

Mobile Books: Effect of Engagement on Students' Motivation  
and Cognitive Strategy Use

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## **Abstract**

This mixed methods research explores the role of reading engagement in 30 grade 1 students' motivation to read mobile electronic storybooks (eBooks) and cognitive strategies used during eBook reading. Data collection comprised motivation and parent questionnaires, behavioural observation checklists, cognitive strategies rubric, and teacher interviews. Students' emotional engagement with and enjoyment of mobile eBooks corresponded to 4 motivational aspects of intrinsic motivation: curiosity, control, choice, and challenge. Post-intervention results indicated that most student participants enjoyed answering eBook comprehension questions and preferred eBooks to print books; by the end of the study, all had access to a mobile device at home. A majority of participants were actively engaged during mobile eBook reading sessions and persisted in answering embedded eBook comprehension questions, which together reflected students' behavioural engagement and time-on-task during mobile reading. Students' off-task behaviours related to iPads' accessibility features and inherent reader-friendliness. All participants successfully answered evaluative questions requiring them to activate prior knowledge, and experienced higher levels of difficulty with making personal connections. The study highlights the importance of making school-based literacy practices relevant to students' outside worlds, and discusses implications for teacher educators, administrators, curriculum developers, and eBook and other digital developers concerning the need for greater collaboration in order to more closely align technology resources with national curriculum expectations.

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## CHAPTER ONE: INTRODUCTION TO THE STUDY

There has been an explosion in children's storybook apps especially since tablet computers have become popular (Larson, 2010). In fact, electronic storybook (eBook) sales have dramatically increased within the last few years, cornering about 18% of the children's book market (Roskos, 2012). An electronic book is defined in this study as a book composed in or converted to digital format for display on a computer screen or handheld device (Hutchison, Beschorner, & Schmidt-Crawford, 2012; Kim, 2014). These eBooks invite young children to interact with books in ways they have not done before: narration, music, animation, print highlights, colour, hyperlinks, motion, embedded games, and haptics (e.g., swiping, tapping, dragging) are powerful attractors that can capture and influence viewer/reader attention (Hutchison et al., 2012; Kim, 2014). Mobile media appears to be the growing choice of young children as they prefer to use their media on the go (Neuman & Gambrell, 2013). When children use tablets, they are generally found to be very engaged in the process: they are on-task and totally immersed in it with little or no awareness of the more general world around them (Beck & Wade, 2006; Shaffer, 2006). Given the already wide availability, market, and interactivity of eBooks on mobile devices, the purpose of this study is to investigate the utility of this new generation of mobile eBook reading for facilitating reading engagement of beginning readers. In this first chapter of the thesis, there will be an introduction to the research problem, rationale and purpose of this study, theoretical framework, guiding research questions, definition of terms, and an overview of the remainder of this document.

## **Background of the Study**

As teachers and researchers consider the need to expand the definition of text, they need to remember that today's readers are immersed in multimodal experiences and, consequently, have a keen awareness of the possibility of combining modes and media to receive and communicate information (Beavis, 2013; Larson, 2010; Merchant, 2010). Larson (2010) concluded that this awareness results in an urgent need for teachers and researchers to address the discrepancy between the types of print-based literacy experiences students encounter at school and those they practice in their daily lives outside the school environment, namely mobile, digital technologies. One way to bridge such incongruity is to expand the types of texts students are exposed to and engaged with at school by turning attention to mobile eBooks.

Such digital texts hold potential as curricular tools in early literacy development as instruction tools and as a means to implement technology standards in early education (International Society for Technology in Education, 2007; Roskos, Burstein, You, Brueck, & O'Brien, 2011). In support of this, the International Reading Association (IRA, 2010) set standards for literacy teachers to use a variety of texts for instruction in reading and writing including traditional print, digital, and online resources. Multimedia additions to children's eBooks include symbolic elements typically not used with print books which may help facilitate better comprehension: digital graphics, animations, music, sound effects, and interactivity of text, such as the highlighting and oral reading of text (Smeets & Bus, 2013). Thus, these additional eBook features combined with the inherent features of mobile devices can personalize the reading experience and provide support for beginning readers' text comprehension.

Interactivity is also one of the areas in which beginning readers might benefit from eBooks. Such multimedia features inherent in eBooks are likely to appeal to many children (Maynard, 2010). Laurillard (2007) claimed that engaging with mobile devices is intrinsically motivating for students by affording: control over learning goals, ownership, learning in contexts, and continuity between contexts. Learners often find their informal learning activities more motivating than learning in formal settings such as schools where there is much less freedom to define tasks and relate activities to their own goals. The idea of control of learning being motivational is well known from the motivation literature. Mobile devices seem to give their users a very strong sense of control and ownership which has been highlighted in research as a key motivational factor (Sharples, Arnedillo-Sánchez, Milrad, & Vavoula, 2009). Mobile technologies have the potential to support and encourage the view of the student as a self-regulated learner and constructivist approaches to pedagogy both within and beyond the classroom by assisting the learner to interact with his/her environment, make independent choices and regulate their own learning (Beishuizen, 2008). In addition, the personal, multimodal, independent capabilities of devices such as the tablet offer the potential for “anywhere, anytime” learning (Evans & Johri, 2008; Norris & Soloway, 2008).

Mobile devices also enable learners to locate resources and information in the context where they are needed and used, including “in the field” and to share this information with others (Sharples et al., 2009). There is potential from use of mobile devices to extending learning possibilities outside the classroom, and also the possibility of securing more continuity between school work inside and outside the classroom. Mobile technologies are particularly useful in providing continuity between different

settings, blurring the boundaries in learning settings, between school and home. Such learning in context has a particular immediacy and relevance which is motivating (Sharples et al., 2009). Mobile technologies support this by being available and providing access to resources in the context in which learning is taking place (Sharples et al., 2009).

The postulation that the new generation of mobile devices might prove more attractive to children, particularly those who struggle with and/or are reluctant to read (Roblyer & Doering, 2010) needs to be further investigated. According to Keller (2008) students should not only be engaged in the reading task, but should also be engaged with the interactive environment of a mobile eBook to support their reading development. What is needed is an investigation of beginning readers' reading engagement during mobile eBook reading; specifically, this study seeks to examine the role of reading engagement in students' motivation to read mobile eBooks as well as their cognitive strategy use during mobile eBook reading.

### **Statement of the Problem**

Although reading engagement contributes to beginning reading and is important for subsequent reading development, little is known about how such affective factors interact when young children use mobile devices for reading (Sharples, 2007; Sharples et al., 2009). Researchers claim that activities for children of this generation are more electronically driven than the activities of any other generation, and young children today are more intrigued by electronic devices than any other type of entertainment (Larson, 2008, 2009; Marsh, 2010). In particular, mobile devices are thought to capture the interest of young children more than paper-based activities, largely due to their multimodal and participatory nature which is not often possible in the context of

traditional literacy practices (Beavis, 2013; Gruszczynska, Merchant, & Pountney, 2013; Marsh, 2010). As abovementioned, increased engagement and motivation are often identified as potential benefits associated with using technology in the classroom (Roblyer & Doering, 2010).

With respect to story comprehension, previous research on eBooks has relied on only low-level literal questions and/or story retelling as a way of evaluating the children's understanding of the story at the end of the reading session (e.g., Grimshaw, Dungworth, McKnight, & Morris, 2007; Pearman, 2008). Additionally, these studies have only examined the use of eBooks available in CD-ROM format or on the Internet (Grimshaw et al., 2007; Pearman, 2008). Studies examining the role of reading engagement in students' cognitive strategy use during mobile eBook reading have not been adequately studied (Bayliss, Connell, & Farmer, 2012; Larson, 2010). Reading from a desktop computer differs from reading from a hand-held device such as a tablet, and thus, the conclusions from these studies may not apply (Bayliss et al., 2012).

Also central to the rationale for this investigation is the finding that reading engagement and motivation contribute to comprehension (Stipek, 2002). It is increasingly evident that the acquisition of cognitive strategies and comprehension skills demands a large amount of effort and motivation on the part of the learner (Stipek, 2002). One reason that motivation and engagement may influence the development of comprehension is that motivated students usually want to understand text content fully and, therefore, process information deeply. As they read frequently with these cognitive purposes, motivated students gain in comprehension proficiency (Guthrie, Wigfield, Metsala, & Cox, 1999). However, motivation and engagement have rarely been

examined concurrently within studies of interventions for comprehension and cognitive strategy use (Guthrie et al., 1999). More specifically, these fundamental aspects of literacy learning have not been examined concurrently within studies of mobile eBooks (e.g., Grimshaw et al., 2007; Larson, 2008, 2009, 2010; Pearman, 2008)

### **Rationale for the Study**

According to Malone and Lepper (1987), motivation is a necessary precondition for student involvement in any type of learning activity; what and how effectively students learn may be influenced by their level of motivation. Vogel, Kennedy, and Kwok (2009) claimed that students' motivation plays a significant role in engaging and sustaining students to use mobile devices for reading. Furthermore, eBooks have the potential to enhance student motivation to read (Lefever-Davis & Pearman, 2005; Pearman, 2008; Shamir & Korat, 2007).

The National Reading Panel (2000) also suggests that strategies for increasing literacy development should focus on developing higher order thinking skills that enable students to actively engage in a variety of cognitive strategies. These strategies include activating prior knowledge, making predictions and personal connections, and visualizing, all of which are applied before, during, and after reading (National Reading Panel, 2000). The development of higher order thinking skills in language and literacy learning is essential throughout the primary grades (Ministry of Education of Ontario, 2003). To accomplish this, students must move beyond recall of the text, reflect on what they know and need to know (metacognition), and draw from a variety of comprehension strategies before, during, and after listening, reading, and viewing to make sense of what they read (Ministry of Education of Ontario, 2003). The extant reading literature has not

yet examined whether and how these traditional (print-based) comprehension strategies can be transferred to digital and mobile texts, specifically eBooks (Margolin, Driscoll, Toland, & Little Kegler, 2013). The definition of literacy is rapidly changing as new technologies emerge, expanding from traditional notions of reading and writing to include the ability to learn, comprehend, and interact with technology in a meaningful way (Coiro, 2003). Moreover, the definition of higher order thinking skills in literacy is also being extended to include how young learners make use of technology tools to engage in literacy learning (National Reading Panel, 2000). This information suggests that more educational research that focuses on the utility of eBooks for facilitating cognitive strategy use is needed. Furthermore, elementary schools are more likely to have desktop computers as opposed to newer technologies such as tablet computers and eReaders, which are only now becoming more affordable (Felvégi & Matthew, 2012). Nevertheless, as more and more schools invest in mobile devices and electronic textbooks (der Bedrosian, 2011; Finnegan, 2011), research on the reading of mobile eBooks with embedded higher order comprehension questions is warranted.

This study investigates both the affective and cognitive processes involved in reading eBooks on mobile devices. More specifically, this study examines the role of reading engagement in grade 1 students' motivation to read with as well as their cognitive strategy use during mobile eBook reading. According to Guthrie and Wigfield (2000), reading engagement is a multidimensional attribute including behavioural engagement (students' attention and effort), cognitive engagement (using high-level cognitive strategies to foster deep learning), and emotional engagement (enjoying reading tasks and expressing enthusiasm about reading).

## Research Questions

The following research questions guide this study:

1. How does reading engagement play a role in students' motivation to read with mobile eBooks?
2. How does reading engagement play a role in students' cognitive strategy use during mobile eBook reading?

## Definition of Terms

For the purpose of this study, *intrinsic motivation* refers to “an internal or external influence that activates, guides and maintains or directs behaviour, which must be instigated and sustained for a period of time” (Gambrell, Palmer, Codling, & Mazzoni, 1996, p. 524). *Reading engagement* is defined as “the interplay of motivation and cognitive strategies during literacy activities;” (Baker, Dreher, & Guthrie, 2000, p. 9). *Cognitive strategies* are seen as mental processes directly concerned with the processing of information in order to learn; that is, for obtaining, storage, retrieval, or use of information (Klingner, Morrison, & Eppolito, 2011). *Mobile eBook reading* refers to the reading of digitized books (eBooks) that is done on mobile technical devices, or tablet computers (i.e., iPads).

## Overview of the Remainder of the Document

Chapter 2 provides a review of the literature as it relates to eBooks and cognitive strategy support, as well as a review of the contextual and innate influences on children's reading development. Chapter 3 presents the qualitative and quantitative research methods chosen for the purpose of this study. Specifically, the participant and site selection, procedure, data gathering, recording, and analysis are presented. Additionally,

chapter 3 outlines the actions taken to establish the credibility of the findings. This section of the thesis also summarizes the ethical guidelines followed to ensure that the participants have been protected. Chapter 4 presents the research findings of the study. Chapter 5 presents the conclusions and outlines the implications for all those involved in education as they work together to understand, evaluate, and incorporate the new literacies, mobile technologies, and multimodal texts into primary classrooms and into children's reading repertoire. Limitations of this study and directions for future research are also stated within this final chapter.

## **CHAPTER TWO: REVIEW OF RELATED LITERATURE**

The current study was designed to investigate the affective and cognitive processes involved in reading eBooks on mobile devices. More specifically, this study examined the role of reading engagement in grade 1 students' motivation to read with as well as their cognitive strategy use during mobile eBook reading. The research questions that guided this study were: (a) How does reading engagement play a role in students' motivation to read with mobile eBooks? and (b) How does reading engagement play a role in students' cognitive strategy use during mobile eBook reading? The study was informed by the following review of literature relating to eBooks and cognitive strategy support. This chapter will present a review of the contextual and innate influences on children's reading development. The following section describes the theoretical framework used to situate this study.

### **Theoretical Framework**

The theoretical basis for this investigation was the engagement perspective of the development of reading (Guthrie & Wigfield, 2000). This model proposes that engagement in reading is based on the motivational and cognitive characteristics of the reader (Guthrie & Wigfield, 2000). Guthrie and Wigfield (2000) proposed that reading engagement is a multidimensional attribute including emotional engagement (enjoying reading tasks and expressing enthusiasm about reading), behavioural engagement (students' attention and effort), and cognitive engagement (using high-level cognitive strategies to foster deep learning). These attributes can be observed in students' cognitive effort, perseverance, and self-direction in reading (Guthrie & Wigfield, 2000).

Various meanings have been associated with the term *engagement*. One meaning emphasizes *affect*; in this case, such qualities as enthusiasm, enjoyment, and liking encompass the interaction with text (Furrer & Skinner, 2003, p. 149). A second meaning of engagement is more *activity based*, referring to the amount of leisure time students spend reading and the diversity of students' reading practices in and out of school (Guthrie, Schafer, & Huang, 2001; Kirsch et al., 2002). Students who are intrinsically motivated become deeply involved and engaged in their activity (Ryan & Deci, 2000; Wigfield & Guthrie, 1997). Young students who read for personal pleasure and enjoyment typically engage in independent recreational reading for more than 30 minutes per day (Aunola, Nurmi, Niemi, Lerkkanen, & Rasku-Puttonen, 2002; Guthrie, 1999; Sweet, Guthrie, & Ng, 1998). The notion of involvement in reading refers to the pleasure gained from and the desire to become absorbed in reading a well-written book or article on a topic one finds interesting. This is often embodied in the fiction genre but may also include information books (Guthrie, Wigfield, & VonSecker, 2000). Devotion to time to an activity or a task denotes the individual's involvement in it (Taboada, Tonks, Wigfield, & Guthrie, 2009). The third meaning is *time on task*, which signifies paying attention to text, focusing on text meaning, and sustaining cognitive effort (Berliner, 1979; Dolezal, Welsh, Pressley, & Vincent, 2003; Stipek, 2002). In view of the importance of reading for meaning, a vital issue for educators is understanding the characteristics of effective instruction for comprehension (Taboada et al., 2009). The growing knowledge base about comprehension instruction is directed toward identifying classroom practices with known effects on specific aspects of reading; a major focus of this research has been on identifying effective reading strategies that increase children's

comprehension (Duke & Pearson, 2002; National Reading Panel, 2000; Pressley & Block, 2002). The evidence rests primarily on the efficacy of cognitive strategies. Accordingly, the fourth major component of the engagement perspective is *cognitive engagement* during reading, which refers to the depth of processing during reading. Cognitively engaged students effectively use strategies such as comprehension monitoring or questioning during reading (Taboada et al., 2009). For students in the elementary grades, comprehension is correlated with a range of cognitive strategies, which include: (a) activating background knowledge and making personal connections for the purpose of understanding text that contains similar information; (b) making predictions; (c) evaluating texts (expressing personal thoughts, feelings, and judgments about what has been read); (d) searching for information in texts; and (e) monitoring comprehension during reading (Bowyer-Crane & Snowling, 2005).

Although Guthrie and Wigfield's (2000) work primarily dealt with print-based texts, the purpose of this study is to determine whether and how this theoretical approach can be applied in a new context for reading; that is, reading eBooks on mobile devices. The current study seeks to assist classroom teachers and curriculum designers respond to the broadening view of reading books in the context of a mobile age. The student participants in this study engaged in traditional practices of reading and were asked to extend their use of traditional comprehension skills and cognitive strategy use to a new context for learning. Participants were required to use the same print-based cognitive strategies during e-reading such as predicting, summarizing, inferencing, asking and answering questions, monitoring, and making connections (Guthrie & Wigfield, 2000).

The study will investigate the behavioural, cognitive, and emotional engagement of grade 1 students' during mobile eBook reading.

In this model, reading motivation, reading engagement, and cognitive strategy use are interrelated and interdependent: when students are motivated and fully engaged in reading, they employ deep processing rather than surface-level strategies, and thus, comprehend the reading material better (Wigfield et al., 2008). Motivated students try to figure out how new information fits with what they already know; they discriminate important information from unimportant; they regulate effort, planning, goal setting, and actively monitor their comprehension (Wigfield et al., 2008). Wigfield et al. (2008) corroborated that reading engagement and intrinsic motivation are fundamental to comprehension. As Wigfield et al. stated, the engaged reader is intrinsically motivated, knowledgeable, and strategic. In contrast, less engaged readers show lower motivation and less use of strategies for comprehending text.

Accordingly, this study sought to examine grade 1 students' levels of engagement and motivation towards reading eBooks on a tablet, as well as their cognitive strategy use performance by combining support for motivation and cognitive strategies during their eBook reading sessions.

### **Literature Review**

Comprehension within a digital environment or in a digital format is very different from traditional comprehension requiring specific skills and dispositions that students may not possess (Castek, Bevans-Mangelson, & Goldstone, 2006). There are, however, cognitive strategy and high-level thinking skills that can be used both with

paper and screen; control over cognitive processes will have strong effects on student achievement regardless of the environment (Duke, Schmar–Dobler, & Zhang, 2006).

### **Cognitive Strategy Support**

According to Bowyer-Crane and Snowling (2005), effective assessment of comprehension hinges upon students' ability to use a range of strategic processes and engage in higher levels of thinking when comprehending text, which include making predictions, making personal connections, and evaluating (expressing personal thoughts, feelings, and judgments about what has been read). These strategies can be performed before, during, and after reading a text and help students become purposeful, active readers who are in control of their own comprehension (Jacobs & Paris, 1987). Research strongly indicates that teaching elementary students to use a repertoire of comprehension strategies increases their comprehension of more complex text and question types (e.g., inferential vs. literal), and therefore are important components of reading for later elementary and middle school students (Duke et al., 2006). According to Bus, Van Ijzendoorn, and Pellegrini (1995), the abovementioned reading strategies can be modeled and practiced through the use of storybook read-alouds, which have been found to improve young students' comprehension as well as their reading motivation and engagement. Such listening activities can provide beginning readers with valuable opportunities to engage in higher level critical thinking skills, even before they learn to decode fluently (Bus et al., 1995).

### **Reading eBooks as a Support for Comprehension**

At the outset of any discussion about eBooks as a support for comprehension, it is important to understand and categorize the different types of eBooks. The simplest type

of eBook is in a portable document format (PDF) that in short travels well across a range of electronic devices including a Kindle, iPhone, iPod, iPad, and desktop computers (Guernsey, 2011). It has the basics: start/stop buttons, front/back arrows for pagination; it may include bookmarking and annotating features plus an audio function (Guernsey, 2011). This type of eBook looks, feels, and acts a lot like the traditional print book and in some cases consists of pages directly scanned from a printed book (Guernsey, 2011). The most complex type of eBook to date is the iBook application which extends the capacity of what eBooks can do; it offers various interactive functions and multimedia content and presents a film-like version of content such as embedded video clips, virtual reality, moving animations, Web resources, dictionaries, and activities (e.g., colouring an illustration) exclusively for the iPad (Hutchison et al., 2012; Kim, 2014). The iBook application also allows learners to create personalized textbooks while using the digital textbook—underlining important parts and taking notes (Hutchison et al., 2012; Kim, 2014).

While most researchers agree that eBooks should not serve as a replacement for traditional paper storybooks (de Jong & Bus, 2004), they may serve as a valuable tool for increasing children's exposure to text, providing increased opportunities for independent reading and read aloud practice, and facilitating interest in text (De Jong & Bus, 2004; Zucker, Moody, & McKenna, 2009). Efforts have been underway to identify whether these beneficial characteristics of eBooks are associated with beginning reading skills in young children. Some findings indicate that eBook experiences can help beginning readers develop traditional literacy skills while meeting curriculum expectations (Castek et al., 2006; Larson, 2008, 2009, 2010; Shamir & Korat, 2007).

Research suggests that eBooks can allow children to explore storybook reading media without adult assistance, which can result in listening comprehension gains (de Jong & Bus, 2004; Shamir & Korat, 2007). For example, eBooks contain features similar to those of a traditional print book including pages that “turn,” but they also include digital features that can assist the reader such as digitized read aloud options accompanied with text-to-speech highlighting. These features allow readers to carefully follow the written words and reduce the burden of decoding for the reader, so more attention can be devoted to processing and comprehending to derive meaning from the text (Pearman, 2008; Shamir & Korat, 2007).

