysis), he failed to realize that the information he was looking for was already included in the article he was reading and he began another online search.

Alexandra, Mary, John, Scott, and Addison demonstrated various stages of progress in their online reading comprehension. Specifically, Alexandra was able to read to locate and do some superficial evaluation of online material; yet, she scanned the online information too quickly and rarely read an online article in its entirety. I also observed this same behaviour with John, Scott, and Addison and often this skimming behaviour led to the omission of important information. Rarely did I observe Mary, Scott, or Addison engaging in research behaviour indicative of higher levels of critical analysis. Often, it appeared that these students were searching the articles for the right answer and frequently judged a website based on its appearance; I did not observe this in Joshua’s think-alouds. Additionally, none of the six students had any difficulty selecting words for their initial keyword search. It is interesting, that although Mary knew to keep her keyword searches to as few words as possible to produce better results, this did not actually lead to improved search results for her. Joshua and John had the most success
with their keyword searches and it is interesting that they are the two students who reported spending the most time on the Internet exploring various web pages outside of school hours.

**Metacognition and Web Searching**

Joshua clearly engaged in metacognitive strategies while completing his online research. Very early, while researching the first question, he began to ask himself deeper questions such as, “I wonder if computers or television are worse for eyestrain,” as he was reading the articles that he found. Also, when reading information about video games published by *Halo*, Joshua decided that he could not trust their opinion since they were a company that produced video games. Joshua exhibited the metacognitive strategies of reading, questioning, determining the usefulness of information that he located to answer the research question. Additionally, Joshua did not appear to judge the validity of a website based on its attractiveness and/or format. That is, he was more interested in determining the author of the site and whether the information seemed valid.

Many researchers (Afflerbach & Cho, 2009; Coiro, 2007; Leu, Kinzer, Coiro & Cammack, 2004) have suggested that a reader’s level of metacognitive awareness will promote the development of deeper understanding of the texts they come across on the Internet. While this may not be a problem for students like Joshua, it certainly was a problem for at least three of the students in this study and consideration of the implications for students who struggle with reading is warranted. It is possible that this new medium could reach more students than traditional literacy methods, or could complicate things further.
When asked to determine a website’s reputability in the first think-aloud, Alexandra quickly scrolled through the article to determine whether the article was written with user-generated content (FitzGerald, 2012) and used this as the measure of its reliability. Also, while reading information from her search, I observed that she did not read any of the articles at length rather; she spent more time looking for the keywords from her search. At one point in her online research, Alexandra stated, “Some of the information is talking about how video games give wrong values to kids” and determined that this was not the information that she needed for her research. This statement reflects the metacognitive processes that Alexandra was engaging in when reading online.

In her second, third, and fourth think-aloud sessions, Alexandra engaged in additional higher-order thinking skills. Specifically, she demonstrated her ability to delve deeper into a subject during her second think-aloud when she decided that it would be important to find out how many hours you would have to listen to an MP3 player for hearing damage to occur. In the third session, she adjusted her keywords in the hopes of producing better search results and in the last session, she looked for information such as the definition of kilohertz to improve her understanding. These are just a few of the examples of the metacognitive strategies that are required by students working in an online environment.

In his first think-aloud session, Scott determined that a website was reputable because it included a large picture of a young boy playing with a Nintendo DS. Scott based his decision on the picture first and then looked at the title, content, and publisher of the article in considering its validity. In particular, I noticed that Scott made a decision about a website during the first think-aloud session when he stated, “This must be good;
here’s a picture of a kid playing videogames.” Also, during the fourth session, Scott was the only one of the six participants to watch a YouTube video about mosquito ringtones demonstrating his preference to watch something rather than read something. I also noted in my field observations that Addison would quickly leave sites that were laden with content and/or did not include many graphics.

Burke (2002) has speculated that students’ questions are a key factor in their ability to learn to read digital text and provides direction for their searches. Further, Burke stated, “Students must learn to ask themselves continually what it is they want to know what is the purpose of knowing it, and what sort of information can contribute to that purpose. Such questions give direction to reading Web sites” (p. 40). This metacognitive strategy has proven successful for learners as they determine the usefulness of what they are reading with what they already know and might prevent students from getting lost on the Internet (Farwick Owens, Hester, & Teale, 2002).

Of the six students, John most frequently engaged in rapid clicking behaviour while conducting his online searches. Several times I observed him clicking on a site, then skimming the article very quickly before clicking onto another site. This rapid clicking of links did not seem deliberate, rather it seemed as though he was searching for the right answer as quickly as possible. This insight into John’s activities on the Web is consistent with the findings reported by Tapscott (1998), who stated that, “It’s not just point and click. It’s point, read, think, and click” (p. 63). According to Coiro (2008), links on a web page act as decision points for the online reader and “…the development of valid and meaningful knowledge assumes that students are actively involved in the learning process, that they construct knowledge by connecting new information to
already acquired knowledge, and that they reflect on this process and its results” (Kuiper & Volman, 2011, p. 261). I did not observe John engaging in any of these behaviours during this session and noted that his research process during this session seemed quite confused.