Several scholars have examined whether or not there are differences in comprehension with children listening to a narration of a story from an eBook and children having the same text read to them in a printed version by an adult (e.g., de Jong & Bus, 2004; Grimshaw et al., 2007; Pearman, 2008). For example, Grimshaw et al. (2007) and Pearman (2008) investigated comprehension based on the source of reading material (electronic books versus print books). In Grimshaw et al.’s study, three conditions were tested using different versions of the same text: (a) printed; (b) CD-ROM with narration; and (c) CD-ROM without narration. The experimental design of Grimshaw et al.’s study used independent measures, with no child being tested on more than one condition. The age range was from 9 years and 9 months to 11 years and 2 months. The comprehension test was administered after the students read the text. The majority of the test included multiple-choice questions (eight out of 15), four of which involved retrieval while the other four involved inference; the rest of the test was a mix of retrieval- and inference-type questions requiring longer answers, and two “find and

copy” questions that tested the children’s ability to identify textual evidence. An independent *t*-test showed that the difference in the scores between the two conditions was not significant,  $t(49) = 1.29, p = 0.21$ . However, results of a one-way analysis of variance (ANOVA) demonstrated that the difference was significant,  $F(2,78) = 3.41, p = .04$ . Comprehension skills were significantly higher for electronic book (eBook) readers when the reader utilized the available eBook resources, such as oral-narration. The Tukey posthoc test also showed that the children who had experienced the extract on CD-ROM with narration scored significantly higher on the comprehension test than did those who had experienced the extract on CD-ROM without narration,  $p = .04$ . The provision of narration was thus shown to significantly improve comprehension, both in terms of the children’s ability to retrieve information and to make inferences from the text.

Pearman (2008) also investigated whether second-grade students of varying reading levels would score higher on an oral retelling when reading text on their level in an interactive CD-ROM storybook rather than a traditional print book. In both conditions, students were asked to orally retell the story upon completion of the reading, following the cue of “Tell me about the story.” A dependent samples *t*-test at the .05 level of significance yielded  $t(53)=2.98, p<.00$ , which shows that, in agreement with Grimshaw et al.’s (2007) findings, mean retelling scores from Pearman’s study were significantly higher for students after reading the electronic books. The main finding of Grimshaw et al.’s and Pearman’s studies was that children who have reached a stage in which they can understand stories are able to retell a story when they experience it independently in electronic form. Overall, positive outcomes on student comprehension

were found in both of these studies concerning the efficacy of narrated eBooks on student comprehension.

However, de Jong and Bus (2004) as well as Segers, Takke, and Veroeven (2004) refuted these findings. The latter two studies showed no significant differences in comprehension test results when comparing eBooks to traditional print books. In the former study, effect of treatment (CD-ROM and Printed Book) on story comprehension was tested using a multivariate analysis of variance (MANOVA) with repeated measures for the following three conditions: (a) exploring an electronic story that provided an oral rendition of the text, animated pictures, and supplementary animations embedded in illustrations; (b) listening to a story read to the child by an adult from a conventional printed book; and (c) a control condition (no treatment). Results from de Jong and Bus's study showed that the scores in the control condition were lower than the scores that children reached in the treatment condition ( $M=-.95$ ;  $SD=.18$ ) and the control condition ( $M=.47$ ;  $SD=.69$ ). In the control condition, children scored lower than in the printed book condition,  $F(1, 17) = 84.23, p < .00$ , and in the electronic book condition,  $F(1, 17) = 61.34, p < .001$ . Children in the electronic book condition recalled about 50% of the story events. A repeated measures analysis was used to explore Segers et al.'s results. A paired samples  $t$ -test revealed no significant difference in comprehension score of the children when the teacher or the computer had read the story,  $t(70) = 1.70, p > .09$ . These results reveal that children's story understanding after independently experiencing electronic versions of books is comparable with their scores after repeated adult-led book encounters.

As abovementioned, many eBooks have additional features that allow readers to interact with the text in a way that is different from how they could interact with

traditional print books. For instance, interactive eBooks may provide opportunities for readers to touch the pages to make sound, make objects move, or even access multimedia content such as videos, games, and puzzles (Schugar, Smith, & Schugar, 2013). The reading of eBooks on such mobile devices can also be presented in an individualized format. In particular, readers can manipulate the font size and page orientation to suit their individual needs and preferences. However, over-reliance on these supports may hinder students from developing their reading skills (Lefever-Davis & Pearman, 2005). Some eBooks also include optional hidden hotspots or a built-in dictionary, which are devices embedded in various screen locations and are intended to provide additional information about the characters, repeat or elaborate text (words), activate the pronunciation of or explain a word, duplicate a sound, or provide entry into games and other activities meant to promote the story's understanding (Roskos, Brueck, & Widman, 2009). Notwithstanding, several scholars caution that these embedded hotspots, albeit helpful at times, may encourage passive participation and distract learners from text, thereby impeding comprehension (Larson, 2010; Lefever-Davis & Pearman, 2005). Some of these incidental animations, sounds, delays in page turning, and games distract readers, interfering with their comprehension and leading to passive viewing rather than active reading (Pearman & Chang, 2010; Shamir & Korat, 2007; Zucker et al., 2009).

Garner, Gillingham, and White (1989) coined the term *seductive details* to describe aspects of texts that were likely to interfere with students' abilities to attend to the most important parts of the texts they read. The seductive detail effect may also make a resurgence with the rise in interactive eBooks, as readers are given options that are likely to result in them straying from the main idea (Schugar et al., 2013). With respect to

eBooks, the *seductive interaction effect* can have three potential outcomes: distracting, supporting, or extending readers' comprehension of the text (Schugar et al., 2013). Similarly, Verhallen, Bus, and deJong (2006) noted the potential of multimedia features (e.g., animations, sounds, and music) to support children's inference making about characters' actions, and feelings. However, Verhallen et al. (2006) also warned that the multimedia richness that results from such features can actually tax children's working memory. Consequently, they argue that children may benefit more from on-screen texts that include only print and oral renderings "without music, visual, or other special effects" (Bus, Verhallen, & deJong, 2009, p. 155). Bus et al. (2009) concluded that the attractive digital options diminished children's attention to the text rather than providing meaningful interactions.

This suggestion is consistent with previous research (e.g., Neuman & Gambrell, 2013) which focused on how distractors and hotspots in some digital text (e.g., animations, audio narration, sound effects, hyperlinks, links to dictionaries, etc.) have an impact on readers' comprehension. Although the interactive features of these books certainly may be motivating to children, as they often "bring the book to life," one must consider how the motivating aspects of such features can be leveraged in a way that supports students' comprehension. One of the most important roles of the teacher when students are e-reading on tablet devices is to aid students in applying their existing strategies for determining main ideas and relevant information as well as for finding ways to overcome distractors in the text. Roskos et al. (2009) also cautioned that close analysis of eBook design is critical because children often read eBooks with minimal

adult involvement. These eBooks benefit emergent readers when parents or teachers are not readily available (Grimshaw et al., 2007).

Previous eBook research studies have assessed children's listening comprehension of eBooks through story retellings and answering closed-ended (yes or no) questions regarding the story content *after* reading, and only required literal recall and low-level inferences (e.g., de Jong & Bus, 2004; Grimshaw et al., 2007; Pearman, 2008; Segers et al., 2004). The proposed study will resolve this issue by asking children questions before, during, *and* after reading. It will also challenge the children to make inferences and use cognitive strategies (i.e., predicting, making connections, inferring, and evaluating) in order to encourage beginning readers to think about their reading and assess their deeper understanding of the story, rather than simply practice information retrieval. Previous research on eBooks has also not examined children's perceived enjoyment of and attitudes toward these digital tools. All of the eBooks used in the aforementioned studies were also narratives (fiction). To fill this research gap in the literature, the eBooks used in the current study comprised a collection of both fiction and non-fiction digital texts.

The overwhelming majority of studies included in this review also pertained to eBooks via a more traditional format: CD-ROM storybooks. Although still in its infancy, some research has been conducted on electronic readers (eReaders), such as the Amazon Kindle (e.g., Larson, 2010; Maynard, 2010; Milone, 2011). While eReaders are important for educators to research and parents to understand, they include multimodal tools and options that are not always offered by eReaders and other mobile devices, such as highlighting, hyperlinks, bookmarking, note making, search features, thesaurus, and

dictionary (Larson, 2012). For the purpose of the present study, the researcher attempted to reduce the number of complexities often found when users read texts on mobile devices by eliminating the multimodal distractions noted above (e.g., hotspots).

### **Contextual Influences on Reading Development**

The forms and functions of reading itself are largely determined by school, home, and family influences on children's reading development and motivation to read (Fern & Jiar, 2013). Therefore, it is important to examine the existing literature on such contextual factors as the home literacy environment, as well as parental and teacher attitudes toward mobile technology use for reading, all of which may be related to students' mobile reading attitudes, experiences, and outcomes in their home and classroom environments (Takeuchi, 2011).

**Relationship between home literacy environment, students' reading performance, and motivation.** One factor that significantly influences the collective mesosystem is the home literacy environment. Research has indicated a significant positive relationship between the child's attitude toward reading based on home experiences, and achievement in reading in the schools (Teale & Martinez, 1986). This is accomplished through access to reading resources, exposure to modeled reading behaviours, and participation in early literacy activities (Duncan et al., 2007; Mullis, Martin, Kennedy, Trong, & Sainsbury, 2009). For example, children raised in environments where oral language is encouraged and where their parents foster a love for literature by exposing them to simple stories appear to have been the building blocks for becoming lifelong readers and successful learners.

Unfortunately, some children lack, or have significantly few, parent–child literacy interactions in their home and school environments, thus inhibiting the acquisition of age-appropriate reading skills (Duncan et al., 2007; Mullis et al., 2009). Reading difficulties in children deprived of such reading interactions is frequently due to word-decoding failure, which can lead to poor vocabulary skills and thus difficulty with comprehension of higher-level reading materials. Parent–child interactions allow the child an opportunity to have instant oral-text narration, word-pronunciation, definitions and other useful literary information provided that are similarly available in eBook reading systems.

**Parental perceptions of mobile technology use for reading.** Often times, parents are the initial contact by which young children are exposed to the function, purpose, and value of a technology tool and their attitudes greatly impact those of the child (Hoover-Dempsey & Sandler, 1997; Sanger, 1997). For example, if parents hold favourable perceptions of a learning tool, such as a mobile device, then it is most likely that the child will adopt similar attitudes. Thus, a mobile device such as a tablet can be beneficial or detrimental to a young reader depending on its use and application as a learning tool and the attitudes held toward it by the parents. There is extant statistical data on the average number of computers and mobile devices in homes, and the increased use of mobile technology by children and adults in the past decade (e.g., Ortiz, Green, & Lim, 2011; Takeuchi, 2011). Yet despite the large amount of data collected in these areas, the investigation of parent perceptions on the importance of mobile technology usage for reading has remained relatively neglected (Ortiz et al., 2011). Thus, the current study was interested in garnering the parents' perceptions of and attitudes toward mobile

technology as a tool for promoting reading engagement, motivation and reading development.

**Teachers' attitudes toward mobile technology use for reading instruction.**

Alongside parents' attitudes and beliefs, it appears that teachers' reading instructional practices, technological pedagogical beliefs, and attitudes toward mobile technology use for reading may also have a significant effect on students' reading achievement and motivation (Applegate & Applegate, 2004; Ertmer, 2005; Windschitl & Sahl, 2002).

Ertmer (2005) argued that the decision of whether and how to use technology for instruction ultimately depends on the teachers themselves and the beliefs they hold about technology. Teacher pedagogical beliefs about technology have been found to be a major barrier to technology integration (Hermans, Tondeur, Valcke, & Van Braak, 2006). For example, Lindahl and Folkesson (2012) found preschool teachers' attitudes influenced their technology adoption, as teachers fell into two groups, those that embraced the technology and those that felt the technology threatened their traditional beliefs and teaching philosophies. In another study of middle school teachers' attitudes toward technology, McGrail (2005) described the teachers' perceptions of technological change in their instructional practice. Teachers denoted the disadvantages of computer use; pedagogical concerns about students; concerns about instruction and language; administrative challenges; and ethical concerns. It was not obvious to these teachers how computer technology fit into their instructional style or how it could be integrated into current curriculum (Jaipal Jamani & Figg, 2009). Teachers' beliefs about their own computer efficacy, and the values and costs of technology, have been shown to predict computer integration in the classroom (Wozney, Venkatesh, & Abrami, 2006). Teachers

are likely to use their past experiences, beliefs, and attitudes about learning and teaching to develop their beliefs about technology as a teaching method or instructional tool (Ertmer, 2005; McGrail, 2005).

One theme that emerges from the existing literature on teacher attitudes and practices with technology is the fact that teachers need strong support for effective integration of mobile technology into classroom teaching and learning in reading (e.g., Druin, 2009). In a very early survey (Karchmer, 2001) and in a more recent study (Hutchison & Reinking, 2011), teachers consistently reported feeling overwhelmed and unprepared to integrate technology into classroom practice. A more recent survey (Hutchison & Reinking, 2011) revealed a gap between teachers' beliefs and literacy practices. That is, teachers believed it was important to integrate technology into classroom literacy instruction; however, their actual implementation lagged behind their beliefs. Furthermore, survey responses suggested that teachers tended not to perceive technology-based reading—other than Internet-based research—as integral to literacy development.

The integration of mobile technologies, such as tablets in classroom instruction is seen as a promising way to facilitate students' learning processes (Banister, 2010). However, there remains a dearth of information and analyses on the acceptance of such technologies amongst teachers, specifically for classroom reading instructional purposes (Ifenthaler & Schweinbenz, 2013; Zhou, Zhang, & Li, 2011). Given the importance placed on technology integration into language education in Ontario (Ministry of Education of Ontario, 2006), it seems relevant to investigate whether and how teachers view mobile learning devices as a classroom reading instructional tool.

## **Innate Influences on Reading Development**

Motivation is an internal influence “that activates, guides, and maintains or directs behaviour and must be instigated and sustained over time” (Gambrell et al., 1996, p. 518). Over the last 15 years, researchers who have studied children’s reading have become increasingly interested in children’s motivation to read (Wigfield & Guthrie, 1997). Motivations for reading are believed to be important both as a consequence of reading experience as well as a predictor of later reading skills (Oldfather & Wigfield, 1996; Scarborough & Dobrich, 1994). While there is speculation about the importance of motivation for subsequent reading development, motivation theorists are only beginning to study what contributes to children’s initial reading motivations and their desires to engage in literacy activities. Although the relationship between motivation and reading has been studied in older children, little is known about how these factors interact during the first years of schooling (Poskiparta, Niemi, Lepola, Ahtola, & Laine, 2003). Additionally, although motivation is a component of beginning reading and important for subsequent reading development, little is known about how such affective factors interact when young children use mobile devices for reading eBooks (Sharples, 2007; Sharples et al., 2009). For these reasons, the following section will closely examine one construct from the motivation field: intrinsic motivation related to reading in general, and specifically reading mobile eBooks.

**Intrinsic motivation.** According to Deci and Ryan (1985), intrinsic motivation is the innate propensity to engage in an activity for enjoyment or personal pleasure. Students who are intrinsically motivated are more likely to aspire to long-term literacy commitments than extrinsically motivated students (Deci & Ryan, 1985; Dweck &

Leggett, 1988; Eccles, Wigfield, Harold, & Blumenfeld, 1998; Nicholls, Cheung, Lauer, & Patashnick, 1989). Unlike extrinsically motivated students, rewards or punishments are not required for intrinsically motivated students to complete reading tasks (Hidi & Harackiewicz, 2000). Rather, Wigfield and Guthrie (1997) reported that the major aspects tied to children's intrinsic motivation to read include curiosity, control, choice, and preference for challenge.

**Curiosity.** Curiosity is the most direct intrinsic motivation for learning. The concept of curiosity can be divided into two broad categories: sensory curiosity and cognitive curiosity (Malone & Lepper, 1987). Sensory curiosity involves the attention-attracting value of variations and changes in the light, sound, or other sensory stimuli of an environment (Malone & Lepper, 1987). Cognitive curiosity is also aroused when learners discover that their knowledge is incomplete or inconsistent, and they have the desire to explore and attain new information and competence with the technology (Malone & Lepper, 1987). Technology-enhanced environments afford individuals with almost limitless opportunities for exploration and ready access to information to support both sensory and cognitive curiosity (Bromley, 2012; Malone & Lepper, 1987). Mobile devices give students instantaneous access to websites, newspapers, magazines, and other resources of high interest that are often more current and credible than textbooks, which are often dated (Bromley, 2012). This desire for new information can lead to deepening levels of interest and vice versa (Bromley, 2012; Malone & Lepper, 1987). When considering motivation within multimedia learning environments, and more specifically multimedia-embedded eBooks, both an individual's sensory or cognitive curiosity can be stimulated. Multimedia features that are typically found in eBooks such as audio

narration, music, animation, and other interactive capabilities afforded by mobile devices evoke sensory curiosity (Shamir & Korat, 2007; Verhallen et al., 2006). Mobile devices such as the tablet also afford greater opportunities for haptic modality, a new channel for communication through mobile technology by utilizing the sense of touch (Wong, Chu, Khong, & Lim, 2010). The tablet, in particular, features flicking, tapping, pinching, and stretching. These haptic touch features have enhance the visual feedback which in turn enhances the learner experience during interaction (Wong et al., 2010); however, as mentioned above, these features have also been associated with a moderate increase in cognitive distraction and cognitive overload (Larson, 2010). This study seeks to address whether and how the features of mobile eBooks activate grade 1 students' interest and curiosity.

**Control.** The concept of control is another cornerstone of intrinsic motivation (Malone & Lepper, 1987). Deci (1981) defines intrinsic motivation as a striving for competence and self-determination (where self-determination means control). Researchers have indicated that locus of control is associated with motivation when students are given control over their learning (Klein & Keller, 1990).

Deci and Ryan (1985) similarly claim that teacher-controlled environments reduce a student's sense of autonomy, decrease intrinsic motivation, and result in poor reading attitudes and performance in the classroom. When examining the influence of perceived control (e.g., self-described feelings of competence and autonomy) on reading motivation, Flowerday and Schraw (2000) found that learners who reported greater perceived control were more motivated to read and actively involved in their classroom. Thus, granting students control of and engagement in the learning experience permits

them to construct their own meaning of the reading materials rather than be passive recipients of the information (Flowerday & Schraw, 2000). Students who select their own reading material will read more deeply than a student who was assigned a book, and the student may use cognitive strategies more effectively to gain meaning from the text (Flowerday & Schraw, 2000).

Similarly, with respect to digital learning environments, particularly mobile games and apps (applications used on mobile devices), users can usually customize a game to fit their learning and playing styles; games also often have different difficulty levels where users can move through the levels at their own pace (Chou, Block, & Jesness, 2012). Similarly, most eBooks allow for self-selected differentiation of reading level where students can move through the books at their own pace (Neuman & Gambrell, 2013). The ability to adjust content to student level and allow self-paced learning may thus lend mobile technology and more specifically mobile eBooks as an ideal tool for implementing differentiated instruction and giving students a greater degree of control over the delivery of their learning in the classroom. In the present study, the researcher sought to examine whether and how such motivational tendencies as sense of control plays a role in influencing students' motivation to read with mobile devices.

**Choice.** Self-determination may also be enhanced by allowing choice in literacy activities. Involving learners in the decisions regarding their reading activities should increase their intrinsic motivation to learn and read (Kamii, 1991; Randi & Como, 2000). According to Kamii (1991), as well as Randi and Como (2000), the use of choice of reading material in the classroom increases students' motivation, effort, and performance. Allowing students to make choices within the context of reading instruction

will likely increase their sense of autonomy, intrinsic motivation to read, afford them with greater learner control, and lessen their perceptions of teacher control (Flowerday & Schraw, 2000; Randi & Como, 2000).

Mobile technologies have the potential to support and encourage the view of the student as a self-regulated learner and constructivist approaches to pedagogy both within and beyond the classroom by assisting the learner to interact with his/her environment, make independent choices and regulate their own learning (Beishuizen, 2008). In addition, the personal, multimodal, independent capabilities of devices such as the tablet offer the potential for “anywhere, anytime” learning (Evans & Johri, 2008; Norris & Soloway, 2008). Affording the grade 1 participants choices of mobile eBooks (fiction and non-fiction) during the reading sessions was a motivation-supporting practice used in this study. The resulting effects of allowing students to self-select and navigate the mobile eBooks will be examined.