In the online environment, students must constantly question what they are reading, if they understand it, and if it relates to what they want to know; behaviours consistently demonstrated by Joshua. One of the most innovative aspects of tablet technology is the ease with which a student can access definitions of words using hypertextual links, which could assist with their understanding of online text. I did not observe one student who clicked on a hyperlink for assistance with a definition or to improve their understanding. Alexandra and Addison were the only students in this study that chose to begin new searches when they came across terms like kilohertz that they did not understand. Also, Mary was the only one who used any of the online tools, Reader, to view the text in a format with all advertisements removed. All of the students’ online reading behaviours in the think-aloud sessions, were consistent with research (MacArthur & Haynes, 1995) that has demonstrated students’ underutilization of the vocabulary links provided in digital novels even when the learners considered them to be useful.

Some researchers have suggested that encouraging students to access these vocabulary hyperlinks could interrupt the flow of reading comprehension (Dalton & Proctor, 2008). However, the results of this study demonstrated that with the exception of Joshua, students skimmed and read the articles so quickly; they were not engaging in sustained reading so risk of interrupting the flow of comprehension was minimal. The hyper textual glossary along with text-to-speech (TTS), and other reading supports have
supported struggling readers (Higgins & Boone, 1996; Horney & Anderson-Inman, 1994; MacArthur & Haynes, 1995). However, in my research not all students accessed these resources as they read online.

In addition, reading comprehension can be negatively affected when students like Mary and Addison do not conceive of a plan for their online research. After reading the assigned research question, Mary and Addison quickly moved to the Google search engine and began their searches with variations of the original question. Unlike Joshua, John, or Scott who told me in their think-alouds what their research plan was, Mary and Addison gave this very little consideration, which resulted in some disjointed and repetitive results.

Researchers who have investigated children’s web-search behavior have frequently seen this unsystematic decision-making. Specifically, Fidel et al., (1999) found that children search the web quickly and unsystematically and did not feel the need to plan ahead. Rather, their search would be determined by what they saw online and they would frequently hover over a few familiar sites. Kuiper and Volman’s (2008) review of children’s web-search behaviour revealed that learners of all ages tend to conduct searches on the Internet that are scattered and quick.

**Critical and Intensive Online Reading**

In the four think-aloud sessions, Joshua has clearly demonstrated himself to be a proficient reader with both printed and digital text. He was equally engaged and motivated to answer all four of the research questions presented to him and engaged in a number of the reading processes that research has demonstrated necessary for the online environment of the 21st century. Specifically, Joshua actively engaged in
the construction of meaning as he read, analyzed, and questioned the online material presented (Wolf & Barzillai, 2009), learning “to build knowledge and go beyond the wisdom of the author to think their own thoughts” (p. 34). While expert readers are able to quickly execute the cognitive functions that lead to improved reading comprehension, Wolf has suggested that the young brain requires more time to perform these sophisticated processes. Yet, as seen from the results of this study, digital learners have come to rely on the immediacy and flexibility of the Internet and often expect to find the answers to their questions very quickly. Like Mary, Scott, and Addison, many learners are not prepared to engage in the sustained reading that is required to develop critical literacy skills. In fact, much of the “snatch and grab” research activity and online reading carried out by these students is indicative of the online activity of today’s learners as a result of being exposed to new media and especially video games (Abersek, 2012). It is important to note that of all six students in the study, Joshua, a self-proclaimed ‘gamer’, was the student who reported the most time spent on a computer after school hours, yet, completed all think-alouds with the greatest proficiency.

Greenfield (2009) has identified basic visual literacy, divided attention, and multitasking as three positive changes in human brains as a result of this new media exposure. In fact, Mary, John, Shawn, Addison, and to a lesser extent Alexandra, part of the new generation of “homo zappiens” (Veen & Vrakking, 2006), showed in their think-alouds that they do not read in a linear fashion. Instead, they read only those paragraphs or bits of information that were most relevant to their keywords (Abersek, 2012, p. 68). However, when skimming articles and using the “snatch and grab” techniques, Mary, John, Shawn, and Addison were not able to engage in critical and intensive online
reading. With the exception of the last research question (mosquito ringtone), these students were clearly more interested in finding the right answer and completing the task as quickly as possible.

In this study, Alexandra, Mary, John, Shawn, and Addison rarely assessed the reliability and reputability of the information found on the Web and tended to stop searching when they thought they had found sufficient information for the research question or became bored with the activity (Agosto, 2002). From the recorded think-alouds, it is not clear whether these students lacked the necessary research skills to use the information they located on the Internet (Hirsh, 1999; Shenton & Dixon, 2003) and/or were unable to assess and evaluate the content they were reading (Kuiper & Volman, 2011). In any case, this inability to assess the reliability and reputability of information led to omissions in information and more poorly written final answers on the class wiki.