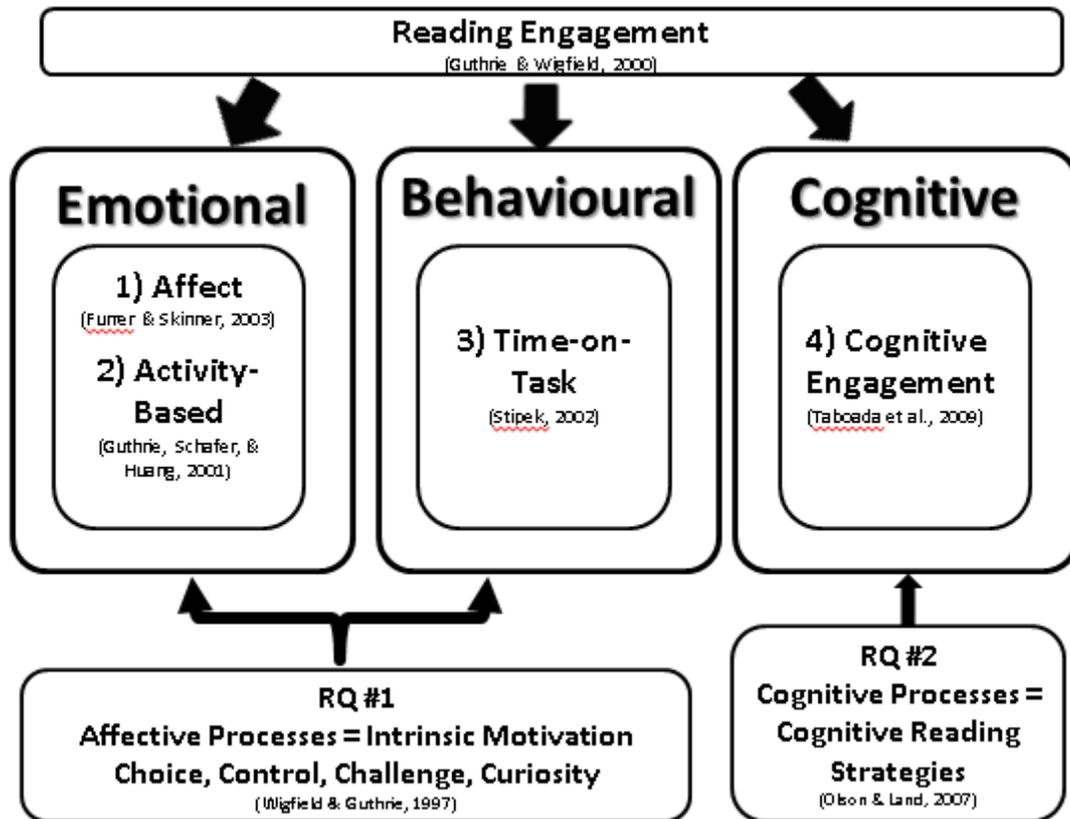
**Challenge.** The final factor that impacts children's motivation is what is known as “reading challenge” (Baker & Wigfield, 1999, p. 452). Challenge is defined as “the satisfaction a reader gets from mastering a complex text” (Baker & Wigfield, 1999, p. 452). Intrinsically motivated students have high perceptions of their abilities and embrace challenges as opportunities to develop new skills and to improve their competence level (Metsaia, 1996). However, researchers such as Gambrell and Marinak (1997) have found that reading challenge is tempered by the degree of difficulty and the amount of time it takes to accomplish the goal. Goals that are challenging at an appropriate level and that can be achieved in a relatively short period of time are most likely to be pursued by intrinsically motivated readers. These intrinsically motivated students display persistence

in reading activities when encountering difficulties and believe exerting effort promotes successful reading outcomes (Hidi & Harackiewicz, 2000). This study sought to examine students' cognitive strategy use performance during mobile eBook reading; specifically, the researcher wanted to investigate whether or not students persist in reading a challenging eBook or answering a challenging comprehension question during their mobile eBook reading experience.

Previous studies have shown that young children's levels of reading skill correlates with and later predicts their reading motivation, as indicated by their goal orientations, attitudes, and attributions towards reading (e.g., Guthrie & Davis, 2003; Lai, 2011). The interaction between poor reading and low intrinsic motivation may "snowball" or increasingly influence each other in such a way as to lead to long-term reading failure; if so, identifying and preventing this early may be critical to preventing such failure (Guthrie & Davis, 2003). Once children endorse negative reading performance expectations, show an apparent lack of motivation, and spend less time reading, it becomes increasingly difficult for them to get back on the road of proficient reading (Morgan & Fuchs, 2007). Since intrinsic motivation contributes to the growth of reading skills and can lead to long-term engagement in reading, educators should foster intrinsic reading motivation (Wigfield, 2010). Neuman and Gambrell (2013) further recommended that classroom reading tasks should be relevant to the students' lives so there is a perceived benefit in understanding the content. In creating motivationally positive learning environments, schools should draw on the experiences and culture of their students as reading instruction and activities are designed and implemented (Neuman & Gambrell, 2013). As the number of eBooks available on the Internet, through

apps, and other digital media increases, it becomes more and more imperative to identify the features inherent in these digital reading tools which may stimulate grade 1 students' engagement to read.

The interconnectedness of reading engagement and reading motivation are depicted graphically in Figure 1. As previously mentioned, reading engagement is based on the motivational and cognitive characteristics of the reader (Guthrie & Wigfield, 2000). Guthrie and Wigfield (2000) proposed that reading engagement is a multidimensional construct that includes behavioural, cognitive, and emotional attributes (Guthrie & Wigfield, 2000). As evidenced in Figure 1, operational definitions have been assigned to each attribute by specifying the activities necessary for it to be measured. According to Deci and Ryan (1985), intrinsic motivation a necessary precondition for involvement in any type of learning activity; what and how effectively students learn may be influenced by their level of motivation. In other words, motivation is crucial to engagement because motivation is what activates behaviour; engagement reflects motivated action (Guthrie, Wigfield, & You, 2012). According to the operational definitions of reading engagement, a highly motivated reader enjoys reading (*affect*) spends more time reading (*activity-based*), engages in active, on-task behaviours (*time on task*), exerts higher cognitive effort and is more dedicated to full comprehension (*cognitive engagement*) than a less motivated reader (Guthrie & Wigfield, 2000). Guthrie et al. (2012) corroborated that classroom practices which support reading engagement should also include the four aspects of intrinsic motivation (*choice, control, challenge, and curiosity*). By virtue of their effects on students' motivation, these four aspects are likely to increase their emotional, behavioural, and cognitive engagement in reading



*Figure 1.* Graphic representation of reading engagement construct, sub-constructs, and relationship to research questions

(Guthrie et al., 2012). Relative to the first research question in this study, the researcher sought to examine whether and how these mediators are engendered in mobile eBook reading. As Guthrie and Wigfield (2000) suggested, engagement in reading also refers to the motivated use of cognitive strategies to gain conceptual knowledge during reading. Accordingly, and as shown in Figure 1, the second research question examines the role of reading engagement in grade 1 students' cognitive strategy use during mobile eBook reading.

### **Chapter Summary**

In accordance with *The Report of the Expert Panel on Early Reading in Ontario* (Ministry of Education of Ontario, 2003), early reading programs should provide opportunities for children to listen to a variety of literature, including fiction and non-fiction, print and electronic materials for enjoyment and information. As technology brings changes and advances in the ways text is presented, it is necessary to determine the effects of different presentation modes on readers' comprehension, cognitive strategy use, reading motivation, and engagement. The literature presented above provides parents and educators with accumulated research-based evidence for integrating eBooks into their reading repertoire. This mixed-methods study will be an initial attempt at reporting how reading engagement plays a role in grade 1 students' motivation and cognitive strategy use during eBook mobile reading.

### **CHAPTER THREE: METHODOLOGY AND PROCEDURES**

This chapter describes the methodological considerations and research design of this study. The procedures detailed in this chapter were used to address the following research questions: (a) How does reading engagement play a role in students' motivation to read with mobile eBooks? (b) How does reading engagement play a role in students' cognitive strategy use during mobile eBook reading? The participant and site selection, data collection and analysis, methodological assumptions, and ethical considerations are also included in this chapter. Following this, the chapter presents the steps that were taken to establish credibility and enhance the quality of the data gathered in this study.

#### **Research Design**

The aim of this mixed-methods study (Creswell, 2012) is to examine the affective and cognitive processes involved in reading eBooks on mobile devices. More specifically, this study examines the role of reading engagement in grade 1 students' motivation to read with as well as their cognitive strategy use during mobile eBook reading. Given the highly individualized and contextual nature of the information derived from this study, a within-subjects design (Creswell, 2012) will be utilized. Narrative data will also capture the participants' thoughts, behaviour, attitudes toward, and experiences with the mobile eBooks. Additionally, in order to determine whether there were any significant differences between the participants' pre-intervention and post-intervention motivational responses, quantitative data methods will be used. More specifically, this study will use the triangulation mixed methods design in which the quantitative and qualitative datasets will carry equal weight, priority, and consideration to answer both research questions concurrently (Creswell, 2012). The pre-intervention and post-

intervention results of the quantitative (i.e., parent questionnaire, child motivation questionnaire, cognitive strategies rubric, and behaviour observation checklist) will be compared and integrated with the qualitative data (i.e., interviews, observational field notes) in the Results and Discussion section of the present study. The resulting triangulated results will show convergence, inconsistency, or be complementary (Creswell, 2012). The basic assumption is that the uses of both quantitative and qualitative methods, in combination, provide a better understanding of the research problem and research questions rather than either method by itself, and can facilitate each other so that the accuracy and robustness of the study will be strengthened (Creswell, 2012). It is important to note that the aim of this study is to not to design or intended to generalize to a larger population. Rather, readers may find similarities and transfer the results gleaned from this study to their own home and school contexts.

### **Pilot Study**

Six single-case studies were conducted with a purposive sample of six 7-year-old children (three boys and three girls), in June 2011, to evaluate the age and reading level appropriateness of the instruments as well as the researcher-developed online storybooks available on the ICANREAD™ website (Ciampa, 2011; see Appendix A for a sample screenshot of an eBook). All of the participants lived in the same suburban school district and geographic region of Southern Ontario, Canada. By ethnicity, five were Caucasian and one was African-American, and all participants were English-speaking. None of the students were receiving special education services or additional support in reading.

The following two research questions guided this pilot study: (a) What are the effects of the online eBooks on grade 1 children's attitudes toward reading online eBooks

and print books? (b) What are the effects of the eBook question-answering tasks on grade 1 children's cognitive strategy use and reading engagement?

### **Pilot Study: Intervention Design**

The researcher-developed ICANREAD™ website was comprised of a collection of levelled non-fiction and fiction eBooks (N=36) from the Big Universe Learning™ (2011) website, as well as embedded researcher-developed comprehension questions. These eBooks were levelled from A through K based on the Fountas and Pinnell Text Level Gradient (1996). The researcher chose the eBooks found on the Big Universe Learning™ website because they were freely accessible and provided a large library of levelled fiction and nonfiction eBooks. The researcher received written approval (via email) from the Big Universe Learning™ creators to use and modify the eBooks for this study.

The eBooks on the Big Universe Learning™ (2011) website originally consisted of static text and images, similar to print-based picture books. The researcher added more interactivity to the eBooks using an e-learning authoring software for creating interactive e-learning content (Adobe™ Captivate 5.5). The researcher added sound effects as well as entrance, emphasis, and exit animation effects to the text and objects on a page, which includes highlighting and presenting each word individually as it was read aloud in a different colour (red). The eBooks provided students with the option of either listening to the stories read aloud to them using the female voice narrator or reading it by themselves without the read-aloud feature. For the purpose of this study, however, the participants were asked to listen to the eBooks using the read-aloud feature. The voice of the researcher was the narrator and was automatically played when each page appeared on the screen, thereby focusing the child's attention on the relationship between the written

text and its oral reading (de Jong & Bus, 2004). Participants could also click the “speaker icon” on the bottom of each page to hear the text again. To stimulate the children’s reading orientation and involvement in reading, the eBooks contained a *forward* button and a *backward* button on each screen, thereby allowing the children to return to previous pages or to continue onto the next one.

Ten embedded comprehension questions appeared on a separate page within the eBook after the participants clicked on the *forward* button to turn the page. These researcher-developed questions that were asked of participants before, during, and after their eBook reading are closely aligned with the grade 1 language curriculum expectations (Ministry of Education of Ontario, 2003). At least one question was also included in each eBook to assess each one of the aforementioned critical thinking skills (making predictions, making connections, and evaluating; see Appendix B for sample comprehension questions).

### **Pilot Study: Instruments**

Qualitative and quantitative data sources were used, including a motivation questionnaire, behavioural observation checklist, eBook reading log, and cognitive strategies rubric.

**My motivation to read questionnaire.** The researcher combined questions from the *Motivation for Reading Questionnaire* (Gambrell et al., 1996) and the *Reading Activity Inventory* (Guthrie, McGough, & Wigfield, 1994) to create a questionnaire that would provide an in-depth understanding of and authentic insights into grade 1 students’ print-based and digital reading practices, experiences, and attitudes. Cronbach’s alpha revealed a moderately high reliability ( $\alpha = .81$ ) of the *Motivation for Reading*

*Questionnaire* (Gambrell et al., 1996). Reliabilities greater than .70 indicated reasonably good internal consistency for all the aspects of the *Reading Activity Inventory* (Guthrie et al., 1994). The researcher used the questionnaire, which was a combination of the two inventories, to determine whether the participants' reading motivation and attitudes aligned with their cognitive strategy use scores and reading behaviours during the eBook sessions. It is important to note that the adapted questionnaire maintained the psychometric properties of the two original inventories. At the beginning of the program, the 28-item *My Motivation to Read Questionnaire 1* (see Appendix C) instrument assessed the dimensions of self-efficacy, choice, interest, involvement, feedback, frequency of reading (both print-based and electronic texts), frequency of Internet use at home and school, frequency of library visits, and text-type reading preferences. The items were scored on a 3-point Likert scale corresponding to the frequency of occurrence (1 = *never or hardly ever*, 2 = *some days*, 3 = *almost every day*). The latter portion of the questionnaire (questions 15–27) used a 4-point Likert pictorial rating scale (the Garfield character with four facial expressions ranging from *very happy* to *very upset*), which assessed students' feelings and attitudes toward both print-based and digital tasks as well as values placed on motivation constructs, including interest/engagement, involvement, choice of tasks, and feedback.

At the end of the intervention, the researcher administered the 35-item *My Motivation to Read Questionnaire 2* (see Appendix D). It contained the same question format as the first questionnaire, with the addition of five items that assessed the frequency of visits to the ICANREAD™ (Ciampa, 2011) website and any changes in students' initial habits of and attitudes toward eBook reading, including their most and

least favourite aspects of the program. To enhance content validity, the researcher had this instrument independently assessed by two grade 1 teachers as well as a teacher educator who teaches courses in educational psychology and literacy assessment and evaluation. Based on the feedback received from the assessors, the researcher subsequently reduced the number of question items from 34 to 20 to eliminate redundancies and reduce responder fatigue.

**Behavioural observation checklist.** The researcher-developed *Behavioural Observation Checklist* (see Appendix E) was used during the online reading session to record the responses and behaviours of the student participants during the digital reading sessions, including the frequency of on- and off-task behaviour and level of engagement with the instructional program. The researcher rated each item on the form on a 4-point Likert-type scale (1 = *rarely*, 2 = *sometimes*, 3 = *usually*, 4 = *always*). The difficulty in operationalizing student engagement led the researcher to adopt time-on-task as a measure for engagement, using observable behavioural measures. The researcher defined a child's high level of engagement (e.g., 4 = *always*) on the computer as those times when the student was always attending to the computer screen by reading aloud or along with the story, clicking the mouse to the next page in the story or question; making comments or asking questions before, during, and after reading (of themselves, me, and/or the text); using other positive, task-/goal-oriented nonverbal behaviours (e.g., smiling when the computer told the child, "Well Done!" after answering a question correctly or eagerly going back to the question and reattempting the question after the computer told the child, "Oops, try again"). The researcher defined a child's low level of engagement (e.g., 1 = *rarely*) during both the read-aloud and post-reading activity on the

computer as those times when the student was never attending to the computer screen and not reading along with the story or answering the questions. If students had their eyes closed or oriented toward another object in the room rather than the computer screen, the researcher also considered them to be off task. The researcher defined a low level of student engagement as those times when the student never changed his/her facial expressions when receiving a correct or incorrect response to a question (e.g., when the computer told the child, “Well Done!” or “Oops, try again” after he/she clicked on his/her answer).

**eBook reading log.** According to Edmunds and Tancock (2003), reading motivation should be examined using a variety of measures, including book logs. The researcher used book logs in this study to measure the participants’ motivation to read the eBooks at home, of their own volition and in their own time, which was based on the number of times they visited and read the eBooks on the ICANREAD™ (Ciampa, 2011) website. Parents were asked to provide the following information for each eBook their child read at home: title of eBook, level of eBook, date started and date completed, and rating (which was determined by asking them to circle how they felt using an emotion pictorial scale composed of three faces—happy, neutral, sad).

**Cognitive strategies rubric.** A scoring rubric was used for assessing the participants’ responses and use of the following comprehension strategies when answering the literal, inferential, and evaluative questions: making connections, activating prior knowledge, questioning, visualizing, inferring and making predictions, and synthesizing. The rubric was found in *The PM Benchmark Reading Kit 2* (Smith, Randell, Nelley, & Giles, 2002; see Appendix F), which was an assessment tool used by

many Ontario primary-level teachers to evaluate their students' comprehension skills. The researcher scored the responses to the inferential and evaluative questions holistically, using a 4-point scale from Level 1 (not meeting expectations) to Level 4 (exceeding expectations). Because scoring of such open-ended responses is somewhat subjective (Pearson, 1994), three independent scorers, who were all familiar with the assessment standards, coded all student responses, and the researcher checked for agreement. An intra-class coefficient was used to calculate the degree of reliability between the coders (McGraw & Wong, 1996). There was strong interrater reliability among the three coders ( $r = .87, p < .05$ ). It was therefore concluded that the coders were reliably and consistently using the coding framework (Hurlburt, 2003).

### **Pilot Study: Procedure**

The researcher arranged and held a total of 12 eBook reading sessions (including the pre- and post-intervention sessions) during a 3-month period with each participant during weekday, after-school hours in an Internet-equipped room at her institutional affiliation. The participants used the researcher's laptop computer to read the online eBooks.

In the first session, each participant individually completed *My Motivation to Read Questionnaire 1*. Following this, the researcher provided each participant with familiarization sessions and instructions in how to navigate the online eBooks. The researcher also gave each child's parents an eBook reading log, which was a record of what and how frequently the child visited the online reading program at home during involvement in this study, and asked them to monitor and sign it. The eBook reading sessions began with each participant one week later. During the online eBook reading

sessions, the participants worked individually next to the researcher. Each participant read two eBooks per session once a week for a total of 3 months, with each session lasting approximately 45 minutes.

In the 12th and final session, each of the participants completed *My Motivation to Read Questionnaire 2*. The researcher collected the eBook reading logs at the end of the post-intervention session. Participants were able to self-navigate throughout the ICANREAD™ (Ciampa, 2011) website and did not experience any technical difficulties during the computer sessions.

### **Pilot Study: Data Analysis**

The data collected from the motivation questionnaires, eBook reading logs, and cognitive strategies rubric were analyzed using simple descriptive statistics, such as frequencies, means, and percentages. The researcher transcribed and manually coded observational field notes, then analyzed these data using an exploratory, emergent, inductive approach to create a profile of the online eBook reading experiences of grade 1 children. The researcher began with an open coding of the data by creating tables. Once the researcher had coded the raw data according to the category systems described, she retrieved, assembled, and viewed data belonging to each category. The researcher then identified commonalities and differences among student responses, experiences, and behaviours and analyzed them using axial coding (Creswell, 2012). To enhance trustworthiness of the coding process, the question codes were validated by a teacher educator, who was involved in coding independently the assigned portion of the data, and there was then a discussion until 100% interrater reliability was reached on categories,

subcategories, and interpretations. Findings from this study were presented next in narrative and tabular form to offer a description of each participant case.

### **Pilot Study: Results**

In response to this study's first research question—"What are the effects of the online eBooks on grade 1 children's attitudes toward reading online eBooks and print books?"—the findings based on pre- and post-intervention data from the *My Motivation to Read Questionnaires* showed that, in contrast to their pre-intervention responses, the participants' post-intervention usage of the Internet for playing games was much lower. The majority of participants ( $n = 4$ ) now used the Internet for reading eBooks, including those from the ICANREAD™ (Ciampa, 2011) website. The eBook reading logs provided information that confirmed the validity of these questionnaire results. According to their reading logs, all six participants frequently visited the study's website at home and engaged in eBook reading in their free time. When they evaluated each of the books using a 3-point Likert scale (happy face, neutral face, sad face), all of the participants circled the happy face for every eBook they read, which reflects their reported enjoyment of the program. Only one of the six participants was prompted by her parents to visit the website, whereas the remaining participants read the eBooks of their own volition. When discussing their reasons for enjoying and visiting the site, several factors arose. Personal interest appeared to be the most important factor that influenced the frequency of site visits and the participants' eBook reading behaviours. Similarly, the element of choice was equally as important for a majority of participants because they had topical interests they wished to pursue.

When asked to indicate their most preferred type of reading material at pre-intervention, picture books and eBooks emerged as the most preferred choice. At post-intervention, eBooks became the most preferred reading choice for more than half of the participants; four students had a higher preference for reading eBooks compared to the other traditional print books. This finding coincided with the participants' preferred media type (print or electronic) prior to and after the intervention. Compared with traditional print books, five students perceived eBooks to be "easier to read and follow along with the moving red words." In addition to this, as reported in their post-intervention motivation questionnaires, four participants said that they would rather have a book read to them by the computer than an adult. Moreover, when asked how they felt about "answering comprehension questions using paper and pencil or using the computer" at pre-intervention, four out of six participants were *very happy* answering comprehension questions using paper and pencil. At post-intervention, however, five out of six participants were *very happy* using the computer to answer the comprehension questions. These same five participants also indicated that they would be very happy if their classroom teachers used the Internet more for reading.

In relation to the second research question—"What are the effects of the eBook question-answering tasks on grade 1 children's cognitive strategy use and reading engagement?"—all six participants were always on task and highly engaged during every eBook reading session. All of the participants occasionally glanced at the static illustrations before and after the narrating voice read the page aloud to them, and most of their extraneous comments and questions related directly to these illustrations. The

participants also seemed to devote most of their attention to and followed along with the moving, highlighted words.

An analysis of the observational field notes also revealed several common performance trends among the participants' responses to the comprehension questions during their eBook reading sessions. Generally, the participants seemed more motivated and eager to answer the literal questions—which were presented to them in a closed-ended multiple-choice format—in comparison to the open-ended inferential and evaluative questions. These observations coincide with their overall success rate in answering the literal questions. Generally from pre-intervention to post-intervention, the participants' ability to answer the literal and inferential questions seemed to remain the same, whereas their ability to answer the evaluative questions increased slightly over the 3-month study period. The mean level on the literal questions was 4 (exceeding expectations). All of the participants correctly answered the literal questions on their first attempt. Many of the participants frequently attributed their successes to task difficulty and to the fact that the literal questions were particularly “easy” (an external, stable, uncontrollable factor). Level 3 (fully meeting expectations) was the average level of achievement for the accuracy of predictions that the participants offered. Across all participants, observations revealed that they could make accurate predictions based on context clues, such as the book title, pictures, and text; however, they could not provide a rationale for making their predictions when the researcher asked them to. In reviewing their rationales for making their predictions, the majority of participants typically gave very limited, one-word answers. With the exception of one male student participant who always went beyond the literal text and readily shared his personal stories with the

researcher, the remaining participants seemed more reluctant and unwilling to elaborate on their answers.