Further, while researching the first assigned question, John quickly got lost when navigating from Google to the class wiki and then back to Google. In this way, John was unable to orient himself in a non-linear and interactive three-dimensional space in order to return to his previous location; a skill that is thought to be required for comprehending digital text (Coiro & Dobler, 2007). As aptly expressed by Laurillard (1998), “The paradox of interactive media is that being a user-control medium the learner expects to have control and yet the learner does not know enough to be given full control” (p. 231). While this is not dissimilar to flipping through the pages of printed text to locate a piece of information, the interactive and non-linear features of the Internet could add a significant dimension of complexity for the struggling reader as it did in this instance for John.
Essential Skills for Online Learning

Joshua’s research during the second think-aloud activity highlighted his proficiency with many of the online reading strategies discussed thus far. One seemingly necessary process that emerged from the results of this study was the importance of taking notes while conducting online research. Out of the six students, only Joshua and Alexandra kept notes during their research. As a result, they were more successful in communicating their final answers to the four research questions and I wondered if note-taking might present itself as a key component to successful online research. Since students working in an online environment must deal with vast amounts of information and require a strategy to assist them in organizing the information that is most valuable to their question(s). As demonstrated by Mary when she could not locate the information about the origin of the ringtone, there is simply too much material available on the Internet and learners must be provided with tools that will assist them to keep track of their new knowledge.

Another essential tool for online research that emerged from this study is the importance of selecting appropriate keywords for their searches. Joshua and Alexandra were quite adept at choosing the most appropriate keywords for their searches; Mary knew that it was important to reduce the number of keywords to get better results; and others like John, Scott, and Addison typed in the whole question in the hopes of finding their answers. This online behaviour is consistent with the results of research conducted by Fidel et al., (1999), and Large and Beheshti (2000), who found that students ranging in age from 12 - 18 had great difficulty selecting keywords and preferred to browse. Kuiper and Volman (2008) have suggested that creating student assignments that are specific and
concrete might assist with the formulation of keywords. In particular, Shawn and
Addison conducted their searches with a determination in finding the right answer and
very little interest in gaining new knowledge.

Also, in an effort to complete their assignment quickly, Scott and Addison
frequently changed their searches to match the exact question they were looking for
(Fidel et al., 1999). In the three think-aloud sessions, Scott and Addison rarely compiled
information from a variety of websites to arrive at their own answer. Rather, their online
researching activity demonstrated that they were most often seeking that one right answer
on one specific website. This search strategy displayed by Scott and Addison showed that
when learners are searching for specific information, they focus on finding one specific
answer rather than collecting a variety of sources and deducing an answer which could
provide a more comprehensive understanding (Bilal, 2001).

Results from this study revealed that students are not necessarily prepared to
conduct research online independently without guidance from the teacher; that students
must be given strategies to evaluate and keep track of the volume of information they are
presented with on the World Wide Web; and most importantly students must be provided
with a context where they are encouraged to find answers to deepen their understanding
of their own questions. In particular, the results of this study clearly demonstrate the need
for continued literacy instruction in the areas discussed with the goal of developing best
practices that will support today’s learners in navigating the reality of their online world.

**Gender differences.**

In this digital world, some have suggested that the Internet is biased toward the
interests and attitudes of males (Bimber, 2000). Survey research has demonstrated that
more men than women use the Internet and one explanation for this difference may be related to socioeconomic status. Specifically, Bimber (2000) has suggested that increased Internet activity is associated with higher education, income, and career status; areas that remain dominated by men. In addition, cultural identity studies have revealed that the use of computer technology may be viewed as more appropriate for males than females; a notion that continues to be perpetuated today (Ingeborg, & Plomp, 1997).

In my research, Joshua, John, and Scott reported spending more time on the Internet than Alexandra, Mary, and Addison outside of school hours. The results of the questionnaire about Internet use also illustrated some important differences in the use of technology between the males and females in this study. In particular, the girls in this study reported that they spent most of their time on the computer interacting on social networking spaces. However, all three girls reported that they only spent approximately one hour per week on their home computers and spent the majority of their free time talking to friends on the phone and text messaging. The boys on the other hand, reported gaming and researching to be their two top activities and all reported spending three or more hours per week at home on the computer. This information supports the findings of Cooper and Weaver (2003), who stated that as the social needs of adolescent girls increase, time spent on the computer lessens because it no longer serves their social needs. However, Alexandra, Mary, and Addison all reported spending time on the Internet for social networking. Since social networking is no longer limited to the use of a computer and can be accomplished using almost any mobile device, adolescent girls may spend less time on an actual computer but spend the same or more time on the Internet.
Some have suggested that the differences in male and female use of computers are a result of their attitude toward technology (Solomonidou & Mitsaki, 2009). In the late elementary school years, it has been reported that girls enjoy using the computer more than boys but this trend shifts from middle school and beyond (Christensen, Knezek, & Overall, 2005). In particular, girls begin to view computers as a machine to assist them in completing work, send emails, and socialize while boys want to be entertained and to ‘dominate’ the computer (Charles & Beavis, 2007). The results of the MRQ data from this study are consistent with these findings. However, the results of this study also demonstrated that both genders were equally effective in navigating their way in the online environment.