Similarly, when asked to express their thoughts on the evaluative question—“What was your favourite part of the story?”—the majority of participants partially explained their favourite part with some effectiveness (Level 2). Six participants typically provided specific but underdeveloped support from the text or their own ideas, with the exception of one male student participant, whose response included some specific but underdeveloped support. Overall, observational data showed that the majority of participants seemed to hurry through the open-ended evaluative questions and provided brief answers in an effort to get back to reading the story. It became apparent that the student participants were either unable or possibly uncomfortable answering many of the open-ended questions in the absence of verbal prompts, phrases, and cues from the researcher. Over the course of the study, the participants made slight improvements in answering the higher-order questions (with additional prompts and probes).

### **Pilot Study: Outcomes and Implications**

Several modifications, omissions, and additions were made based on the findings of this pilot study. Since the pilot study was conducted in 2011, tablet computers have gained popularity in the educational sphere. Mobile learning devices such as tablet computers are ubiquitous in the sense that they are becoming ever more commonplace and a part of each child’s personal computing resource outside the classroom (Banister, 2010). The growth of mobile learning devices over the last decade has spawned many attempts to help teachers harness the power of such digital technologies as a classroom instructional resource (Druin, 2009). It seemed appropriate, then, to keep abreast of the

latest technological trends and use a new digital platform for creating and reading the eBooks in the current study. To better suit the scope and context of this study, the term “computers” was replaced with “mobile devices” and more specifically “tablets” in the child and parent questionnaires.

One of the suggestions made by the student participants for improving the ICANREAD™ (Ciampa, 2011) website was to offer more books related to their personal interests. For this reason, the researcher decided to increase the variety and number of fiction and non-fiction eBooks that may appeal to the early elementary grade readers. The researcher also removed the closed-ended literal questions as these have been studied at great length by others who have examined the effects of electronic book reading on students’ literal comprehension and recall abilities (e.g., Larson, 2012; Margolin et al., 2013; Wright, Fugett, & Caputa, 2013).

This pilot study was submitted to peer-reviewed journals for publication and subsequently published (Ciampa, 2012a) and presented (Ciampa, 2012b). The comments garnered from the peer review process were used to further refine the pilot study’s research methodology and data collection. According to some of the reviewers, the eBook reading log, although an interesting data source, was not a valid and reliable indicator of a student’s motivation to read. For this reason, the researcher chose to omit this data collection tool for the present study. Additionally, reviewers confirmed that subsequent research in this area be framed as a mixed-methods approach. The basic assumption is that the use of both quantitative and qualitative methods, in combination, provide a better understanding of the research problem and research questions rather than either method by itself, and can facilitate each other so that the accuracy and robustness

of the study will be strengthened (Creswell, 2012). Thus, quantitative methods would more aptly measure and verify whether and how reading engagement plays a role in grade 1 students' cognitive strategy use and motivation during mobile eBook reading, while the qualitative methods will describe why this occurred.

### **Present Study**

The following section presents the context of the current study, the intervention design, qualitative and quantitative data and methods of analysis.

#### **Selection of Site and Description of Participants**

Upon the ethics clearance received from the university REB and the IRB of the participating school board, the Chairperson of the Research Advisory Committee of the school board selected and contacted the principals in two schools where the present study was conducted. These schools differed in terms of socioeconomic level according to the Statistics Canada (2006) *2006 Census Tract (CT) Profiles*. It is important to note that the names of teacher participants, student participants, their parents/guardians, as well as the names of the participating schools were replaced with pseudonyms. As described below, this study was carried out in a low-to-middle income Catholic elementary school (St. Columbus—School 1) and a middle-to-high income Catholic elementary school (St. Veronica—School 2). Both elementary schools were situated in suburban areas in southern Ontario. In light of School 1's relatively small student population (compared to School 2), there was only one grade 1 classroom that the sample could be drawn from. School 2 had two grade 1 classrooms from which the sample could be drawn. Martha, the grade 1 teacher participant from School 1, Leslie and James, the two grade 1 teacher participants from School 2, were asked to distribute letters of invitation to all of their

students. The sample consisted of the first 15 student participants from each school who returned the consent and assent forms with parent signatures of approval allowing their child to participate in the study. The final total sample consisted of 30 students (15 boys and 15 girls) aged 6-7 years. Fifteen student participants (eight girls; seven boys) were recruited from Martha's classroom. Six student participants (four girls; two boys) and nine student participants (six boys and three girls) were recruited from Leslie's and James's classrooms, respectively. Students were predominately Caucasian and were native English speakers. It is important to note that six (three male and three female) student participants from Martha's classroom who were reading below grade level worked individually with a Reading Recovery Teacher for approximately 30 minutes daily in their school library.

St. Columbus Catholic School (School 1) has a Junior Kindergarten through 8th-grade population of 227 students (as of September 2012). St. Veronica Catholic School (School 2) has a Junior Kindergarten through 8th-grade population of 386 students (as of September 2012). Martha teaches the grade 1 classroom in School 1. Martha has also accumulated 15 years of teaching experience, all of which were spent teaching in the primary grades. Leslie is a certified female teacher at School 2 with 15 years of teaching experience, nine of which have been at the primary level. James, a grade 1 teacher employed in School 2, had been teaching for 14 years (nine of which have also been within the primary division).

### **Intervention Design**

ICANREAD™ ([www.icanreadcanada.com](http://www.icanreadcanada.com)) is the researcher-developed website that was used in this study with each student participant using a tablet (iPad). This

website is specifically designed for children in the early primary grades (K-2). As shown in Appendix G, ICANREAD™ comprised a collection of levelled non-fiction and fiction eBooks (N=78) from the Big Universe Learning™ (2011), Tumblebooks™ (2012) website, Dr. Kari-Lynn Winters (a Canadian children's author and literacy researcher), and JLS Storybook Project™ (2012). The eBooks also consisted of embedded comprehension questions which were developed by the researcher and aligned with the Ontario Grade 1 language curriculum expectations (Ministry of Education of Ontario, 2006). The eBooks were chosen because they were freely accessible to the researcher, and provided a large library of fiction and non-fiction eBooks. The researcher received written approval (via email) from the book creators and publishers to use and augment the eBooks for this study (with the stipulation that these books were to be used for educational research purposes only and not to be sold or made commercially available). These eBooks were levelled from A through K based on the qualitatively-oriented readability measure (*PM Benchmark Assessment System*; Fountas & Pinnell, 2008) which is used by most school districts in Ontario for students in the primary grades. The Spache readability measure, a formula that is recommended to be used with texts at a Grade 3 level and lower (Gallagher, Fazio, & Gunning, 2012; Spache, 1974) was also used to determine the readability of each eBook. The researcher guided students to match texts to their reading levels which were provided by their classroom teacher and based on recent classroom running records.

Each eBook contained five open-ended questions, three of which were inferential questions, and two were evaluative questions (see Appendix B for sample comprehension questions). The questions were composed according to the *Fountas and*

*Pinnell Prompting Guide 2 Comprehension* (2012). Table 1 includes sample questions that were asked of participants before, during, and after their eBook readings. The comprehension questions aligned with the expectations found in the Reading strand of the Ontario Grade 1 Language Curriculum, more specifically, the “Reading for Meaning” sub-strand (Ministry of Education of Ontario, 2006). For example, according to the Ministry of Education of Ontario (2006), grade 1 students are expected to “use stated and implied ideas in texts to make inferences and construct meaning” (p. 39). In the eBook, *Caillou Tidies His Toys*, participants were asked the following inferential question: “Why do you think Caillou’s mom and dad had those rules?” Students in grade 1 are also expected to “extend understanding of texts by connecting the ideas in them to their own knowledge, experience and insights; to other familiar texts; and to the world around them” (Ministry of Education of Ontario, 2006, p. 39). Student participants were asked to make a personal connection to the eBook, *Sight*, “What does this story remind you of in your life?” Finally, “What was your favourite part of the story?” was another evaluative comprehension question in the eBook, *Maddy Goes to the Zoo*, which assessed whether or not the grade 1 participants could “make judgements and draw conclusions about the ideas and information in texts and cite stated or implied evidence from the text to support their views” (Ministry of Education of Ontario, p. 40). Each question appeared on a separate page in the eBook. Students’ responses to the comprehension questions were recorded into field notes, and the answers were scored using the *Cognitive Strategies Rubric* (see Appendix F).

Eight individual eBook reading sessions (20-25 minutes per session) were held over a 5-month period with each participant. At School 1, data collection took place with

Table 1

*Sample eBook Comprehension Questions—Alignment with Grade 1 Ontario Language**Curriculum Expectations*

Grade 1 Ontario language curriculum expectations	Sample guided eBook questions
Extending understanding (making connections) 1.6 -Extend understanding of texts by connecting the ideas in them to their own knowledge and experience, to other familiar texts, and to the world around them	<ul style="list-style-type: none"> <li>• What does this story remind you of in your life?</li> <li>• Does this story remind you of something else you have read?</li> <li>• Does this story remind you of anything you saw on TV or in a movie?</li> </ul>
Responding to and evaluating texts 1.8- Express personal thoughts and feelings about what has been read	<ul style="list-style-type: none"> <li>• Have you ever been as upset as Sam? What happened? How did you feel? What did you do to make yourself feel better?</li> <li>• How does the ending of this story make you feel? Why? If you could change the ending of this story, what would happen?</li> <li>• What was your favourite/least favourite part of the story? Why?</li> </ul>

each student participant in the school library during the student participants' lunch hour and independent reading time so that he or she did not lose any classroom instructional time. For the student participants from School 2, data were collected during their regularly scheduled 100-minute morning literacy blocks in a self-contained meeting room.

### **Data Collection and Analysis**

In order to ensure triangulation of data, both qualitative and quantitative data were gathered at pre-, interim-, and post-intervention from four perspectives: the investigator as an observer, the Grade 1 student participants, their teachers, and parents. Accordingly, findings from this study are presented in narrative and tabular form. The research questions framing this mixed-methods study were addressed through the use of the following instruments: (a) researcher field notes; (b) child questionnaires (c) teacher interviews; (d) parent questionnaires; (e) behavioural observation checklists; (f) auditory discrimination test (as the covariate); and (g) cognitive strategies rubric. Figure 2 depicts a graphic representation of the data sources used to answer the two research questions and measure the construct and sub-constructs of reading engagement.

### **Qualitative Data Collection**

The following section includes qualitative data sources collected at pre-, interim-, and post-intervention for thematic analysis, including: researcher's field notes, teacher interviews, and the open-ended questions in the student and parent questionnaires.

**Researcher field notes.** To answer the first and second research questions, the researcher kept detailed field notes during each student participant's mobile eBook reading session. The field notes included extraneous comments and questions (from the

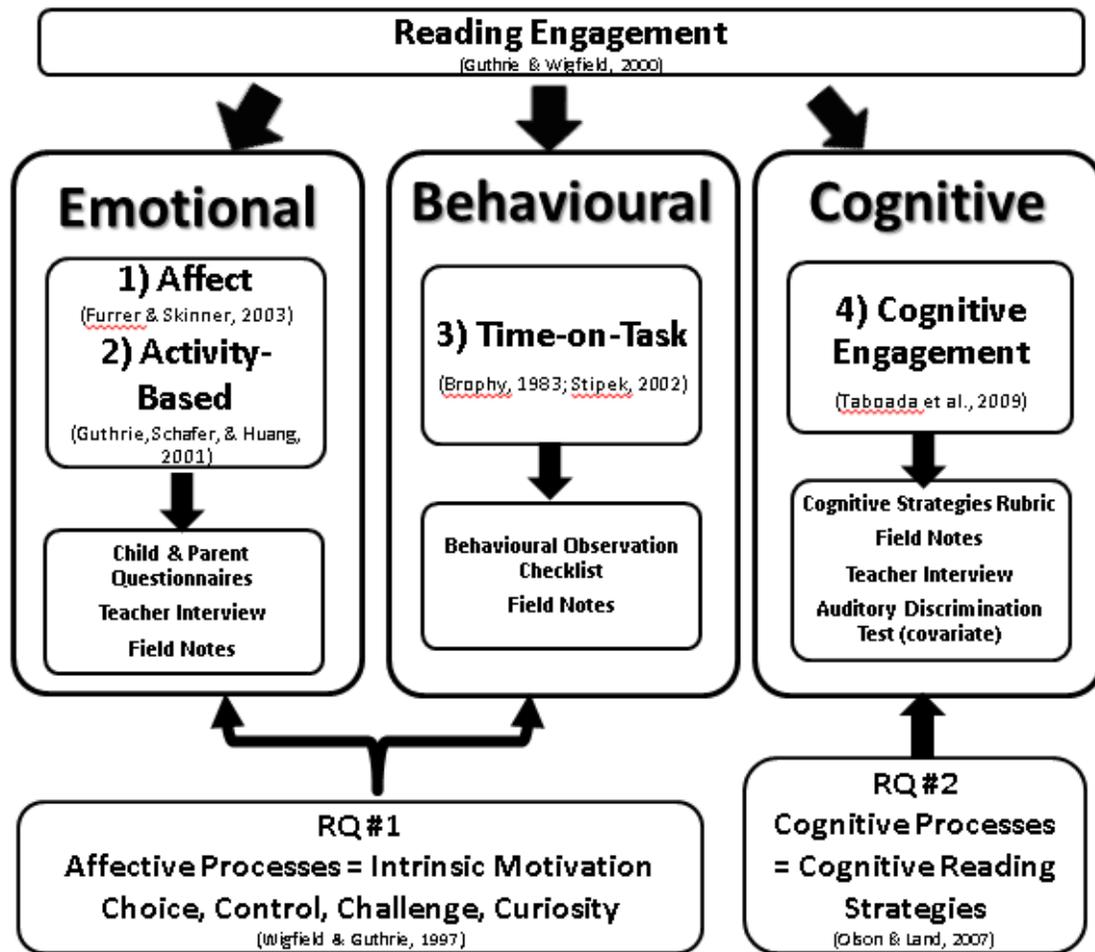


Figure 2. Graphic representation of reading engagement construct, sub-constructs, and data sources used to answer research questions

teachers, student participants) related to the student participants' mobile eBook reading experiences.

**Motivation to read questionnaire—conversational interview.** To answer the first research question, *My Motivation to Read Questionnaires 1 and 2* (see Appendices C and D) were administered to participants exactly as it was administered to pilot study participants except that, where necessary, questionnaire items were modified to better suit the scope of the current study. For example, in adapting the questionnaire, the terms “computers” and “Internet” were replaced with “mobile devices” and specifically “tablets.” For post-intervention questionnaires, additional items asked participants to discuss their most and least favourite aspects of mobile eBooks, as well as any recommendations for improving the mobile eBook reading experience.

**Teacher interviews.** To answer the first and second research questions, semi-structured interviews (see Appendix K) were conducted with the three teacher participants individually at the end of the study during their lunch break (approximately 20 minutes in length). Questions focused on their perceptions of the student participants' cognitive strategy use, frequency of mobile technology use (more specifically, mobile eBook reading), reading engagement, and motivation. Teachers were also asked to share their views on the integration and significance of technology, and more specifically, mobile devices such as iPads as tools to use as part of their first grade children's classroom reading instruction.

## **Qualitative Data Analysis**

Interviews and researcher's field notes were transcribed and analyzed independently by the researcher. A summary of each participant's overall thoughts and conversations with the researcher were prepared. As part of a member-checking process, the participants were invited to edit and elaborate on these summaries (Bogdan & Biklen, 1998; Miles & Huberman, 1994). Each dataset was organized and coded according to the participants' homeroom teacher (using single-letter identifiers A-C) and school type (School 1 and School 2). The interview data were colour-coded to sort out the general discussion topics. Field notes and journal entries were used to corroborate patterns found from the verbal data. The field notes were coded as documentation of the researcher's interactions with the student participants and used to confirm the child, teacher, and parent participants' perceptions of their mobile eBook reading experience (Creswell, 2012). After several readings of the data files, the investigator worked on linking the qualitative and quantitative data to this study's research questions. Here, the researcher highlighted certain words, phrases, patterns of behaviour, and occurrences that repeated themselves. Commonalities and differences among student, teacher, and parent responses, experiences, and behaviours were then identified. As displayed in Table 2, a sample of the emergent coding process used for textual content analysis is provided to illustrate how unitized data from data sources were coded and then organized into key descriptor phrases. Categories emerged from these data and the categorical clusters were collapsed to form general patterns (Bogdan & Biklen, 1998; Creswell, 2012; Miles & Huberman, 1994).

Table 2

*Sample of Data Analysis: Category Generation of Themes*

Theme	General coding categories	Example of units of data
Role of reading engagement on students' reading motivation (breadth, amount, and enjoyment)	Reading breadth	"Students prefer fiction. They have been exposed to fiction more since infants like fairy tale stories" (James, Grade 1 Teacher, Interview)
	Reading amount	At pre-intervention, ten students from Martha's class take out books from the library "some days", four take out books never/hardly ever, and one student takes books from the library almost every day" ( <i>My Motivation Questionnaire 1</i> , p. 1). At post-intervention, six students from Martha's class take books out from the library "some days"; seven never/hardly ever visit the library, and two students take books out from the library "almost every day" ( <i>My Motivation to Read Questionnaire 2</i> , p. 1)
	Reading enjoyment	Altogether, eight parent participants said their child enjoys spending their free time reading "a lot"; nine said "a bit" and three said "dislikes a bit" ( <i>My Child's Motivation to Read Questionnaire</i> , p. 4).

In order to establish the credibility of the conclusions and findings, peer debriefing was used. During the peer debriefing process, raters reviewed data samples, and provide a sounding board for the researcher's ideas, questions, and conclusions in order to confirm or disconfirm emergent themes as logical and proper (Creswell, 2012; Erlandson, Harris, Skipper, & Allen, 1993). The peer debriefer included the researcher's faculty advisor. Additionally, two primary-grade teachers served as practitioner debriefers, whose roles were to provide review initial coding to ensure consistency in scoring students' responses to the eBook comprehension questions, as well as review initial coding to confirm that the codes and data interpretation match the textual data. Although findings from this type of analysis are not generalizable, the themes and patterns identified as relevant to this type of experience may be transferable to similar situations (Lincoln & Guba, 1985). Credibility of findings was ensured through the use of multiple data sources providing triangulation of data.

### **Quantitative Data Collection**

Data sources collected for purposes of descriptive and inferential statistical analyses included mean pre-, interim-, and post-intervention scores from the auditory discrimination test, child and parent questionnaire, student behaviour observation checklist, and cognitive strategies rubric (see Figure 2).

**Motivation to read questionnaire—reading survey.** To answer the first research question, *My Motivation to Read Questionnaires 1 and 2* (see Appendices C and D) were administered to participants exactly as they were to the pilot study participants except that, where necessary, the closed-ended questionnaire items were modified to better suit the scope of the current study. For example, the researcher included items that

assessed the breadth and frequency of children's reading on mobile devices both in and out of school (e.g., eReaders, iPads). At the end of the intervention, *My Motivation to Read Questionnaire 2* (see Appendix D) was administered. It contained the same question format as the first questionnaire, with the addition of five items that assessed any changes in children's initial habits of, attitudes toward, and frequency of mobile eBook reading. Content validity was enhanced by having this instrument independently assessed by four grade 1 teachers and the researcher's advisor and dissertation committee. Paired and independent samples *t*-tests were conducted to measure changes or differences in student participants' motivation scores.

**My child's motivation to read questionnaire (parent version).** To facilitate home-school connectivity and gain the parents' perspectives on their child's use of the iPad for mobile eBook reading, parents of the student participants were asked to complete and return *My Child's Motivation to Read Questionnaire* (see Appendix H) at post-intervention. This instrument was constructed to parallel the content and format of the child version so that measures between parents and children were comparable for data analysis. The first part of the survey assessed whether or not their child had access to certain mobile devices at home, such as an eReader (e.g., Amazon Kindle), or other tablet computers (e.g., Apple iPad). The post-intervention questionnaire assessed the parents' attitudes toward and perceptions of the impact that the iPad had on their child's reading and level of enjoyment derived from participating in various reading activities. Parent respondents were invited to write comments about their child's involvement in this study, including any changes they may have seen in their child's motivation toward reading (especially mobile eBooks), as well as any reservations they may have about

their child using such mobile devices for classroom reading instruction. A total of 30 surveys were distributed, and 21 parents (eight from School 1 and 13 from School 2) completed the survey, for an overall response rate of 70%.

**Auditory discrimination.** *Wepman Auditory Discrimination Test* (Wepman & Reynolds, 1987; see Appendix I), a baseline test of auditory discrimination, was conducted at the beginning of this study as a covariate or screen for any deficits in student participants' auditory processing skills. A covariate is a variable that the researcher controls for using statistics and that relate to the dependent variable and adjusts for the results of initial differences in performance among the participants (Creswell, 2012). An analysis of covariance was conducted using the listening comprehension pre-intervention raw scores from the *Wepman Auditory Discrimination Test* (Wepman & Reynolds, 1987) in order to address the possibility that differences in student participants' cognitive strategy scores during the mobile eBook reading sessions might be due to differences in their listening skills. The researcher used this test in order to identify any participants that may have a Central Auditory Processing (CAP) Disorder, which would potentially confound the results of any presented auditory stimuli, such as in the eBook read-alouds or the researcher's verbal instructions.

The *Wepman Auditory Discrimination Test* (Wepman & Reynolds, 1987) consists of 40 one-syllable word pairs, with the words in each pair differing by one phoneme. Test-retest reliability estimates ranged from .88-.91 as reported in the test manual (Wepman & Reynolds, 1987). The researcher read the word pairs aloud, one pair at a time, to the student participants who were faced away from the researcher. The participants were told to respond "same" or "different" to the pairs of words, and the

researcher recorded their responses. The total score was determined by counting the number of circled responses in the 40 unshared boxes in the “Different” column. The maximum possible raw score was 40. The test was considered invalid if the total number of circled responses in the unshaded boxes in the “Different” column was nine or less, and/or the total number of circled responses in the unshaded boxes in the “Same” column was six or less.