**From Offline to Online – Implications for Practice**

One of the most interesting findings of this research was the fact that only the three proficient readers, Joshua, Mary, and Scott demonstrated a statistically significant increase in their motivation for reading by the end of the study based on the combined MRQ results reported in the previous chapter. These findings have significant implications for practice and in particular, it would appear that even in the digital world, the “rich get richer” with respect to motivation for reading online (Stanovich, 1986). That is, those students who already had post-high school scores for reading comprehension at the onset of the study demonstrated increased motivation and engagement for reading online at the end of the study. This increased motivation and engagement might lead to increased online reading which could continue to improve their reading comprehension. This cyclical trend is known as the “Matthew Effect” (Walberg & Tsai, 1983) and has
been used by Stanovich (1986) to describe individual differences in literacy acquisition.

The theory according to Walberg and Tsai (1983), states that,

Those who did well at the start may have been more often, or more intensively, rewarded for their early accomplishments; early intellectual and motivational capital may grow for longer periods and at greater rates; and large funds and continuing high growth rates of information and motivation may be more intensely rewarded (p. 92).

This finding has important implications for education. It is a largely held belief that technology could provide the motivating hook for many students who struggle with literacy (Northrop & Killeen, 2013). However, the results of this research would suggest that students are able to make gains in reading comprehension even when their motivation for reading does not show demonstrable gains. In this study, the struggling readers, Alexandra, John, and Addison did in fact show an increase in reading comprehension despite showing not increase in motivation according to the MRQ. It is important to remember that MRQ is only one test and that in all of their reflections; all three struggling readers expressed their enthusiasm and engagement with working on the iPads. Perhaps a new questionnaire needs to be developed for online reading motivation and engagement.

This might also suggest that there are other features of technology (i.e., portability, real-time learning, speech-to-text, touch screen interface) that assist with gains in reading comprehension and that motivation for reading is only one of many key components to achieving this success. In addition, at the beginning of this study, participants received one-to-one instruction related to Internet navigation and use of the class wiki on the iPad. This individualized attention could have also contributed to the results of this investigation and should be considered for classroom practice.
One unique feature of the iPad is the numerous Applications that are available as educational tools. One specific Application called *Show Me*, allows a teacher to provide individualized instruction based on the learner’s needs and that a student is able to watch and listen to as often as necessary. In this way, the iPad acts as a wonderful tool for differentiated instruction. Also, by using the *Dropbox* Application on the iPad, students can send their work electronically to their teacher who can then provide feedback either in a written and/or audio format.

Results of this research clearly demonstrate the need for educators to continue to instruct students using best practices for literacy instruction when supporting them in the digital world. Although the medium has changed, the results of this research show that the skills required by students to read, research, and comprehend online material have not changed. In fact, they have been shown to be essential abilities for students in navigating the volumes of information available to them on the World Wide Web. These findings are consistent with research by Wallace, Kupperman, and Krajcik (2000) who concluded that, “the Web is not a magic bullet: It matters what students are asked to do and how tools and techniques to accomplish these tasks are provided” (p. 97). Specifically, educators need to provide their students with tangible processes for navigating the online world including creativity, collaboration, communication, and critical thinking (Trilling & Fadel, 2009). With these factors in mind, I am suggesting a four-stage, gradual release of responsibility model (Duke & Pearson, 2002) that begins with educators modeling online navigation for students in a traditional face-to-face approach and moves toward students working independently; faces-to-screens.
In the first stage, only the teacher would have access to a computer and/or iPad and through the use of a data projector, would model a think-aloud for their students, as was completed in this study. This would allow the teacher to model the metacognitive and web searching skills that are essential to working in this milieu. In the second stage, all students would use their individual iPads to work collaboratively with the teacher on a specific research question. Again, during this phase, teacher and students work together to determine validity of websites, note-taking skills, and critical thinking skills, to name just a few. The third stage would involve the teacher working with small groups of students on specific research skills they require assistance with such as, refining keywords to produce better search results. Finally, in the fourth stage, students would work independently on their online task. Recently, this framework was also suggested as an effective approach when teaching students to use Apps on the iPad (Northrop & Killeen, 2013). Despite resistance, this must be the model that we strive to implement; a model that will foster the educational context where students investigate their own concerns in authentic research, work collaboratively with their classmates to solve problems and think critically, and finally, communicate their new understandings using their own voice.