**Cognitive strategies rubric.** The researcher used the same scoring rubric from the pilot study for assessing individual participants’ oral responses and their use of the following comprehension strategies when answering the inferential and evaluative questions that were read aloud to them during each mobile eBook reading session: making connections; activating prior knowledge; questioning; inferring and making predictions (see Appendix F). The student participants’ oral responses to the oral inferential and evaluative questions were scored holistically, using a four-point scale from: Level 1 (not meeting expectations); Level 2 (partially meeting expectations); Level 3 (meeting expectations); to Level 4 (exceeding expectations). Because scoring of such open-ended responses are somewhat subjective (Pearson, 1994), three independent scorers, including two grade 1 teachers who were all familiar with the assessment standards coded all student participant responses and checked the interrater agreement (McGraw & Wong, 1996). There was strong interrater reliability among the three coders ( $r = .97, p < .05$ ). Therefore, the coders were reliably and consistently using this data collection instrument (Hurlburt, 2003).

**Behavioural observation checklist.** An adapted version of the *Behavior Observation System for Students (BOSS; Shapiro, 2004)* was used during the mobile

eBook reading sessions with each student participant to answer the first research question and record the frequency of on- and off-task behaviour during the mobile eBook reading sessions (see Appendix J). The difficulty in operationalizing child engagement led the investigator to adopt time-on-task as a proxy measure for engagement, using observable behavioural measures. Using 30-second intervals, a momentary time sampling procedure was used to observe and categorize children's engagement as either active or passive. A child's level of active engagement during the mobile eBook reading session was defined as those times when the child was always attending to the computer screen, by reading aloud or along with the story, clicking the mouse to the "next" page in the story or question, making comments or asking questions before, during, and after reading (of themselves, the author, and/or the text), using other positive, task-/goal-oriented nonverbal behaviours (e.g., smiling when the computer told the child "Well Done!" after answering a question correctly, or eagerly going back to the question and reattempting the question after the computer told the child, "Oops, try again").

When a child was not engaged in academic reading behaviour, three possible categories of off-task behaviour were coded. If any of the three behaviours occurred at any point during the interval, a mark was made in the appropriate box. Off-task motor behaviours (OFT-M) were defined as any instance of motor activity that is not directly associated with the assigned academic task. Examples of OFT-M included: engaging in any out-of-seat behaviour; aimlessly flipping the pages of the book or touching the computer screen, manipulating or playing with objects not related to the academic task. Off-task verbal behaviours (OFT-V) were defined as any audible verbalizations that were not permitted and/or were not related to the assigned academic task. Examples of OFT-V

included the following: making any audible sound (e.g., whistling, humming) or talking to the researcher about issues unrelated to the assigned academic task. Finally, off-task passive behaviours (OFT-P) were defined as those times when a child was passively not attending to an assigned academic activity for a period of at least 3 consecutive seconds. Examples of OFT-P behaviour included looking away from the computer screen, not reading along with the story or answering the questions. It is important to note that the child must be passively off-task for 3 consecutive seconds within an interval to be scored. Interrater reliability kappa coefficients for the *Behavior Observation System for Students* have been reported as ranging from 0.93 to 0.98 (Shapiro, 2004).

### **Quantitative Data Analysis**

All quantitative analyses were performed using the Statistical Program for Social Sciences (SPSS), Version 19 for Windows (IBM Corp., 2010). To mitigate any significant differences between the student participants' listening comprehension skills, the researcher conducted an analysis of covariance (ANCOVA) at pre-intervention using *Wepman Auditory Discrimination Test* (ADT; 1958), as a covariate. To answer the first research question, statistics (i.e., frequencies) and descriptive parametric analyses (specifically, paired *t*-tests) were run in order to analyze the differences in reading motivation from pre-intervention to post-intervention. Descriptive statistics (i.e., frequencies) were also used to assess the student participants' frequency of on- and off-task behaviour and level of engagement during the mobile eBook reading sessions. To answer the study's second research question, descriptive statistics and independent *t*-tests were used to assess the student participants' strategy use performance during the mobile eBook reading sessions. It is important to note here that any comparisons between the

two participating schools were made to look at the integrity between the groups and not to compare students from low socioeconomic status (SES) backgrounds to those from high SES backgrounds.

### **Ethical Review**

The current study followed the Tri-Council Policy Statement conventions for ethical research. Brock University Research Ethics Board (REB #10-225) and the school board's Research Advisory Committee (#11-23-12-01) provided formal ethical clearance.

## CHAPTER FOUR: FINDINGS

The purpose of this study was to investigate the utility of mobile eBook reading and the role that reading engagement played in grade 1 students' reading motivation and cognitive strategy use. The following research questions guided this study: (a) How does reading engagement play a role in students' motivation to read with mobile eBooks? (b) How does reading engagement play a role in students' cognitive strategy use during mobile eBook reading? The first two sections answer the first research question and examine the findings from the child and parent questionnaires as well as the student behaviour observation checklist. To answer the second research question, the third and fourth sections summarize the findings from the participants' performance on cognitive strategy use during their eBook reading sessions. The findings from the analysis of covariance (ANCOVA) will also be provided, which examined the participants' cognitive strategy use scores as a variable and auditory discrimination scores as a covariate in order to mitigate any significant differences between the student participants' listening comprehension skills. The teachers' and parents' attitudes toward and perceptions regarding the effects of mobile eBook reading on students' cognitive strategy use, reading motivation, and engagement are embedded in each section.

### **Mobile Reading Amount, Breadth, and Enjoyment: Students' Emotional Engagement During Mobile eBook Reading**

The following section addresses the study's first research question which examined the role that reading engagement plays in grade 1 students' motivation to read with mobile eBooks. Descriptive statistics and the paired samples *t*-test were used to report the findings from the *My Motivation to Read Questionnaires 1 and 2*, as well as

*My Child's Motivation to Read Questionnaire*. It is important to note here that a total of 21 parents (eight from School 1 and 13 from School 2) completed the *My Child's Motivation to Read Questionnaire* at the end of this study, for an overall response rate of 70%.

Three items in *My Motivation to Read Questionnaires 1 and 2* (items 1, 5, 8) were quantitatively scored on a 3-point Likert scale corresponding to the frequency of occurrence (*1 = never or hardly ever, 2 = some days, 3 = almost every day*). The questionnaires also included eight items (12-19) which were quantitatively scored on a 4-point Likert scale ranging from *1 = a little* to *4 = a lot*. Five questions (2-3, 6-7) used a nominal level of measurement, three (4, 9-11) were dichotomous (i.e., *Yes/No; Adult/eBook; Print/eBook*). The findings from *My Motivation Questionnaires 1 and 2* using descriptive statistics and paired samples *t*-test are presented herein to measure the difference (if any) in the breadth, frequency, and enjoyment of participants' reading from pre-intervention to post-intervention.

### **Grade 1 Participants' Reading Involvement: Amount of Reading**

To examine the amount of their out of school reading (print and eBooks), the student participants were asked how often they took books out of their classroom, school, and public library for recreational reading purposes. At pre-intervention, the majority ( $n = 22$ ) of participants claimed to take books out of the library *some days* ( $M = 1.93$ ,  $SD = .52$ ). There was no change in the frequency of visits to the library at post-intervention as the majority ( $n = 16$ ) of the participants still said that they took books out of their library *some days* ( $M = 1.93$ ,  $SD = .69$ );  $t(29) = .00$ ,  $p = 1.00$ . In response to the question, "This is how much I enjoy it when I spend my free time reading," the paired sample *t*-test

revealed a statistically significant difference in mean response scores from pre-intervention ( $M = 1.63$ ;  $SD = 1.13$ ) to post-intervention ( $M = 1.87$ ;  $SD = 1.14$ );  $t(29) = -2.54$ ,  $p = .02$ . The majority of parent respondents ( $n = 9$ ) and student participants felt *very happy* spending their free time reading at pre-intervention ( $n = 21$ ) and post-intervention ( $n = 16$ ).

### **Grade 1 Participants' Reading Involvement: Breadth of Reading**

As shown in Table 3, fiction books continue to remain the dominant and most preferred book type among the primary-grade children (Palmer & Stewart, 2003).

Students from School 1 read a total of 71 fiction eBooks and 49 non-fiction eBooks. Similarly, the student participants from School 2 read 81 fiction eBooks and only 39 non-fiction eBooks. This finding also coincides with the grade 1 teachers' perceptions of their students' preference for fiction books: "Our students prefer fiction. They have been exposed to this type of book more since they were infants. We've just started diving into non-fiction, so it is still new to them" (James, Grade 1 Teacher, Interview).

As Malone and Lepper (1987) suggested, the eBooks comprised varying reading levels, which allowed students to move through the levelled eBooks with self-determination and at their own pace. For example, the researcher noted that many of the student participants frequently sought to read the eBooks that were above their independent reading level. For example, Patrick, a grade 1 student from School 2, constantly sought new challenges in his reading and set lofty goals as he believed he could successfully achieve them: "I did Level B last time, I'm going to do Level D today, that's a higher level" (Researcher's Anecdotal Notes).

Table 3

*Total Number of Fiction and Non-Fiction Books Read During eBook Reading Sessions*

	N	M	SD	t	P
<b>Fiction</b>					
School 1*	71	4.73	2.19	-.88	.39
School 2**	81	5.40	1.96	-.88	.39
<b>Non-Fiction</b>					
School 1*	49	3.27	2.19	.88	.39
School 2**	39	2.60	1.96	.88	.39

*Note.* \*School 1 = St. Columbus (low income elementary school); \*\*School 2 = St. Veronica (high income elementary school).

When asked to indicate their most preferred type of reading material at pre-intervention, picture books emerged as the most preferred choice ( $n = 13$ ;  $M = 4.27$ ,  $SD = 1.78$ ). At post-intervention, eBooks became the most preferred reading choice for 10 participants ( $M = 4.73$ ,  $SD = 1.84$ ). This finding coincided with the participants' preferred media type (print or electronic) as an overwhelming majority of participants ( $n = 26$ ;  $M = 1.87$ ,  $SD = .35$ ) preferred electronic reading material to printed material at pre- and post-intervention. Similarly, the same number of participants ( $n = 23$ ;  $M = 1.60$ ,  $SD = 1.40$ ) reported that newspapers were their least preferred reading source at both pre- and post-intervention.

At pre-intervention, three student participants from School 1 and eight students from School 2 had read eBooks on a mobile device (outside their eBook reading sessions with the researcher). The same number of participants read mobile eBooks at home at post-intervention. At School 1, students had reportedly read eBooks such as *The Hunger Games*, Dr. Seuss, and comics on their iPods and iPads. At School 2, students had read eBooks such as Robert Munsch, comics, and Starfall on their mobile devices at home.

### **Grade 1 Participants' Reading Involvement: Enjoyment of Reading eBooks**

The following section uses the nominal (2-4, 6-7, 9-11) and ordinal data (12-19) from *My Motivation to Read Questionnaires 1 and 2*, as well as *My Child's Motivation to Read Questionnaire* to assess how much and why the student participants enjoyed reading the eBooks from ICANREAD™ on a mobile device. A paired samples *t*-test was also run to analyze the ordinal data and reveal any significant differences between the participants' pre- and post-intervention responses.

The item “This is how much I enjoy reading eBooks” reported a significant increase between means from pre-intervention ( $M = 1.17$ ;  $SD = .38$ ) to post-intervention ( $M = 1.50$ ;  $SD = .97$ ),  $t(29) = -2.28$ ,  $p = .03$ ). The majority of student participants reportedly felt *very happy* reading eBooks at pre-intervention ( $n = 25$ ) and post-intervention ( $n = 22$ ). This finding coincides with the participants’ preferred book format and media type (print book or eBook) which indicated significant pre- and post-intervention differences,  $t(29) = .10$ ,  $p = .00$ . At pre- and post-intervention, 26 student participants had a higher preference for reading mobile eBooks compared to the traditional print books. This was also confirmed during the teacher interviews:

I know my students, particularly Aaron, Nolan, and a few other students were always asking me, “Is it my day for the iPad?” They loved doing it. They were engaged and they wanted to come, which for some of them, they are not necessarily always the ones that are engaged during a print book read aloud. But I think with the iPad it was more fun for them. (James, Grade 1 Teacher, Interview)

More specifically, when the student participants discussed their reasons for enjoying the mobile eBooks, several factors arose. The most frequently occurring comments from the participants’ questionnaires focused on choice, personal interests, eBook text features (e.g., digitized speech), user interactivity (ability to answer questions during reading), independence, and control. Three student participants enjoyed the mobile eBook reading because they were able to choose the eBooks they read rather than have text chosen for them by an adult. The student participants clearly had topical interests they wished to pursue during the mobile eBook reading sessions.

For example, three male participants from School 2 each read the same fiction eBooks (i.e., books about *Caillou*, *Franklin*, monsters, and tigers) twice. Likewise, two female and one male participant from School 1 each read the same fiction eBooks twice (i.e., a book about fairy tales, puppies, and a rhyming/counting book), while another male participant's fascination with birthday parties led him to re-read the same non-fiction eBook twice. Fourteen student participants reportedly enjoyed answering the embedded eBook comprehension questions. This finding coincided with the participants' responses to the question, "This is how much I enjoy answering reading questions on an iPad." There was a significant difference in mean response scores from pre-intervention ( $M = 1.9$ ;  $SD = 1.03$ ) to post-intervention ( $M = 2.00$ ;  $SD = 1.15$ );  $t(29) = -2.69$ ,  $p = .01$ . Again, the majority of participants were *very happy* answering reading questions using the iPad ( $n = 15$  at pre-intervention,  $n = 16$  at post-intervention). Another cited reason for students enjoying the mobile eBooks included the fact that the mobile eBook reading "felt like bedtime reading with mom and dad."

As indicated in their questionnaires, students perceived the eBooks to be: "easier to read and follow along with the big, moving words and talking voice," "easier because you don't have to write if you are not good at it, you can save books easier on iPads than on paper which you can lose," "you get to watch videos and read any story you want," and "when a book is on a bookshelf at the library, it is harder to find but you just have to look a book up in the App Store on the iPad." Likewise, the majority of parents ( $n = 11$ ) also believed that their child preferred reading mobile eBooks over traditional print books.

Similarly, the majority of parent respondents provided several of the following reasons for their child's perceived enjoyment of the mobile eBooks, including: their child's proficiency with and admiration for the mobile tool ("she's good at it"); the interactivity and novelty of the eBooks (i.e., moving pictures, colourful illustrations, and sound effects); ease of use; novelty; independence ("makes her feel like a big girl"); one-on-one instruction; wide variety of eBooks; and audio narration. The teacher participants were also in agreement with the parent respondents that the undivided attention and one-on-one instruction provided to student participants during the eBook reading sessions likely contributed to their positive feelings toward this reading activity than other print-based reading activities: "I think students love and crave the one-on-one attention. I heard some kids ask why they couldn't go with you. So they all wanted a turn...the feedback from the kids was good" (Leslie, Grade 1 Teacher, Interview).

The motivation questionnaire also asked students and their parents to describe their least favourite aspects of reading the mobile eBooks. Ten student participants said that they would not change anything about the eBooks. One parent respondent believed that the selection of eBooks available on the ICANREAD™ website (Ciampa, 2011) were not high-interest books that their child would choose on his or her own. Three student participants and a parent respondent did not like the fact that they could not read the eBooks by themselves. Two parent respondents and one student participant shared their own preference for the comforting presence and physicality of a print book along with the haptic nature of page-turning. Technical frustrations including the perceived delays in webpage loading time were reported by the student participants. Three student participants did not like "the learning" on it (i.e., answering

comprehension questions) as they believed the sentence starters were “too hard to answer.” According to one parent respondent and consistent with Korat’s (2010) findings, one of the problematic issues regarding eBooks was that the interactive effects tend to distract the child’s attention from the story’s content, as “he is frequently interrupted because he is so curious.”

Mobile devices were viewed as a tool for bridging school learning and home learning (Traxler, 2007). It was found that the students who had access to handheld devices at home wanted to engage in more eBook reading and increased iPad use at home; one parent noted that “My child always enjoyed reading on the iPad, and asked me to buy him an iPad because he wants to read these books on it at home” (Anonymous Parent), while another commented that “My child has asked to use the iPad more frequently for reading books since this study started” (Anonymous Parent).

By enabling learners to learn anytime, anywhere, mobile technology augments the propensity for students to engage in self-directed, independent learning beyond the classroom walls. Consistent with previous research (e.g., Sharples et al., 2009), the findings of this research illustrate how mobile devices were used by parent respondents as a tool for bridging school learning and home learning.

### **Time on Task: A Measure of Students’ Behavioural Engagement During Mobile eBook Reading**

This section also addresses the first research question, “How does reading engagement play a role in students’ motivation to read with mobile eBooks?” A behavioural observation checklist was used during the mobile eBook reading sessions (which lasted approximately 20 minutes) with each student participant to record the

frequency of on- and off-task behaviour, and level of engagement with the mobile eBooks. According to the checklists, a total of two participants from School 1 and 14 participants from School 2 were always actively engaged during each mobile eBook reading session. These participants were never distracted by surrounding noises and their eyes were always oriented toward the tablet screen. These 14 participants occasionally glanced at the static illustrations before and after the narrating voice read the page aloud to them, all of their extraneous comments and questions related directly to the eBook, and they even voluntarily made text connections relevant to the story content. A total of 18 off-task motor behaviours were observed and coded from the participants in School 1, while none of the student participants from School 2 demonstrated off-task behaviours during the eBook reading sessions.

Interestingly, the majority of students' off-task motor behaviours related to the accessibility features of the iPad, including tapping the highlighted words, action words (text balloons) in the illustrations (i.e., "drag," "flip"), zooming in and out on the page, and playing with the iPad cover. When the researcher asked the participants why they were tapping the words or icons on the screen, some responded with, "I wanted to see if it would read the words out loud to me again," and "I wanted to see what would happen when I touched the balloon." Similarly, 14 out of 39 coded off-task verbal behaviours that occurred in School 1 related to the inherent reading-friendly dimensions of the iPad, (e.g., "I didn't know that's how you make the screen bigger"; "I like how you can stand the iPad up when you're reading"; "Is this your voice that's reading to me?"). A total of 67 off-task passive behaviours (e.g., looking at the children and/or teachers walking into the library) were demonstrated by the participants from School 1. It is

important to note that all of the student participants persisted in answering the embedded eBook comprehension questions regardless of the difficulty level or question type.

The student participants' behaviours during the eBook reading sessions did not match their questionnaire responses. When asked how well they could focus while reading a book on an iPad, the *t*-test revealed a statistically significant difference in mean response scores from pre-intervention ( $M = 1.57$ ;  $SD = .82$ ) to post-intervention ( $M = 1.97$ ;  $SD = 1.07$ );  $t(29) = -2.11$ ,  $p = .04$ . At pre-intervention and post-intervention, the majority of participants ( $n = 19$  and  $n = 12$ , respectively) reportedly felt *very happy* and could focus well while reading a book on an iPad. The majority of parent respondents ( $n = 11$ ) also believed that their child could focus very well while reading on an iPad. Based on these findings, it is possible that other contextual factors may have contributed to some of the participants' off-task behaviours. These factors will be further discussed below.

### **Students' Cognitive Engagement During Mobile eBook Reading**

To address the second research question—"How does reading engagement play a role in students' cognitive strategy use during mobile eBook reading?"—the following section uses descriptive statistics to examine the researcher's field notes and cognitive strategy use rubric that assessed student participants' oral responses to the embedded comprehension questions during the mobile eBook sessions. The findings from the independent *t*-tests which were run to examine the differences (if any) in cognitive strategy use scores between the two participating schools will also be discussed. First, the findings from the analysis of covariance (ANCOVA) will be

provided, which examined the participants' cognitive strategy use scores as a variable, and auditory discrimination scores as a covariate in order to mitigate any significant differences between the student participants' listening comprehension skills.

### **Participants' Auditory Discrimination: Analysis of Covariance (ANCOVA)**

A one-way analysis of covariance (ANCOVA) at the .05 probability level ( $p=.05$ ) was conducted using the raw scores (out of 40) from the *Wepman Auditory Discrimination Test* (Wepman & Reynolds, 1987) in order to address the possibility that differences in student participants' cognitive strategy use scores might be due to differences in their listening skills. The independent variable (school groups) involved two levels: School 1 (St. Columbus) and School 2 (St. Veronica). The dependent variable was the participants' cognitive strategy use scores and the covariate was the auditory discrimination test which was administered at pre-intervention. By applying auditory discrimination as a covariate, the ANCOVA was not significant  $F(1, 29) = .13, p = .72$ . In other words, there was no significant difference (interaction effect) in cognitive strategy use scores in respect of the two school groups.

As can be seen from the descriptive statistics for the overall cognitive strategy use scores in Table 4, the students from School 1 showed higher mean overall scores ( $M = 2.36, SD = .46$ ) than did the students from School 2 ( $M = 2.00, SD = .51$ ). Table 5 shows the mean levels of achievement for the participants' responses to the inferential and evaluative questions in the mobile eBooks they read during the 5-month intervention period.

Table 4

*Means and Standard Deviations for Responses to eBook Comprehension Questions*

*(Overall Cognitive Strategy Use Scores)*

	<i>n</i>	<i>M</i>	<i>SD</i>
School 1 (St. Columbus)	15	2.36	.46
School 2 (St. Veronica)	15	2.00	.51

Table 5

*Means and Standard Deviations for Mean Responses to the eBook Comprehension*

*Questions*

	Question type / cognitive strategy							
	Inferential						Evaluative	
	Making predictions		Prior knowledge		Making connections		Expressing personal thoughts/opinions	
School	1	2	1	2	1	2	1	2
M	2.0	2.2	2.5	2.3	1.9	1.9	2.3	1.9
SD	1.0	1.1	1.0	.9	1.3	1.1	1.2	.96

As shown in Table 5, the inferential scores (making predictions) for the children from School 1 yielded a mean of 2.0 with a standard deviation of 1.0; the inferential scores (making predictions) for the children from School 2 yielded a higher mean of 2.2 with a standard deviation of 1.1. When asked to brainstorm what they already know (prior knowledge) about the book topic (e.g., “What do you already know about energy?”), the children from School 1 yielded a higher mean of 2.5 with a standard deviation of 1.0. The prior knowledge scores for the children from School 2 yielded a lower mean of 2.3 with a standard deviation of 0.9. When asked to express their personal opinions and thoughts on evaluative questions like, “What was your favourite part of the story?” and “If you were the author, which part of the story would you change and why?” the students from School 1 answered with “some effectiveness” (Level 2), with a mean of 2.3 and a standard deviation of 1.2. The students from School 2 answered these evaluative questions with “limited effectiveness” (Level 1), scoring a mean of 1.9 and a standard deviation of .96.