Current teacher education programs should strive to more effectively integrate technology into their literacy curriculum. In addition, teacher education programs must continue to emphasize a constructivist perspective where the key role of teachers today is to provide students with authentic learning environments and support them in the process of their learning (Kuiper & Volman, 2008). By accepting and practicing this constructivist pedagogy, teachers will foster the development of individual and
collaborative student constructed knowledge (Kuiper & Volman, 2008). Collaborating with peers allows students to enhance their understanding and gain critical thinking skills since they must take an active role in explaining their ideas to their classmates and/or comparing multiple perspectives (Bransford, Brown, & Cocking, 1999). Although students in this study worked independently, it would be interesting to see how they might work together in a learning community to answer the same research questions.

Also, more work must be done to move students away from the idea that the right answer must be found for the teacher. Instead, educators need to move students toward finding the answers to their own authentic questions, using planned out searches, which in itself will result in greater motivation and engagement in the research process. As stated by Watson (2001),

There is a real danger that a fundamental purpose of schooling, to learn to know, is being swept aside by the need to acquire information. Where do the pupils learn the wisdom of how to use the information and how to challenge its assumption and sources – indeed the very hegemony of ‘Information’ (p. 256).

In light of Joshua, John, and Scott’s planned out searches, systematic behaviour and success in locating information, it would appear that this process should be taught to students before moving them onto an online environment to conduct their research and is similar to the strategies that are taught when working in a print environment. All of these factors are important considerations for the current education system and especially for those who struggle with literacy.

Further, today’s students require additional instruction in and practice with critical digital literacy skills. While the ability to assess and evaluate web content is an essential skill for today’s learners, many studies (Agosto, 2002; Fidel et al., 1999; Hirsh, 1999; Shenton & Dixon, 2003) have shown that students did not evaluate web sites based on
content, rather, they used inappropriate measures such as the amount of text on a page and the appearance of graphics. In a study conducted with eighth-grade students, Watson (1998), also found that download time factored into student decisions when choosing websites. Similarly, Agosto (2002) found that websites that were more attractive and included more pictures were evaluated more positively by students and held their attention for longer periods of time.

Perhaps this will become an important point of consideration for learners in today’s classrooms. That is, if a student decides that a website is reputable solely based on its format and does not take the time to read to evaluate for reliability and author’s level of expertise, questions related to critical analysis of media literacy become significant. Further, it is possible that this type of online evaluation may perpetuate what critics have referred to as, “an environment that promotes cursory reading, hurried and distracted thinking, and superficial learning” (Abersek, 2012). The question remains then, how can critical and intensive reading be encouraged in an online environment and what are the skills that will need to be fostered in today’s learners to ensure the depth of comprehension and critical analysis skills required in this global economy?

Finally, a curriculum for Internet use must be developed and introduced to teachers at the pre-service level (Frechette, 2002). Although teachers currently entering the program have grown up with technology, a framework for the successful integration of technology into the classroom does not exist. To date, many articles and books are available to assist practicing teachers but until the curriculum is modified and a framework provided, inequities in practice will continue in classrooms provincially, nationally, and globally. According to Fullan (2012), “…these innovations must not
further complicate the lives of teachers and students but make learning easier and more interesting” (p. 33). As clearly demonstrated by the current results, it is not sufficient to simply have teachers’ hand over the iPads to their students without modeling and supporting their use. Further, this research showed the effectiveness of student think-alouds to assess online research skills and reading comprehension. This suggests that this approach could be an important addition to the literacy curriculum.

A first step could be the purchase of various forms of mobile technology for all incoming pre-service teachers. This would allow professors to model the face-to-faces, faces-to-screens progression with their teacher candidates. Once practicing, these new teachers could then begin the slow transformation that would result in full integration of tablet technology into the classroom. In essence, teacher education programs and teacher education curriculum, needs to evolve in the same manner as the classrooms they will enter. The results of these modifications could then be used to improve the curriculum of teacher education programs globally.

As explained by Mouza and Karchmer-Klein (2013), the need for ongoing professional development in learning to teach with technology is paramount for educators. The instability of technology requires that teachers need to be made explicitly aware of the constant changes to both the hardware and software applications. In addition, teaching with technology is a complex process and involves the interaction between content, pedagogy and technology (Koehler & Mishra, 2008). This new and distinct knowledge of the integration of technology into teaching has been named the Technological Pedagogical Content Knowledge (TPACK) (Angeli & Valanides, 2009; Mishra & Koheler, 2006; Mouza & Karchmer-Klein, 2013). Further, Mouza and Karchmer-Klein
found case development that integrated the elements of TPACK was an effective way for pre-service teachers to draw connections between content, pedagogy, and technology and improve their TPACK. This model offers a promising beginning point for those designing and delivering pre-service curriculum.

For those already practicing, sporadic professional development sessions are not enough. Rather, I am suggesting that school boards employ a number of technology curriculum specialists who could work with teachers individually and support them in their learning as they integrate new technologies into the existing curriculum and into their classrooms. As stated in a recent Ontario Ministry of Education (2012) document, an important goal of our educational system should be, “Building digital citizenship capacity for collaboration, skilled communication, and critical thinking; problem solving and innovation and awareness of healthy use of technology and issues of safety” (p. 6). I believe this goal should be applied to all levels of education.