Generally, the participants were most successful at answering inferential questions that required prior knowledge to be accessed ( $M = 2.4, SD = .95$ ). Participants received the same mean score when required to make predictions ( $M = 2.1, SD = 1.05$ ) and express their thoughts and personal opinions ( $M = 2.1, SD = 1.08$ ). The participants were least successful at answering evaluative questions that required them to make connections relevant to the story content ( $M = 1.9, SD = 1.2$ ).

### **Comparing Group Means in Cognitive Strategy Use: Independent *t*-Test**

Independent Samples *t*-tests were run to examine the differences (if any) in cognitive strategy use scores between the two participating schools. There is no

significant difference between the mean inferential scores (ability to make predictions) for the two groups of children,  $t(361)=-1.73, p=.08$ . There is a significant difference between the mean evaluative (activating prior knowledge) scores for the students from School 1 and School 2,  $t(40) = -2.23, p = .03$ . There is no significant difference between the mean evaluative (making connections) scores for the students from School 1 and School 2,  $t(126) = -0.50, p = .96$ . Lastly, there is a significant difference between the mean evaluative (expressing personal thoughts/opinions) scores for the two groups of children,  $t(141) = 2.3, p = .02$ .

### **Fostering Students' Higher Order Thinking Skills: Classroom Questioning Techniques**

In support of the above findings, Martha, the grade 1 teacher from School 1 reported that the vast majority of comprehension questions she asks her students are typically high-level cognitive questions that require them to use higher order thinking and reasoning skills:

The questions I ask are not usually literal questions. They are usually higher level- some analysis, judgment, or inferencing. It depends on the read-aloud—if the purpose is to find evidence in the story, then there might be some literal component to it, but I generally don't stick with "Who is the character?"; it is more like, "What is the character's motivation?" or "How did the character change in the story," or "How are you like the character?". (Martha, Grade 1 Teacher Interview)

In contrast to Martha's questioning techniques, the grade 1 teachers from School 2 were more focused on teaching their students sentence-composing techniques and seemed to underestimate their students' inference-making and evaluative comprehension abilities:

For the higher primary grades and lower junior grades, a lot of it is maturity. I don't think a lot of the students understand when they are asked a high-level inferential or evaluative question. It is not their way of thinking as a 6 year old, unless it is modeled, and we rarely do it. (James, Grade 1 Teacher Interview)

In grade 1, a lot of it is just getting them to answer questions based on a full answers, and "Where do you get that information?" and "Why do you think that?" So we're teaching them to go back to the text to answer the question. That is our job, teaching them how to find an answer, how to structure an answer, and how to tell me what they know in complete thoughts. (Leslie, Grade 1 Teacher Interview)

The above assertions expressed by the teachers themselves may account for the differences in comprehension scores between the two participating schools.

In answer to the second research question—"How does reading engagement play a role in students' cognitive strategy use during mobile eBook reading?"—there was no significant difference in cognitive strategy use scores between the two schools at post-intervention. In terms of the participants' overall cognitive strategy use scores, there was no significant difference between the mean inferential and the evaluative (making connections) scores for the two groups of participants. However, there was a significant difference between the mean evaluative scores for the questions that assessed students' ability to activate their prior knowledge as well as express their personal thoughts and

opinions. A plausible explanation for this finding is that one of the grade 1 teachers reportedly asked her students high-level cognitive questions that required them to consistently use higher order thinking and reasoning skills.

### **Summary of the Findings**

To address the study's first research question, "How does reading engagement play a role in students' motivation to read mobile eBooks?" eBooks became the most preferred reading choice for the majority of participants at post-intervention. The most frequently occurring reasons for the participants' perceived enjoyment of and emotional engagement with the mobile eBooks (*affect*) focused on choice, personal interests, eBook text features (e.g., digitized speech), user interactivity (ability to answer questions during reading), independence, and control. The majority of parent respondents believed that their child enjoyed reading eBooks on a mobile device because of their child's proficiency with and admiration for the mobile tool ("she's good at it"); the interactivity and novelty of the eBooks (i.e., moving pictures, colourful illustrations, and sound effects); ease of use; novelty; independence ("makes her feel like a big girl"); one-on-one instruction; wide variety of eBooks; and audio narration. It was also found that the students who had access to handheld devices at home wanted to engage in more eBook reading and increased iPad use at home. In terms of their levels of behavioural engagement (*time on task*) during the mobile eBook reading sessions, the majority of students' off-task motor behaviours related to the accessibility features of the iPad. Off-task verbal behaviours related to the inherent reading-friendly dimensions of the iPad. Off-task passive behaviours (e.g., looking at the children and/or teachers walking into the library) were mostly demonstrated by the participants from School 2.

In response to the second research question, “How does reading engagement play a role in students` cognitive strategy use during mobile eBook reading?” the participants were most successful at answering inferential questions that required prior knowledge to be accessed and least successful at answering evaluative questions that required them to make connections relevant to the story content. There was no significant difference between the mean inferential (ability to make predictions) and evaluative (making connections) scores for the two groups of children. However, there was a significant difference between the mean evaluative (activating prior knowledge and expressing personal thoughts/opinions) scores for the students from Schools 1 and 2. These findings corroborate the teachers` questioning techniques during their reading instruction, which may account for the differences in comprehension scores between the two participating schools.

## **CHAPTER FIVE: DISCUSSION, IMPLICATIONS, LIMITATIONS, AND CONCLUSIONS**

Previous research on eBooks has relied on only low-level literal questions and/or story retelling as a way of evaluating the children's understanding of the story at the end of the reading session (e.g., Grimshaw et al., 2007; Pearman, 2008). Additionally, these studies have only examined the use of eBooks available in CD-ROM format or on the Internet (Grimshaw et al., 2007; Pearman, 2008). Studies examining whether and how eBooks on tablets influence beginning readers' motivation and comprehension (more specifically, cognitive strategy use) have not been adequately studied (Bayliss et al., 2012; Larson, 2010). Also central to the rationale for this investigation is the finding that motivational factors relating to eBooks and mobile eBook reading has been minimal (Sharples, 2007; Sharples et al., 2009).

### **Discussion of the Findings**

The purpose of this study was to investigate this underexplored area in the literature and examine the utility of mobile eBook reading and the role that reading engagement plays in grade 1 students' motivation to read with mobile eBooks as well as their cognitive strategy use during mobile eBook reading.

The following section is a discussion of the findings that respond to this study's two research questions.

#### **Mobiles Devices: Educating or Simply Entertaining?**

Regardless of their involvement in this study and increased exposure to reading mobile eBooks, the student participants and their parents perceived the iPad as a game-playing device as opposed to seeing the iPad as a technology that could enhance their

literacy skills (Godwin-Jones, 2005). According to the parent respondents, the student participants continued to use technology at home for playing non-educational games. This coincides with the findings from Thai, Lowenstein, Ching, and Rejeski's (2010) study as well as those from Purcell, Entner, and Henderson's (2010) research which found that games were the most popular type of app downloaded on mobile devices used by children, with the average device containing approximately 10 game-related apps. In a similar vein, children thought of a mobile device as a device related to games and play. Although a few of the student participants became increasingly interested in reading books via mobile devices by the end of this study, the remaining students and their parents either did not view the iPad as a potential education tool or did not know where to locate educational eBooks and eBook apps. Though numerous studies and a growing number of experts believe that mobile devices have significant potential to transform children's learning, most parents and teachers do not yet view these devices as educational allies (Shuler, 2009). To promote public understanding, alter parents' and teachers' perceptions about mobile devices, and prepare for the effective use of such devices, national and provincial education ministries should identify and support the use of mobile technology for education.

Similarly, the frequency and nature of computer use at school may have also been reflective of the grade 1 teachers' comfort level and familiarity with technology. In accordance with Hutchison and Reinking (2011), the three grade 1 teachers reportedly felt unprepared to teach with these technology tools; although they believed it was important to integrate technology into classroom practice, their actual implementation lagged behind their beliefs (Druin, 2009; Hutchison & Reinking, 2011; Karchmer, 2001).

According to Millstone (2012), teachers say that they do not get adequate training on specific technologies or about how to more fully integrate technology into their teaching; nearly half of survey respondents in Millstone's (2012) study cited inadequate training as a reason they would not use technology to support their teaching.

### **The Role of Reading Engagement in Grade 1 Students' Motivation to Read with Mobile eBooks**

The first research question sought to examine the role of reading engagement in grade 1 students' motivation to read with mobile eBooks. Guthrie et al. (2012) corroborated that classroom practices which support student motivation should include the four aspects of intrinsic motivation (choice, control, challenge, curiosity), which are likely to impact students' reading engagement by virtue of their effects on students' motivation. As will be discussed below, these four aspects of motivation (mediators) were embedded in each of the constructs of reading engagement, and may have indirectly impacted the student participants' mobile eBook reading experiences.

Accordingly, the researcher to examine whether and how these aspects which are tied to intrinsic motivation are found in mobile eBook reading. With respect to the participants' emotional engagement with the mobile eBooks, the motivation questionnaire responses revealed that the cited reasons for students' perceived enjoyment of the mobile eBooks (*affect*) closely related to the four motivational aspects of intrinsic motivation: control, choice, curiosity, and challenge (Wigfield & Guthrie, 1997). With respect to the motivational aspects of *control* and *choice*, the student participants enjoyed the mobile eBook reading because they were able to choose the eBooks they read rather than have text chosen for them by an adult. Students who prefer to choose their own

books see such choices as a way for them to express their autonomy and ownership over their own reading (Ryan & Deci, 2000). When students are autonomous and granted control of their own reading experience, it permits them to make their own meaning of reading materials rather than being passive recipients of information.

The participants clearly displayed an interest in the interactive features, such as having the books read aloud to them (the “talking voice”), having the moving words highlighted for them, and being able to hear the words and questions again. These multimedia features afforded by mobile devices seemed to evoke sensory *curiosity* (Korat & Shamir, 2007; Verhallen et al., 2006), and helped to capture almost half of the participants’ attention during the read-aloud sessions without being distracted or influenced by external stimuli. The narrated eBooks also decreased or eliminated the need for students to focus on decoding, allowing them to concentrate on constructing meaning from text (Pearman, 2008).

With respect to the motivational feature of *challenge*, the mobile eBooks allowed for self-selected differentiation of reading level where students could work through the eBooks at their own pace (Chou et al., 2012). The ability to adjust reading content to student level and allow self-paced learning may thus lend mobile eBooks as an ideal tool for implementing differentiated instruction in the classroom. Furthermore, it is important to mention that all of the students persisted in answering all of the embedded eBook reading questions regardless of the perceived difficulty level or question type. If a child is intrinsically motivated to read, they will persist in reading difficult text, exert cognitive effort in resolving conflicts, and successfully employ cognitive strategies (Wigfield & Guthrie, 2000). However if a text is not fulfilling other intrinsic motivational goals such

as control, curiosity, and choice, the person will terminate or minimize the cognitive activity of reading that material (Wigfield & Guthrie, 2000). The cognitive abilities to avoid distraction while reading (behavioural engagement) and employ cognitive strategies are activated if the reading activity is fulfilling said motivational goals. This is consistent with the development of intrinsic motivation (Ryan & Deci, 2000).

In terms of students' behavioural engagement and time-on-task during mobile eBook reading, the iPad also afforded students greater opportunities for haptic modality and user engagement, a new channel for communication through mobile technology by utilizing the sense of touch (Wong et al., 2010). In fact, some of the student participants, especially those from School 1 who had never previously used a tablet, incidentally learned about the haptic touch features such as pinch-in and pinch-out zoom gestures during their mobile eBook reading sessions. The majority of participants from School 1 displayed off-task motor behaviours (i.e., tapping the highlighted moving words, static action words in the illustrations, zooming in and out on the page, and playing with the iPad cover) when they were reading both fiction and non-fiction eBooks on the iPad. Similarly, some of the off-task verbal behaviours that occurred related to the inherent reading-friendly dimensions of the iPad. As abovementioned, these haptic touch features seemed to enhance the student participants' mobile eBook reading experience as well as evoke their *curiosity* (Wong et al., 2010).

Similarly, Simpson, Walsh, and Rowsell's (2013) study on users' navigation behaviours across iPad technologies showed a relationship between physical movement and cognitive (reading) processes. Specifically, the authors' close analyses of elementary school students' responses to literacy tasks revealed the importance of considering touch

to be part of the meaning making processes students employ when they work with interactive tablet screens. By tracking touch, Simpson et al. (2013) suggested that the physical affordances of the mobile platform are a central element of the exploratory learning experience. Therefore, one can deduce that within these mobile environments, touch is a new way of enhancing user engagement.

Although the majority of student participants reported that they could focus better when reading books on a mobile device than a printed book, this finding did not align with the mobile eBook reading observations. Lastly, off-task passive behaviours (e.g., looking at the children and/or teachers walking into the library) were demonstrated by some of the participants when they read the eBooks on the iPad. This finding might be attributed to the fact that all of the student participants from School 1 engaged in independent eBook reading during their lunch hour in the school library, whereas the participants from School 2 engaged in eBook reading in a quiet, enclosed meeting room during their morning literacy block. This distinction prompts the question about which factors may have influenced their mental performance skills (i.e., inability to maintain focus and concentration): the location and time of day when the eBook reading sessions occurred, the static features of the mobile eBooks (versus embedded hotspots), or the students' familiarity and proficiency with the mobile device?

As with any technology that is introduced in a learning environment, there is always a novelty effect (Krendl & Clark, 1994). Accordingly, the student participants may have been more motivated to use this new piece of technology because it was novel and unfamiliar to them, and consequently focused on the technology skills needed to use the book instead of on the content of the book (Parish-Morris, Mahajan, Hirsh-Pasek,

Golinkoff, & Collins, 2013). In fact, this finding is supported by the fact that at pre-intervention, the majority of student participants from School 2 had home access to a tablet computer digital media player such as an iPod Touch, and/or a mobile phone, whereas fewer student participants from School 1 had the same mobile technology access at home. This may explain some of these former student participants' off-task behaviours during their eBook reading sessions.

The majority of the student participants in this study have grown up completely immersed in technology at home; computers and mobile devices are the ways they interact with their world beyond the classroom walls (Howe & Strauss, 2003). This level of familiarity with technology breeds a certain level of expectation (Howe & Strauss, 2003). No longer limited to static pictures to illustrate the text, the student participants in this study expected to dive into an illustration displayed in the mobile eBooks with interactive captions and 3D objects. In other words, the student participants craved more interactivity and immediacy with the mobile reading device (Oblinger & Oblinger, 2005).

Although there was no significant difference in the frequency of student participants' eBook reading at post-intervention, the questionnaire data corroborated the findings from previous research (e.g., Chera & Wood, 2003; Korat & Shamir, 2006; Segers et al., 2004) and revealed that the interactive features of the mobile eBooks may have influenced the student participants' desire to use electronic formats as their preferred medium for reading material.

In line with the four aspects of intrinsic motivation, the teacher participants were also in agreement with the parent respondents that the independence provided to student participants during the eBook reading sessions gave them greater control over their

learning while allowing them to assuage their own curiosity (Yopp & Dreher, 1994). This likely contributed to their positive feelings toward this reading activity rather than print-based reading activities. This finding coincides with that of de Jong and Bus (2004) as well as Korat and Shamir (2007) who found that children's story understanding after independently experiencing electronic versions of books was comparable with their scores after repeated adult-led text readings.

Despite the student participants' preference for being read to by an adult, lack of time has been an often cited reason for teachers' and parents' inability to provide individual attention during book reading (Segers et al., 2004). Since eBooks do not place a heavy demand on adult support, this offers a viable option for parents and educators who are looking for alternative ways to provide children with occasions for listening to stories (de Jong & Bus, 2004; Korat & Shamir, 2007). Similarly, the student participants, parent respondents, and the grade 1 teachers commented that the undivided attention and one-on-one instruction provided to student participants during the eBook reading sessions likely contributed to their positive feelings toward this reading activity. In line with Deci and Ryan's (1985) motivation theory, two student participants from School 2 who excelled in reading reported that they preferred reading by themselves. Although the student participants looked forward to their teachers' and parents' read-alouds, their reported perceived enjoyment of working individually with the program and without any adult assistance is also noteworthy.

## **The Role of Reading Engagement in Grade 1 Students' Cognitive Strategy Use during Mobile eBook Reading**

The second research question looked at the role of reading engagement in grade 1 students' cognitive strategy use during mobile eBook reading. As revealed in their mean cognitive strategy scores, the student participants' performance was optimized when they could relate (unfamiliar) material to existing, familiar knowledge; all of the participants were most successful at answering the evaluative questions that required them to activate their prior knowledge. In fact, there was a significant difference between these mean evaluative scores for the students from Schools 1 and 2, with the participants from School 1 yielding a higher mean than those from School 2. The participants' prior knowledge (schema) for text content was strongly related to how successfully they constructed meaning—their prior knowledge fueled the accuracy and appropriateness of their inferences (Graesser & Bower, 1990). Similar to the findings in Duke, Pressley, and Hilden's (2004) study, all of the student participants experienced higher levels of difficulty with making personal connections as well as expressing their personal thoughts and opinions about what they read. These difficulties with engaging in critical thinking and evaluating literary texts have been called the "hallmark of poor comprehension" (Duke et al., 2004, p. 512), and there is evidence that it is this difficulty with evaluating (higher level processes) that causes problems with text comprehension, not vice versa (Cain & Oakhill, 1999). When readers have less experience with the book topic, they may have difficulty understanding the content and making inferences from unfamiliar information in texts, for they do not have prior knowledge with which to make any connections (Lee, Grigg, & Donahue, 2007).

Motivation researchers have discussed how motivational and cognitive processes interact and how each affects achievement outcomes (Taboada et al., 2009). In particular, such research has focused on how motivation provides an activating energizing role for cognitive processes which in turn can impact achievement (Pintrich, 2003; Taboada et al., 2009; Wigfield et al., 2008). For example, Wigfield et al. (2008) showed that motivational variables such as intrinsic motivation predict students' achievement in different areas such as comprehension. Previous research has established that specific dimensions of reading motivation (such as control, choice, challenge, and curiosity) and comprehension are correlated (Taboada et al., 2009; Wang & Guthrie, 2004). Interest has also been found to correlate more highly with deep level learning than with surface level learning from texts (Taboada et al., 2009; Wigfield et al., 2008). Wigfield et al. corroborated that reading engagement and intrinsic motivation are fundamental to comprehension. As Wigfield et al. stated, the engaged reader is intrinsically motivated, knowledgeable, and strategic. In contrast, less engaged readers show lower motivation and less use of strategies for comprehending text. So, do motivational constructs such as student choice, control, challenge, curiosity, and interest contribute to students' cognitive strategy use scores? To answer this question is beyond the scope of this study. Future research could examine the relationship between students' reading engagement, reading motivation, and cognitive strategy use performance.

It has been suggested that an internally motivated reader will be more devoted to reading and thus comprehend better (Taboada et al., 2009). In other words, if internal motivation for reading is present and fostered in students, the cognitive processes become more fluent, enhancing students' text comprehension. This desire to understand

energizes the use of reading strategies whether it be activating background knowledge to build a fuller text representation. With respect to readers' cognitive strategy use and persistence during mobile eBook reading, it is plausible then that the student participants' engagement with the mobile eBooks helped them to remember what they were reading, activate their prior knowledge, and make more accurate predictions. With respect to readers' voluntary questioning and commentary during mobile eBook reading, this is a reading strategy that by its characteristics denotes not only cognitive but also motivational attributes of a reader. From a motivational standpoint, a reader who asks high-quality questions conveys his or her curiosity and interest in the topic and the text at hand. This was clearly evident during a vast majority of participants' mobile eBook reading sessions.

However, as indicated in the teacher interviews, one of the grade 1 teachers frequently modelled and expected her students to engage in inferring and evaluating texts, whereas the other teachers from School 2 believed that their students were less capable of answering such higher-order thinking questions due to their developmental levels. Readers are reminded that this study was conducted in the natural classroom settings of each of the schools and that the researcher did not dictate instructional methods.

Recent research suggests that the effectiveness of the teachers can have a very large cumulative impact on student learning over time (e.g., Konstantopoulos & Chung, 2011; Palardy & Rumberger, 2008). While there is a consensus in the research literature that teachers vary widely in their effectiveness to promote student learning (Palardy & Rumberger, 2008), there is a lack of agreement about which aspects matter most. For

instance, some scholars contend that teaching rather than the teacher is the critical factor (Konstantopoulos & Chung, 2011; Palardy & Rumberger, 2008). That is, the practices that teachers employ in the classroom are more important than their qualifications.

Some teachers encourage children to discuss the story during their read-aloud sessions, whereas others leave the discussions until the end. Meyer, Wardrop, Stahl, and Linn (1994) suggest that it is the timing and quality of the interaction that occurs during reading that results in positive effects, rather than just the storybook reading itself. That is, involving students interactively while reading a story aloud may help to improve comprehension and engagement more than post-reading discussions (Terblanche, 2002). In support of this, Hargrave and Sénéchal (2000) found that preschool children who participated orally during storybook reading and responded to open-ended questions about the text had better results than children who listened passively to stories.