**Methodological Limitations.**

It is important to acknowledge several inherent limitations in the methods utilized for this study. The use of the repeated case study approach allows for in depth examination of several individuals but limits the ability to generalize the result to a broader population of students. Future studies could address this concern by considering larger samples selected from various classroom, at different schools, and in different regions of the province or country.

Another concern is the potential confound of my direct interaction with my subjects. While not intended, it is important to acknowledge that subtle non-verbal cues emitted during the think aloud process may have influenced the students’ responses and
my results. I attempted to limit this by following a pre-determined script but the think aloud methodology allows for follow up questions and discussion which by definition will vary from subject to subject. In addition, I was unable to account for the influence of the teacher in the classroom, as I did not include any anecdotal observations or other measures of her classroom practice in this study.

A third limitation deals with testing measures and specifically the MRQ, which was a pencil and paper test. This questionnaire may not have accurately captured students’ true motivation and engagement especially given the short time frame from pre-test (September) to post-test (December). Future studies could include a modified online version of this test with questions related specifically to motivation for online reading and over a longer time frame.

It is important to acknowledge that two of the three students in the proficient reading group had dramatically lower post reading comprehension scores as measured by the Stanford Diagnostic Reading Test Online. These seemingly anomalous results may have occurred due to overachieving on the pre-test or a lack of motivation and/or focus on the post-test. Also, given the short time frame of the study, accurate measures of increases or decreases in reading comprehension may be difficult to ascertain. A final limitation relates to the use of a naturalistic classroom setting. Students were undoubtedly affected by the day-to-day life of their classroom and the school. Reliability becomes a concern when situational and time of day factors influence subject responses. I attempted to deal with this issue by testing my subjects on several different occasions but some situational influences undoubtedly remained. Follow up studies should be designed to address these limitations.
**Future Research.**

Future studies are required to address this concern and the limitations stated in the previous section and to inform teacher education curriculum. In particular, the process of learning to read (early literacy) as opposed to reading to learn (middle school) may or may not lend itself to the use of tablet technology. Subsequent investigations could also consider the effectiveness of this model with struggling and proficient readers and in students from diverse populations.

Future research could also focus on online reading comprehension and web-searching behaviour for authentic questions that are posed by individual students. That is, do student-generated questions rather than assigned research questions (as utilized in this study), lead to increased motivation and engagement for online research? Also, how do online researching skills change after students are instructed in the gradual release of responsibility model suggested earlier (a model not utilized in the current research) and how might this model effect student motivation, engagement, and achievement?

Other future research suggested by the current findings should further explore the unexpected finding that struggling readers improved their reading comprehension despite no increase in their motivation to read as measured by the MRQ. However, all six students reported their excitement and engagement with working on the iPads in their reflections. One potentially effective methodology would include following these students longitudinally as they received further support in their learning across a longer period of time. Finally, an important question not addressed in the current dissertation is whether traditional, linear reading correlates with online, non-linear reading ability. That is, if a student is a proficient reader of traditional printed text, are they automatically a
proficient reader of online material? This could be addressed by giving students a
traditional written test after reading a printed text and comparing their performance with
a similar assessment completed online. Additional research that builds upon the work
outlined in this dissertation is critical to addressing this goal and effecting change in our
society.

This dissertation initiates an important line of research examining the effective
integration of technology into today’s classroom. This work is timely since school boards
are currently investing heavily in new technologies. Many teachers, however, are not
prepared to effectively integrate these devices into their teaching. As Graham and
Richardson (2012) have stated, “within the current public education schooling experience,
there would still appear to be a distinct emphasis on putting the technology well before
the pedagogy” (p. 7). As we continue to handle these issues as educators, it is important
to consider the demonstrated potential of tablet technology such as the iPad. If this
research is any indication, these tablets may be the tools that will support educators in
their efforts to provide truly differentiated instruction. It will also foster the creation of
educational environments where students can engage in authentic and personally
meaningful questions; work together in collaborative spaces; and communicate their
understandings in multiple modalities.
References


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Fasimpaur, K. (2004). Why e-books? Should they be part of a school’s collection? 

*Media and Methods, 40*(5), 12.


Tate, C. (2012, March 27). *Schools across the country bring iPads to the classroom*. McClatchy Newspapers (mcclatchydc.com).


Appendix A

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<thead>
<tr>
<th>Name of Instrument</th>
<th>Motivation for Reading Questionnaire (MRQ)</th>
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<tbody>
<tr>
<td>Developer/Website</td>
<td>The items were developed by Dr. Allan Wigfield and Dr. John Guthrie at the University of Maryland.</td>
</tr>
<tr>
<td>Instrument Availability/Key Source(s)</td>
<td>The items are described in the following published article in which the authors indicate that the items and format for the instrument are available by contacting them.</td>
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<tr>
<td>Population</td>
<td>Wigfield and Guthrie (1997) used the MRQ on a sample of 105 4th and 5th grade elementary students at one mid-Atlantic state school and 148 (Guthrie et al., 2004) and 150 (Wigfield et al., 2004) 3rd grade students from four mid-Atlantic state schools (respectively) during administration of Concept-Oriented Reading Instruction (CORI: see <a href="http://www.cori.umd.edu">www.cori.umd.edu</a> for more details). The student samples were approximately 70-76% European American and 22-30% African American.</td>
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<tr>
<td>Type of Method</td>
<td>Student ratings of various aspects of their reading motivations.</td>
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<tr>
<td>Overview</td>
<td>The Motivation for Reading Questionnaire is a student rated assessment of the extent to which each student is motivated to read. It was originally developed by Wigfield and Guthrie (1995) to assess different aspects of student's reading motivation. In 1997, Wigfield and Guthrie improved the MRQ by grouping questions into 11 constructs of reading motivation with the help of motivational interviews with students, classroom reading instruction observations (Guthrie et al., 1996), and alignment with motivational theory. The original scale contained 82 items (Wigfield &amp; Guthrie, 1995) but was revised by Wigfield and Guthrie (1997) and now only contains 53 items. A shortened version (18 items) of the MRQ was also created to use for pre- and post- CORI assessments (Guthrie et al., 2004; Wigfield et al., 2004).</td>
</tr>
<tr>
<td>Administration</td>
<td>The MRQ is a set of items that each student completes independently with a group of other students (approximately 10-15). As a group, students go through 3 practice questions with the questionnaire administrator(s) and then are allowed to complete the remainder of the questionnaire on their own. The revised MRQ only has 2 practice questions. Questionnaire administrators are available to answer questions during this time. Students are typically able to finish the MRQ.</td>
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in one 15 to 20 minute session (Wigfield & Guthrie, 1997).

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<tr>
<th>Domains Measured</th>
<th>The revised MRQ contains 53 items intended to reflect 11 constructs of reading motivation:</th>
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<td>1. Reading Efficacy (3 items)</td>
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<td>2. Reading Challenge (5 items)</td>
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<td>3. Reading Curiosity (6 items)</td>
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<td></td>
<td>4. Reading Involvement (6 items)</td>
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<td>5. Importance of Reading (2 items)</td>
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<td>6. Reading Work Avoidance (4 items)</td>
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<td>7. Competition in Reading (6 items)</td>
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<td>8. Recognition for Reading (5 items)</td>
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<td>9. Reading for Grades (4 items)</td>
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<td></td>
<td>10. Social Reasons for Reading (7 items)</td>
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<td>11. Compliance (5 items)</td>
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| Scoring/Reporting | The response format for the above items is 1 = very different from me to 4 = a lot like me. Scores are computed for each aspect and construct by averaging across their responsive items. |

| Reliability | Wigfield and Guthrie (1997) reported the reliabilities for all the aspects of the 53-item MRQ ranging from .43 to .81. Work Avoidance and Reading for Grades had reliabilities of .44 and .43 respectively, at one time point, but they had reliabilities of .60 and .59 at a different time point. The remaining 9 aspects showed consistent reliabilities ranging from .52 and .81. |

| Validity | Factor analyses conducted by Wigfield and Guthrie (1997) indicated evidence of construct validity supporting eleven factors for the 53-item revised MRQ in 4th and 5th grade students. Most of the reading motivation aspects correlated positively from low- to moderately high levels, providing further evidence of construct validity. Only the Work Avoidance aspect correlated negatively with all aspects aside from Competition in Reading. Unrau and Schlackman (2006) also found support for the 11-factor model in a sample of 6th, 7th, and 8th grade students with a confirmatory fit index (CFI) of .90, suggesting relatively good model fit. |

| Overview of Use | The MRQ has been used in published research by the instrument developers to explore the multidimensionality of student’s reading motivation in grades 4-5 and to assess the impact of the CORI intervention on reading motivation in 3rd grade students. The MRQ has also been successfully used in published research by other researchers with middle school students from grades 6-8. |
References


Motivation for Reading Questionnaire

We are interested in your reading.

The sentences tell how some students feel about reading. Listen to each sentence and decide whether it talks about a person who is like you or different from you. There are no right or wrong answers. We only want to know how you feel about reading.

For many of the statements, you should think about the kinds of things you read in your class.

Here are some ones to try before we start on the ones about reading:

I like ice cream.

\[
\begin{array}{cccc}
\text{Very Different From Me} & \text{A Little Different From Me} & \text{A Little Like Me} & \text{A Lot Like Me} \\
1 & 2 & 3 & 4 \\
\end{array}
\]

If the statement is very different from you, circle a 1.

If the statement is a little different from you, circle a 2.

If the statement is a little like you, circle a 3.

If the statement is a lot like you, circle a 4.
I like spinach.