According to Dickinson and Smith (1994), read-alouds can support children's developing ability to reason for themselves when these events actively involve the children in analytic discussions of the book being read. The student participants' cognitive strategy use performance may have been influenced by the fact that the eBook comprehension questions were asked during the course of reading, as it has been found that the closer the question to the information it asks about, the higher the recall performance (Dewitz, Jones, & Leahy, 2009). For this reason, the researcher purposefully designed the intervention in such a way as to maximize the effectiveness of the read-alouds and transfer traditional reading behaviours, strategies, and skills by asking student participants questions throughout the eBook reading session rather than only at the end (Dickinson & Tabors, 2001).

According to Attribution Theory (Weiner, 1986), students may rush through or withdraw from a task that proves to be unexpectedly difficult, because a failure episode or the exertion of high effort may engender cognitive or affective distress. Additionally, the absence of frequent rewards, such as immediate feedback and praise may have also removed an important means of sustaining students' engagement with some of the inferential and evaluative tasks (Deci & Ryan, 1985; Lepper, 1981). According to Self-Determination Theory (SDT) (Deci & Ryan, 1985; Ryan & Deci, 2000), interpersonal situations that are conducive to feelings of competence during a certain action can enhance intrinsic motivation for that action, whereas situations that do not support people's need for competence and provide them with positive, immediate feedback undermine intrinsic motivation. In contrast, positive, immediate feedback is assumed to support people's need for competence, which then enhances their intrinsic motivation to engage and re-engage with the task (Deci & Ryan, 1985; Ryan & Deci, 2000). These conjectures suggest that the presence of immediate feedback may have had a more positive impact on intrinsic motivation among the student participants.

### **Implications for Theory**

The theoretical basis for this investigation was the engagement perspective of reading development (Guthrie & Wigfield, 2000). Figure 2 is presented again on the following page for ease of reference. As shown in Figure 2, this model proposes that engagement in reading is based on the motivational and cognitive characteristics of the reader (Guthrie & Wigfield, 2000). Guthrie and Wigfield (2000) proposed that reading

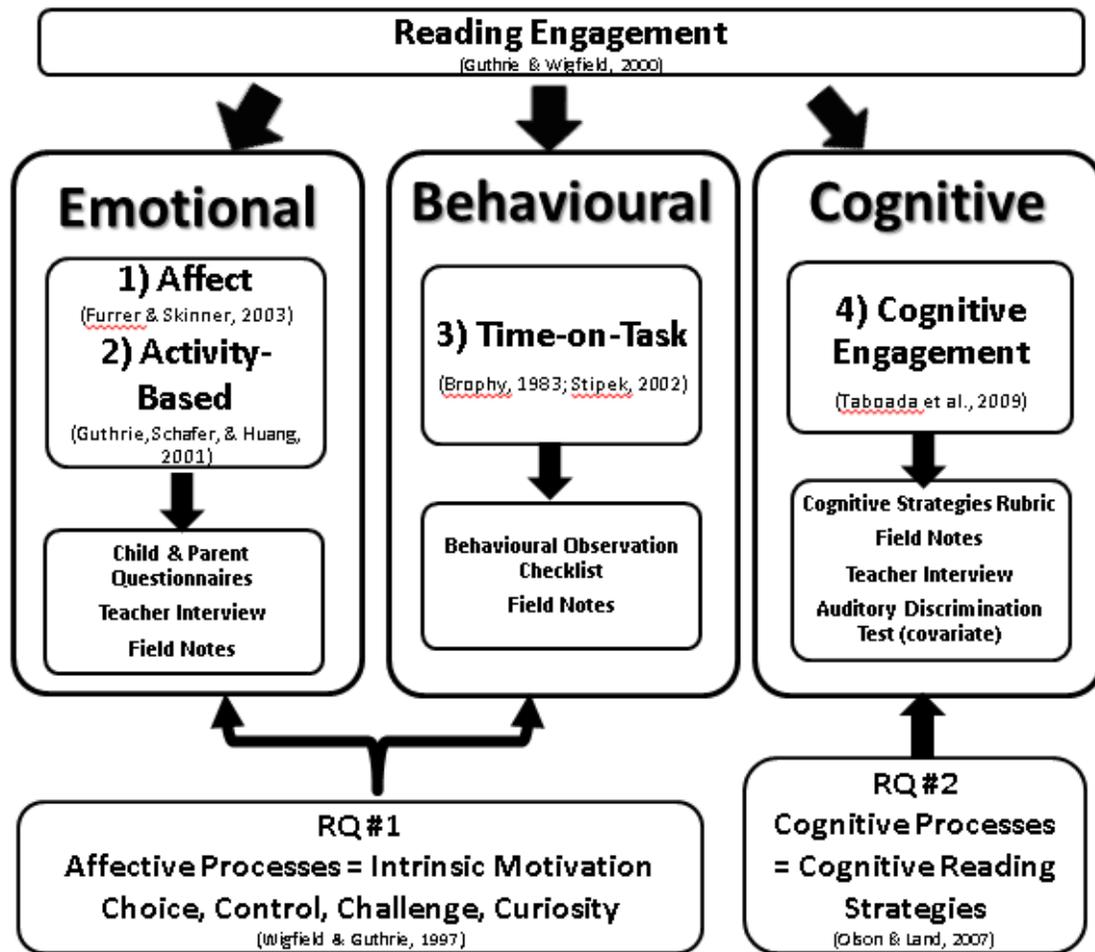


Figure 2. Graphic representation of reading engagement construct, sub-constructs, data sources used to research questions

engagement is a multidimensional attribute including emotional engagement (i.e., *affect*, *activity-based*), behavioural engagement (i.e., *time on task*), and cognitive engagement (i.e., using high-level *cognitive strategies* to foster deep learning). Accordingly, the present study investigated whether, why, and how students' traditional reading behaviours—more specifically, reading engagement—can be transferred to a digital reading environment and play a role in students' motivation to read mobile eBooks as well as their cognitive strategy use during mobile eBook reading. As evidenced below, the four aspects of intrinsic motivation are embedded within each construct and sub-construct of reading engagement.

### **Recommendations to Increase Emotional Engagement (Enjoyment, Amount, and Breadth) during Reading**

One meaning of emotional engagement emphasizes *affect*; in this case, such qualities as enthusiasm, enjoyment, and liking encompass the interaction with text (Furrer & Skinner, 2003; Guthrie & Wigfield, 2000). At the beginning and end of their involvement in this study, the majority of participants had a higher preference for reading mobile eBooks compared to traditional print books. Based on the student participants' reasons for enjoying the mobile eBooks, it is recommended that the following motivation-supporting practices and approaches be used to increase children's desire to read: choice (self-selection), attention to curiosity-evoking characteristics and features of eBooks, personal interests, challenge, and control (Guthrie & Wigfield, 2000).

One way to increase children's desire to read is to let them choose their own books (Wigfield, 2010). During the administration of *My Motivation to Read Questionnaire 2*, children frequently discussed books they had chosen themselves. This

finding highlighted the importance of choice when attempting to positively affect children's reading motivation. Therefore, it is recommended that teachers allow children the opportunity to self-select the books they would like to read. Involving learners in decisions regarding their reading activities should increase their reading engagement and intrinsic motivation to read (Randi & Corno, 2000).

Another meaning associated with emotional engagement relates to how *activity based* it is; this refers to the amount of leisure time students spend reading and the diversity of students' reading practices in and out of school (Guthrie et al., 2001; Guthrie & Wigfield, 2000; Kirsch et al., 2002). Motivation to read contributes to an increased amount of reading, which may then contribute to increased text comprehension (Guthrie & Wigfield, 2000). Taken together, these investigations point toward the position that reading motivation increases reading amount and breadth of reading (Guthrie & Wigfield, 2000). The student participants who had access to handheld devices at home wanted to engage in more eBook reading and increased iPad use at home. In line with one of the four aspects of intrinsic motivation, it is conjectured that the interactivity of the mobile eBooks may have also contributed to heightened cognitive *curiosity* and students' increased voluntary use of mobile devices at home.

Teachers can assess these aspects of reading engagement by questioning students with an instrument like the *My Motivation to Read Questionnaire*. This questionnaire assessed students' amount of reading for enjoyment, as well as their breadth of reading by asking them to identify their least and most preferred reading material. Teachers and parents should then ensure that their children have access to a wide variety of books that appeal to a wide range of interests and allow them to self-select and explore different

types of literature both inside and outside the classroom (Wigfield et al., 2008). In the current study, the participants chose certain eBooks because they were related to their own personal interests. The participants' preferred reading materials included eBooks, magazines, comic books, and picture books. If we want beginning readers to engage in leisure reading, perhaps the first thing we need to do is expand our definition of reading to include eBooks (Schmar-Dobler, 2003). As noted above, at one end of the eBooks spectrum there are PDFs of printed titles, while on the other end are electronic resources with animated characters, interactive quizzes, and online games that accompany texts that can be "played" while each spoken word is highlighted on the screen (Guernsey, 2011). It is believed that reading these various types of eBooks have a place in the 21<sup>st</sup> century classroom. The findings from this study illustrate how interactive features of these digital texts may motivate children.

To prepare students for the digital reading demands they will face both in and out of school, teachers need to model strategies for e-reading (especially books that employ multimodal features and interactive tools), assist students in transferring traditional reading behaviours to electronic texts, and select high-quality interactive eBooks that will scaffold students' reading. The information derived from the motivation questionnaire may help teachers become more knowledgeable about effective and motivational reading instruction practices that meet the diverse needs of their students and take into account the prior knowledge and experiences each child brings to the classroom. However, it is also important for educators and parents to remember that children's reading motivation is multifaceted (Guthrie & Wigfield, 2000). That is, children should not be characterized as either motivated or not motivated to read. Instead (much like adults), they are

motivated to read for different reasons or purposes, and it is important to distinguish among them.

It is recommended that teachers and parents consider the characteristics and features of eBooks that appeared to influence children's interest to read them. Although the student participants preferred and selected fiction text more often than non-fiction text, they also reported that they enjoyed reading some of the eBooks because they learned something from the book. There were also no observed differences in students' off-task behaviours and levels of engagement when reading fiction or non-fiction eBooks. This finding demonstrates the importance of offering both fiction and non-fiction digital texts to beginning readers when trying to increase their reading engagement. These digital texts show promise in supporting struggling readers through multiple tools and features, including manipulation of font size, text-to-speech options, and/or questions that relate directly to the storyline, which all seem to comprise good support for children's literacy development and reading engagement (Korat, 2010). Most classroom teachers have access to at least one computer in the classroom, the school's library, or computer lab. Many electronic books are free and the websites are children friendly and easy to navigate. The addition of a mobile device in the classroom would be beneficial for the students and the teacher. These devices are expensive, but may be less expensive than a computer or laptop. In this study, the majority of student participants had at least one computer at home. If they do not computer access at home, then they have access to a computer at their local public library which also offers free eBooks. As de Jong and Bus (2004) as well as Korat and Shamir (2007) suggested, eBooks might also be useful in allowing children who have the capability to understand stories to

engage in independent reading before they are capable of reading conventional printed texts on their own.

### **Recommendations to Increase Students' Behavioural Engagement (Time on Task)**

#### **During Reading Activities**

One meaning that has been associated with behavioural engagement is *time on task*, which signifies paying attention to text and sustaining cognitive effort (Berliner, 1979; Dolezal et al., 2003; Guthrie & Wigfield, 2000; Stipek, 2002). Time-on-task has long been recognized as an important contributor to reading success because reading is partly a function of the time spent engaged in a task; individual differences in time-on-task contribute to individual differences in reading performance (Guthrie & Wigfield, 2000). The findings in this study, however, do not necessarily support this claim. Off-task behaviour is defined as any behaviour that does not involve the learning task or material, or where learning from the material is not the primary goal (Guthrie & Wigfield, 2000). In the present study, the majority of students' off-task motor behaviours during the mobile eBook reading sessions related to the accessibility features of the iPad, including tapping the highlighted words, action words (text balloons) in the illustrations (i.e., "drag," "flip"), zooming in and out on the page, and playing with the iPad cover. Similarly, some of the off-task verbal behaviours that occurred related to the inherent reading-friendly dimensions of the iPad. Lastly, off-task passive behaviours (e.g., looking at the children and/or teachers walking into the library) were demonstrated by some of the participants when they were reading both fiction and non-fiction books on the iPad. Although these participants (mostly from School 1) exhibited off-task behaviours during the eBook reading sessions, they did not adversely influence their

cognitive strategy use performance. The cognitive strategy use scores of participants from School 1 were comparable to the student participants from School 2. The question then arises as to whether the inherent features of the mobile device and eBook actually facilitate or hinder the participants' learning and comprehension. The haptic/tactile technology delivered a more interactive user experience and seemed to evoke the student participants' sensory curiosity (Wong et al., 2010), which may have enhanced the participants' attention rather than averted their attention from the task at hand (Rodrigo, Baker, & Rossi, 2013). Accordingly, one must also wonder whether the current definitions of on-task and off-task behaviour are still applicable and transferable to instructional contexts beyond the conventional, print-based classroom. The question that comes to mind is, do these on and off-task behaviours manifest themselves differently in a mobile (technological) setting? Future research should more closely examine this concept.

As abovementioned, the students' off-task passive behaviours might have also been attributed to the fact that all of the student participants from School 1 engaged in independent eBook reading during their lunch hour in the school library, whereas the participants from School 2 engaged in eBook reading in a quiet, enclosed meeting room during their morning literacy block. Therefore, extraneous factors such as the location and time of day when the eBook reading sessions occurred may have influenced their mental performance skills (i.e., inability to maintain focus and concentration). Teachers must take these factors into consideration when planning for instructional time devoted to reading.

## **Recommendations to Increase Cognitive Engagement and Higher Order Thinking**

### **Skills during Reading**

The fourth and final major component of the engagement perspective is *cognitive engagement* during reading, which refers to the depth of processing during reading (Guthrie & Wigfield, 2000). Cognitively engaged students effectively use strategies such as comprehension monitoring or questioning during reading (Guthrie & Wigfield, 2000). This process of engagement in reading is facilitated when classroom practices directly address it by providing instruction in cognitive strategies (Guthrie & Wigfield, 2000).

All of the student participants were capable of answering the inferential and evaluative questions, although some were more successful than others, especially the participants from Martha's grade 1 classroom. With regard to the motivational aspect of reading challenge, it is noteworthy that all of the student participants persisted in answering all of the comprehension questions, regardless of difficulty level or question type. Wigfield and Guthrie (2000) postulated that if a child is intrinsically motivated to read, they will persist in reading difficult text and exert cognitive effort.

One consistent finding was that higher-level questioning techniques matter. While this may not directly address the second research question, Martha asked higher-level questions during her literacy instruction; this subsequently resulted in her students being more successful in answering the eBook comprehension questions than those from School 2. Martha appeared to understand the importance of challenging her students to think about what they had read. In the process of asking higher-level questions, Martha emphasized character interpretation and connections to experience in her discussions

(Guthrie & Wigfield, 2000). In doing so, she implicitly implemented elements of the framework of cognitive engagement, especially in encouraging her students to focus on higher-level thinking (Guthrie & Wigfield, 2000). These practices likely interacted in complex ways to increase students' comprehension during the eBook reading sessions.

With respect to developing students' inferential and evaluative comprehension skills, then, it is important for teachers to help students successfully make predictions about texts by ensuring that students have sufficient background knowledge before beginning to read the text (Guthrie & Wigfield, 2000). This may explain the participants' lower performance on some of the inferential and evaluative questions. These findings suggest that young readers require explicit teacher modeling, guided practice, prompts, cues, and close monitoring to respond to such higher-level thinking questions, connect ideas together, and build connections between them (Guthrie & Wigfield, 2000).

One of the broad conclusions that can be gleaned from this study is that complementary instructional methods are integral to influence student learning and achievement (Palardy & Rumberger, 2008). Obviously, teachers' instructional strategies are not the only factor that affects student achievement. The student's own motivations and family support play crucial roles as well (Hanushek, 2011). Future studies should attempt to isolate the impact of teachers from these other influences.

Given that the results of this study showed that both cognitive reading strategies and internal motivation contribute independently to students' reading comprehension, educators need to take into account the significance that both of these practices have for cognitive strategy instruction. Educators need to consider how reading strategies can be taught and fostered in the light of supporting students' internal motivation for reading. In

other words, students need opportunities to use reading strategies in a classroom context where internal motivation is equally supported through concrete practices. For example, asking questions in relation to a text that is disconnected from students' backgrounds or for which students do not have a broader context to relate the content to will not be as successful as providing students with texts that relate to their backgrounds or for which students can make connections to ideas previously learned (Guthrie, Wigfield, & Perencevich., 2004; Guthrie et al., 2007). If teachers can incorporate principles that support building different aspects of internal motivation for reading they most probably have higher chances of having students use reading strategies successfully and in turn become better comprehenders (Guthrie et al., 2004; Guthrie et al., 2007). The contributions of both cognitive and affective factors to comprehension serve to emphasize that both are equally important in the development of students' reading development and neither should be neglected in classroom instruction.

### **Implications for Practice**

Given the above findings, some assertions can be made in the context of this study concerning the implications for exercising caution in selecting interactive eBooks, and motivating students' digital reading in the classroom.

#### **Interactivity in eBooks: Caution and Concerns**

Although it is believed that tablet devices have great potential for classroom literacy instruction, educators must exercise caution when deciding how to introduce them into the primary classroom. Teachers need to look past the attractive, engaging aspects of eBook apps and examine their content and functionality carefully before using them in the classroom. As evidenced in this study, general strategies for both fiction and

informational text comprehension, such as previewing, inferring, predicting, and connecting, lend themselves to electronic texts; however, not all strategies are transferrable from print-based to electronic book formats. Although embedded hotspots and literacy support features such as built-in dictionaries, highlighting, bookmarking, and note-making were not included in the eBooks used in this study, it is important to review with students the appropriate use of such interactive supports. Just as most students would not look up every unknown word in a dictionary, students should not over-rely on such features when e-reading, as the time it requires to use dictionary functions and tapping on hotspots may unnecessarily disrupt the reading process (Larson, 2010; Lefever-Davis & Pearman, 2005). If students are using interactive eBooks for literacy instruction, it is important to consider how students' reliance on these features might positively or negatively influence the students' overall reading experiences. Teachers and parents can aid students in negotiating a balance between using these interactions to support comprehension and using them in a way that limits their opportunities to apply strategies while reading. Although there are still some concerns about using interactive mobile eBooks with students who are still developing effective reading strategies, it is believed these technologies hold promise, given that teachers and parents scaffold the experience for students (Naismith, Sharples, Vavoula, & Lonsdale, 2004). Teachers and parents are encouraged to first provide guided and shared reading instruction with interactive mobile eBooks through activating students' background knowledge before reading, prompting students to answer comprehension questions during reading, and helping students to extend their thinking about the text after reading. With an adult's guidance, it is possible that students would be able to overcome the obstacles students

may face when independently confronted with the interactive features found in interactive eBooks.

Reading eBooks on a mobile device can and should have a place in the 21<sup>st</sup> century classroom. The researcher aimed to raise awareness of the complicated nature of e-reading, particularly for students who are still learning how to read. Specifically, educators are urged to consider how some interactive features of these mobile texts may motivate children, while potentially distracting them from the meaningful content of the text and mitigating some students' comprehension difficulties. To prepare students for the digital reading demands they will face both in and out of school, adults need to model strategies for e-reading, assist students in applying traditional reading behaviours to electronic texts, and select high-quality interactive eBooks that will scaffold students' reading.

The issues of equitable access and use also need to be addressed before learning platforms can become an integrated part of young people's daily learning. Exploring digital divide issues in the schools requires educators to examine the access students have to technology as well as the equity in the educational experiences students have with technology. Leadership and creativity are required to acquire sufficient resources necessary for technology integration especially to those schools serving students most in need. This encompasses devoting their school's budget to purchasing, maintaining, and replacing mobile technologies and mobile apps. For schools that have a limited number of mobile devices, teachers can incorporate a station model in their classroom instruction to best utilize the technology and maximize student learning. As groups of students rotate through the stations, they can work together and assist each other in the learning process.

This strategy can be used at all grade levels. Another solution is for administrators to provide resources to enable the computer labs to be open before and after school as well as throughout the school day.

Since mobile devices were typical in many of the participants' homes, communicating with parents about the educational uses of such devices could be another extension of community (Sharples et al., 2009). Schools need to update and inform families about what they can do to support their children's literacy learning at home. Schools can also facilitate family technology workshops or online networks where parents can share knowledge and raise questions about their children's mobile reading experiences. A user-friendly "best practices" guide for teachers and parents could also be developed to disseminate the effective uses of mobile technology for literacy education.

The proximity and flexible access to mobile (reading) resources cannot be minimized (Figg & Burson, 2006; Motiwalla, 2007). This is not to detract from the print resources available in the public library. However, on a day-to-day basis, from the participants' responses, the impact and frequency of (mobile) computer use compared to library visits are evident, which highlights the maximizing potential and importance of creating technology-rich classrooms for literacy learning. Even though there are many espoused benefits of having traditional home libraries, mobile devices enable readers to easily maintain personal libraries while also allowing students and teachers to keep a vast array of texts on their devices that are diverse and readily accessible (Maynard, 2010). Digital readers also prove to be a valuable tool in assisting the teacher in differentiating reading instruction and providing students with individualized support (Banister, 2010; Larson, 2010; Lapp, Moss, & Rowsell, 2012).

### **Implications for Motivating Students' Digital Reading in the Classroom**

To address the teachers' lack of time for reading one-on-one with their students, a cross-age, buddy reading program might be a way of helping beginning readers in the primary grades and the struggling readers in the upper elementary grades to improve their reading skills and increase on-task behaviour. If teachers have extra assistance in their classrooms (e.g., co-op students, parent volunteers, or teaching assistants), they should assist students during their interactions with mobile eBook reading. Working in pairs with educational eBooks, as occurs in many classes (Lewin, Mavers, & Somekh, 2003), often because insufficient numbers of computers necessitates sharing them, might be both a practical solution as well one that is educationally beneficial (Korat & Shamir, 2007). Families can also increase read-aloud opportunities by asking older siblings, babysitters, or other family members to sit next to their young readers while they read. This is particularly important for beginning readers whose emergent literacy skills might get a much-needed boost from the use of these newly available technological media during their elementary school years (Shamir & Korat, 2013).