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If the statement is very different from you, what should you circle?

If the statement is a little different from you, what should you circle? If the statement is a little like you, what should you circle?

If the statement is a lot like you, what should you circle?

Okay, we are ready to start on the ones about reading. Remember, when you give your answers you should think about the things you are reading in your class. There are no right or wrong answers, we just are interested in YOUR ideas about reading. To give your answer, circle ONE number on each line. The answer lines are right under each statement.

Let’s turn the page and start. Please follow along with me while I read each of the statements, and then circle your answer.
1. I like being the best at reading.

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2. I like it when the questions in books make me think.

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3. I read to improve my grades.

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4. If the teacher discusses something interesting I might read more about it.

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5. I like hard, challenging books.

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6. I enjoy a long, involved story or fiction book.

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7. I know that I will do well in reading next year.

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8. If a book is interesting I don’t care how hard it is to read.

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9. I try to get more answers right than my friends.

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10. I have favorite subjects that I like to read about.

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11. I visit the library often with my family.

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12. I make pictures in my mind when I read.

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13. I don’t like reading something when the words are too difficult.

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14. I enjoy reading books about people in different countries.

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15. I am a good reader.

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16. I usually learn difficult things by reading.

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17. It is very important to me to be a good reader.

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18. My parents often tell me what a good job I am doing in reading.

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19. I read to learn new information about topics that interest me.

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20. If the project is interesting, I can read difficult material.

<table>
<thead>
<tr>
<th>Very Different From Me</th>
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21. I learn more from reading than most students in the class.

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22. I read stories about fantasy and make believe.

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</table>
23. I read because I have to.

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24. I don’t like vocabulary questions.

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25. I like to read about new things.

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26. I often read to my brother or my sister.

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27. In comparison to other activities I do, it is very important to me to be a good reader.

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28. I like having the teacher say I read well.

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29. I read about my hobbies to learn more about them.

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30. I like mysteries.

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31. My friends and I like to trade things to read.

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32. Complicated stories are no fun to read.

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33. I read a lot of adventure stories.

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34. I do as little schoolwork as possible in reading.

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35. I feel like I make friends with people in good books.

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36. Finishing every reading assignment is very important to me.

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37. My friends tell me that I am a good reader.

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38. Grades are a good way to see how well you are doing in reading.

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39. I like to help my friends with their schoolwork in reading.

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40. I don’t like it when there are too many people in the story.

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41. I am willing to work hard to read better than my friends.

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42. I sometimes read to my parents.

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43. I like to get compliments for my reading.

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44. It is important for me to see my name on a list of good readers.

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45. I talk to my friends about what I am reading.

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46. I always try to finish my reading on time.

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47. I am happy when someone recognizes my reading.

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48. I like to tell my family about what I am reading.

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49. I like being the only one who knows an answer in something we read.

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50. I look forward to finding out my reading grade.

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51. I always do my reading work exactly as the teacher wants it.

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52. I like to finish my reading before other students.

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53. My parents ask me about my reading grade.

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Appendix B

STUDENT QUESTIONNAIRE ABOUT READING ON THE INTERNET (Coiro & Dobler, 2007)

1. Do you like to read on the Internet? (circle one answer)
   - Yes
   - Sort Of
   - No

2. Please rank the following six activities in order of use from 1–6. Write a “1” beside the Internet activity you do the MOST, a “2” beside the activity you do second most, and so on, ending by writing a “6” beside the Internet activity you do the LEAST.

   - __ Playing interactive games on the Internet
   - __ Searching for a topic using a search engine
   - __ Reading certain websites to learn more about a topic
   - __ Using e-mail, Instant Messenger, or chat rooms
   - __ Browsing or exploring lots of different webpages
   - __ Downloading music or software games

3. Find the activity you rated as “1” in question 2 and guess how much time you spend doing that activity in one week
   - Less than 1 hour
   - Between 1 and 3 hours
   - More than 3 hours

4. Find the activity you rated as “2” in question 2 and guess how much time you spend doing that activity in one week.
   - Less than 1 hour
   - Between 1 and 3 hours
   - More than 3 hours

5. How good are you at understanding what you read in books (stories, textbooks)? (circle one answer)
   - Very good
   - Just OK
   - Not so good

6. How good are you at figuring out where to go on the Internet to find what you want? (circle one answer)
   - Very good
   - Just OK
   - Not so good

7. How good are you at using a search engine to find what you want? (circle one answer)
   - Very good
   - Just OK
   - Not so good

8. When reading on the Internet, you are usually at . . . (circle one answer)
   - School
   - Home
   - Friend’s house
   - Parent’s office

9. How comfortable would you be in explaining out loud to someone else what you are thinking while you are searching and reading on the Internet? (circle one answer)
   - Very comfortable
   - Sort of comfortable
   - Not at all comfortable

10. Name two of your favorite Internet sites.
11. How do you find something you are searching for on the Internet?

12. What else would you like to tell me about how you use the Internet?