### **Methodological Limitations and Implications for Future Research**

As with any body of educational research, the current study exhibits some limitations that merit noting. One of the most common concerns with all self-report measures remains the truthfulness of the participants' responses (Creswell, 2012). The parent and child motivation questionnaires are susceptible to biased reporting. Response bias of social desirability may have also occurred when the teachers and student participants were interviewed (Creswell, 2012). In other words, the interviewees might have filtered their responses in a conscious effort to create a favourable impression of

participating in this project. There is an even stronger tendency for participants to modify their responses when they are not anonymous (Creswell, 2012). Third, because the researcher was present during mobile eBook reading sessions, the Hawthorne effect (i.e., participants may change their typical behaviour merely because of the presence of the researchers) may have skewed the results (Creswell, 2012).

Future studies could also increase the degree of internal consistency by including teacher participants with similar teaching philosophies and practices. These complementary teachers could serve as a model for best practices in primary literacy instruction that includes mobile eBooks. Beyond the school board that hosted this research, examining effective primary teachers in different school boards across the province would also afford researchers the opportunity to highlight effective reading instruction practices and literacy resources.

A longitudinal study that followed the same group of participants into the later grades would offer greater insight into the relationship between and the long-term effects of the two types of book reading instruction (digital reading versus print-based reading) on grade 1 students' reading motivation and reading achievement. It would also be interesting to build on the current research and conduct a cross-section study with older children in the later stages of their reading development to capture more fully the relationship between the different formats of reading, reading motivation, and reading achievement. Furthermore, this specific age group is expected to be accustomed to using mobile devices, and so, are less likely to be subject to any novelty effect. Similarly, future research might examine gender differences (if any) in reading motivation,

engagement, comprehension and cognitive strategy use as a function of mobile eBook reading.

Furthermore, correlational research that examines the different ways that engagement and motivation relates to various cognitive processes during mobile eBook reading should be conducted. This way, an integrated model of cognitive, behavioural, and emotional engagement could be developed and applied to mobile reading environments.

More large-scale, longitudinal studies examining the role that reading engagement plays on students' motivation to read mobile eBooks as well as their cognitive strategy use during mobile eBook reading are warranted. Specifically, focusing on the behavioural, emotional, and cognitive engagement during mobile eBook reading with other early elementary school-age students who receive special education services as well as English language learners experiencing comprehension and/or motivational problems in reading is also merited.

Although more research needs to be done on this subject, this study is an initial attempt to shifting the theoretical purview of reading engagement to the digital age; specifically, reading eBooks on mobile devices. With respect to measuring students' emotional engagement and enjoyment of reading, instruments should be brought into the 21<sup>st</sup> century and assess the students' print-based and digital reading amount, breadth, and preferences. In terms of examining students' behavioural engagement, this study has offered the conjecture that behavioural observation tools should be modified to reflect the changing nature of reading and reading comprehension; this includes re-defining the occurrence and forms of on- and off-task behaviour during digital reading. Lastly,

although the eBooks used in this study were augmented by the researcher, this study identifies the implications for increasing students' cognitive engagement. That is, there is a need for greater collaboration between teacher educators, administrators, curriculum developers, and eBook (app) developers in order to more closely align eBook reading resources with language curriculum expectations. These collaborative efforts will help young readers develop their higher-order thinking and comprehension skills, as well as provide students with motivation to develop the literacy skills needed in the digital age of information.

Overall, the findings of this work shed some light on a new and relevant but under-researched area. There is a need for future research with a larger and more varied sample to clarify the present findings and examine the use of a range of mobile eBooks for beginning readers. This is important, given the prevalent use and enjoyment of this medium in children's out-of-school experiences. Future research should also incorporate a broader range of naturalistic observations in the classroom setting to gain a better understanding of children's reading motivation and experiences with print-based and electronic texts. Furthermore, there was also no random assignment of students to a control or intervention condition. This research could thus be enhanced using a quasi-experimental design with the inclusion of a (non-intervention) control group. In order to minimize any novelty effect among student participants, each participating school should have equal access to mobile technologies.

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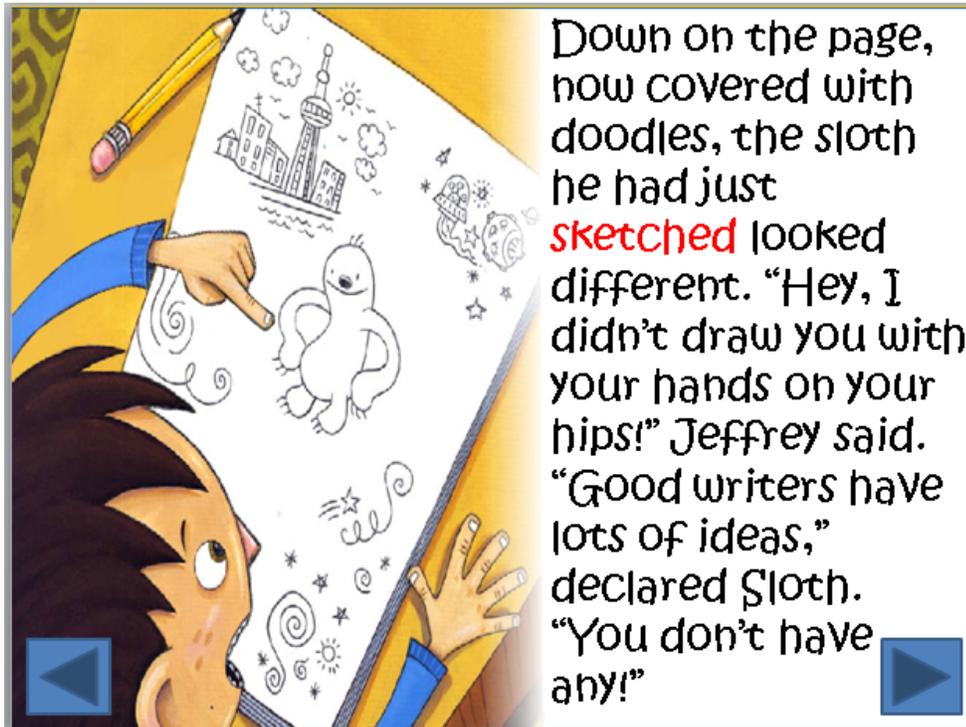
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## Appendix A

## Screenshot of ICANREAD™ eBook



## Appendix B

## Sample eBook Comprehension Questions



**What do *you* think will happen next?**



**What important lesson did you learn from reading this story?**







13. This is how much I enjoy it when I spend my free time reading.



14. This is how much I enjoy it when I read a (hardcover) book.



15. This is how much I enjoy it when I read books on the iPad?



16. This is how much I enjoy it when I answer questions about a story I read using pencil and paper.



17. This is how much I enjoy it when I do answer questions about a story I read on the iPad.



18. This is how much I can focus when I read a book on an iPad.



**19. This is how much I can focus when I read a hardcover book.**



**20. This is how much I enjoy it when I get to choose the kind of reading material I read.**



**21. This is how much I enjoy getting immediate feedback on my reading performance.**







**14. Would you rather have a story read to you on the iPad or by an adult?**

Adult       iPad

The pictures of Garfield show different moods. Point to the first picture at the top. We call this mood “very happy.” Move your finger to the next picture. Look closely at his mouth. How does it look different from the first picture? We call this picture “a little happy.” Look at the third picture of Garfield. His mouth has changed. He is “a little upset.” Point to the last picture of Garfield. Look at his mouth. He looks “very upset.” *[Wait for response. Point out the differences, if student does not seem to follow.]* I will read some statements about reading, and I want you to think about how you feel about each sentence. Then circle the one picture of Garfield that is closest to YOUR feelings. Remember: There are no right or wrong answers. I only want to know how you feel about reading, not how Garfield feels!

**15. This is how much I enjoy it when I spend my free time reading.**



**16. This is how much I enjoy it when I read a (hardcover) book.**



**17. This is how much I enjoy it when I read books on the iPad?**



**18. This is how much I enjoy it when I answer questions about a story I read using pencil and paper.**



**19. This is how much I enjoy it when I answer questions about a story I read on the iPad.**



**20. This is how much I can focus when I read a book on an iPad.**



**21. This is how much I can focus when I read a hardcover book.**



**22. This is how much I will enjoy school if my teachers use iPADS for reading books.**



**23. This is how much I enjoy it when I get to choose the kind of reading material I read.**



**24. This is how much I enjoy getting immediate feedback on my reading performance.**



**25. Do you have anything else you would like to say about your reading experience using the iPad? (What else would you have liked to see in the eBooks and why?)**

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## Appendix E

## Pilot Study Behavioural Observation Checklist

Student Code: \_\_\_\_\_

1 = Never

2 = Rarely

3 = Sometimes

4 = Usually

5 = Always

	1	2	3	4	5	Observer Comments
<b>Time On-Task While Reading</b>						
<b>Level of Engagement While Reading</b>						
<b>Area of Focus</b>						
<i>Illustrations</i>						
<i>Text</i>						
<i>Reader</i>						
	1	2	3	4	5	Observer Comments
<b>Time On-Task During Post-Reading Activity</b>						
<b>Level of Engagement During Post-Reading</b>						
<b>Level of Frustration During Post-Reading Activity</b>						

## Appendix F

## Cognitive Strategies Rubric

Child Name:

School/Classroom Name:

Date:

Book Title and Level:

<i>Ontario Grade 1 Language Curriculum (Reading) Expectations- Comprehension Strategies</i>						
<b>Literal Questions:</b>						
<ul style="list-style-type: none"> <li>• Question asks the reader to synthesize and demonstrate understanding of a text by retelling the story or restating information from the text, including the main idea (<i>Expectation 2.2</i>)</li> <li>• Question asks the reader to analyze the text and identify the main idea and a few elements of texts (<i>e.g., narrative: characters, setting, problem/solution; information text: facts, headings, table of contents, glossary, index</i>) (<i>Expectation 2.3</i>)</li> </ul>						
<i>Types of Comprehension Questions</i>	<b>Characteristics of Student Performance &amp; Performance Level</b>				<b>Unassisted (U) or Assisted (A)</b>	<b>Comments</b>
	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>		
<b><u>LITERAL</u></b>						
<b>1.</b>						
<i>Ontario Curriculum Reading Expectations- Comprehension Strategies</i>						
<b>Inferential Questions:</b>						
<ul style="list-style-type: none"> <li>• Question asks the reader to use stated and implied ideas from the text to draw conclusions about the text, the author, or a character (<i>Expectation 2.2</i>)</li> <li>• Question asks reader to use the title, pictures/context to make reasonable predictions of what may happen next in a story (<i>Expectation 2.2</i>)</li> <li>• Question asks reader to visualize, create, and share mental images of the text (<i>Expectation 2.2</i>)</li> </ul>						
<i>Types of Comprehension Questions</i>	<b>Characteristics of Student Performance &amp; Performance Level</b>				<b>Unassisted (U) or Assisted (A)</b>	<b>Comments</b>
	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>		
<b><u>INFERENTIAL</u></b>						

1.						
<b>Ontario Curriculum Reading Expectations- Comprehension Strategies</b>						
<b>Evaluative Questions:</b>						
<ul style="list-style-type: none"> <li>• Question asks the reader to express personal thoughts and feelings about what has been read (<i>Expectation 2.3</i>)</li> <li>• Question asks the reader to activate prior knowledge, extend understanding of and relates to text by connecting the ideas in them to their own knowledge and experience, to other familiar texts, and to the world around them before, during, and after reading (<i>Expectation 2.3</i>)</li> </ul>						
<b>Types of Comprehension Questions</b>	<b>Characteristics of Student Performance &amp; Performance Level</b>				<b>Unassisted (U) or Assisted (A)</b>	<b>Comments</b>
<b><u>EVALUATIVE</u></b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>		
1.						

**LEVEL 1** = Response attempts to answer the question **in a limited way** but **does not explain (evaluative) or show how support from the reading selection (inferential)** proves how the big sister feels about her little sister or which toy the reader would like to play with and why.

Instead the response **either**

- answers an aspect of the question (e.g., **them all; Good**)

**OR**

- provides inaccurate support (e.g., **I'd like the Lego; They are all alone**)

**OR**

- does not refer to the reading selection (e.g., **I like to play; I like to play at the park too**)

.....  
**LEVEL 2** = The response **partially** explains **with some effectiveness** which toy the reader would like to play with and why.

Response provides **either**

- irrelevant support from the text (e.g., **Teddy bear. My mom always buys them.**)

**OR**

- vague support from the text or own ideas (e.g., **Teddy bear. I love teddies.**)

**OR**

- limited support from the text or own ideas (e.g., **The teddy bear because teddies are my favourite.**)

The response usually requires the reader to connect the support to what it is intended to prove.

.....  
**LEVEL 3** =

Response answers the question **with considerable effectiveness** but **does not fully explain**. Response includes **some accurate and relevant support AND some vague or underdeveloped support**.

**Examples:**

**The teddy bear because I get to play baby with the teddy bear. He is so cute.**

**OR**

**I would like to play with the airplane because it zooms.**

.....

**LEVEL 4** = Response answers the question **with considerable effectiveness** but **does not fully explain** how the reader knows that this is a non-fiction text. Response answers **includes some accurate and relevant support AND some vague or underdeveloped support**.

**Examples:**

- **Nonfiction. It is from the newspaper and it has real facts in it. It has real photographs of what the cyclone did.**

**OR**

- **Nonfiction because the picture shows how the city was destroyed. There is also a fact bubble (\*) at the end of the report.**

Response answers the question **thoroughly** and **with a high degree of effectiveness** by providing **specific and relevant support** from the text and the student's own ideas to **explain fully** the reasons for the choice of toy.

## Appendix G

### ICANREAD™ eBook Titles, Levels, Genre, Authors, and Publishers

BOOK TITLE	LEVEL	GENRE	AUTHOR/PUBLISHER
<b>KINDERGARTEN</b>			
1. Big and Little	A	Non-Fiction	Dona Herweck Rice/Big Universe Learning
2. What Tigers Do	A	Non-Fiction	Kris Bonnell/Big Universe Learning
3. We Like the Beach	A	Fiction	Kris Bonnell/Big Universe Learning
4. Party Time	A	Fiction	Suzanne Barchers/Big Universe Learning
5. Let's Play	A	Non-Fiction	Sara A.Johnson/Big Universe Learning
6. Crafty Kids	A	Non-Fiction	Char Benjamin/Big Universe Learning
7. A Turtle in the Sun	B	Fiction	Kris Bonnell/Big Universe Learning
8. Look For It!	B	Non-Fiction	Kris Bonnell/Big Universe Learning
9. Shopping Cart	B	Fiction	Kris Bonnell/Big Universe Learning
10. A Look into the Rainforest	B	Non-Fiction	Kris Bonnell/Big Universe Learning
11. In and Out	B	Non-Fiction	Luana K. Mitten/Big Universe Learning
12. Little Pig	B	Fiction	Mia Coulton/Big Universe Learning
13. Weather	C	Non-Fiction	Dona Herweck Rice /Big Universe Learning
14. Workers	C	Non-Fiction	Dona Herweck Rice/Big Universe Learning
15. Cones	C	Non-Fiction	Luana K. Mitten /Big Universe Learning
16. Counting at the Market	C	Non-Fiction	Amy Rauen/Tumblebooks
17. Poko: Best Friends	C	Fiction	Lobster Press/Tumblebooks
18. Who Am I?	C	Non-Fiction	Big Universe Learning
<b>GRADE 1</b>			
19. Frogs on a Log	D	Fiction	Kris Bonnell/Big Universe Learning
20. This is a Family	D	Non-Fiction	Kris Bonnell/Big

Universe Learning			
21. Alligators	D	Non-Fiction	Derek Zobel/Big Universe Learning
22. What is Budu?	D	Fiction	Billie Huban/JLS Storybook Project
23. Trucks	D	Non-Fiction	J. Robertson and M. Greve/Big Universe Learning
24. Biscuit	D	Fiction	Alyssa Satin Capucilli/Tumblebooks
25. Cheerleading	D	Non-Fiction	Holly Karapetkova/Big Universe Learning
26. Adding and Subtracting at the Lake	D	Non-Fiction	Amy Rauen/Tumblebooks
27. Pet Tricks	D	Non-Fiction	J. Strum and M. Greve/Big Universe Learning
28. North, South, East, West	E	Non-Fiction	Meg Greve/Big Universe Learning
29. Puppies	E	Non-Fiction	Colleen Sexton/Big Universe Learning
30. Fix it, Sam	E	Fiction	Lori Ries/Big Universe Learning
31. Sunny or Cloudy	E	Fiction	Kris Bonnell/Big Universe Learning
32. Miss Moo Goes to the Beach	E	Fiction	Jeff Dinardo/Big Universe Learning
33. Days of the Week	E	Non-Fiction	Luana K. Mitten/Big Universe Learning
34. Months of the Year	E	Non-Fiction	Luana K. Mitten/Big Universe Learning
35. Poko: How Does Poko Feel?	F	Fiction	Lobster Press/Tumblebooks
36. Bugs for Lunch	F	Non-Fiction	Margery Facklam/Big Universe Learning
37. Always	F	Fiction	Alison McGhee/Tumblebooks
38. One Duck Stuck	F	Fiction	Phyllis Root/Tumblebooks
39. A Penguin Story	F	Non-Fiction	Antoinette Portis/Tumblebooks
40. And the Caboose Said	F	Fiction	Simone Cooper/Big Universe Learning
41. The Grump	G	Fiction	Sarah

			Garson/Tumblebooks
42. Baseball	G	Non-Fiction	Holly Karapetkova/Big Universe Learning
43. Soccer	G	Non-Fiction	Holly Karapetkova/Big Universe Learning
44. And You Can Come Too	G	Fiction	Ruth Ohi/Tumblebooks
45. Frank Was a Monster Who Wanted to Dance	G	Fiction	Keith Graves/Tumblebooks
46. I Wish I Had Glasses Like Rosa	G	Fiction	Heling, Kathryn and Deborah Hembrook /Tumblebooks
47. When I Visit the Farm	H	Fiction	Crystal Beshara/Big Universe Learning
48. You Can Be Anything!	H	Non-Fiction	Gary Craig/Big Universe Learning
49. Penguin's Special Christmas Tree	H	Fiction	Jeannie St. John Taylor/Big Universe Learning
50. 50 Below Zero	H	Fiction	Robert Munsch/Tumblebooks
51. Meet the Meerkat	H	Non-Fiction	Darrin Lunde/Tumblebooks
52. The Biggest Job of All	H	Fiction	Harriet Ziefert/Tumblebooks
53. Where Does the Sun Go?	I	Non-Fiction	Gary Craig/ Big Universe Learning
54. Big or Little?	I	Non-Fiction	Kathy Stinson/Tumblebooks
55. Maddy Goes to the Zoo	I	Fiction	Sally Crust/JLS Storybook Project
56. Rhyme or Reason	I	Fiction	Kari-Lynn Winters/Gumboot Books
57. One Potato	I	Fiction	Sue Porter/Big Universe Learning
58. Swordfish	I	Non-Fiction	Colleen Sexton/Big Universe Learning
59. Cinderella	J	Fiction	MightyBook
60. Haunted Party	J	Fiction	Iza Trapani/Big Universe Learning
61. The Life Cycle of a Cat	J	Non-Fiction	Colleen Sexton/Big Universe Learning
62. You are a Really Good Friend of Mine	J	Fiction	Laura Liliom/Big Universe Learning

63. One Odd Day	J	Fiction	Doris Fisher and Dani Sneed/Tumblebooks
64. Toopy and Binoo Funny Halloween	J	Fiction	Dominique Jolin/Tumblebooks
65. Bread and Cheese	J	Fiction	Billie Huban/JLS Storybook Project
<b>GRADE 2</b>			
66. If You were my Baby	K	Non-Fiction	Fran Hodgkins/Big Universe Learning
67. Wolf Camp	K	Fiction	Katie McKy/Big Universe Learning
68. The Doll that Flew Away	K	Fiction	Kh. Batkhuu/Big Universe Learning
69. First Day Jitters	K	Fiction	Julie Danneberg/Big Universe Learning
70. Toopy and Binoo Robinson Toopy	K	Fiction	Dominique Jolin/Tumblebooks
71. Franklin's Class Trip	K	Fiction	Paulette Bourgeois/Tumblebooks
72. Helping Out is Cool	K	Non-Fiction	Ellen Feinman Moss/Tumblebooks
73. Keesha's Bright Idea	L	Fiction	Eleanor May/Tumblebooks
74. Jeffrey and Sloth	L	Fiction	Kari-Lynn Winters/Orca Book Publishers
75. Caillou Tidies His Toys	L	Fiction	Joceline Sanschagrin/Tumblebooks
76. Franklin Goes to School	M	Fiction	Paulette Bourgeois/Tumblebooks
77. Animals in Camouflage	M	Non-Fiction	Phyllis Limbacher Tildes/Tumblebooks
78. Sight	M	Non-Fiction	Annalise Bekkering/Tumblebooks



**6. How often does your child take books out of the public or school library to read for fun?**

almost every day

some days

never or hardly ever

**7. a) Does your child use technology at home?**

No

Yes

**b) If yes, what type of technology does your child use at home?**

---

**c) If yes, what does your child use technology for?**

---

**d) If yes, how much time does your child spend using technology at home?**

almost every day

some days

never or hardly ever

**8. a) Does your child use technology at school?**

No

Yes

**b) If yes, what type of technology does your child use at school?**

---

**c) If yes, what does your child use technology for at school?**

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**d) If yes, how much time does your child spend using technology at home?**

almost every day

some days

never or hardly ever

**9. a) Prior to participating in this study, had your child ever read storybooks on a mobile device (e.g., Kindle, iPad, iPhone)?**

YES

NO

**b) If yes, what kinds of books (e.g., fiction or non-fiction) did your child read and what type of technology did he/she use to read them?**

---

**10. If your child had to choose between reading a hardcover book or an electronic book on a mobile device (e.g., iPad), which one do you think that your child would you choose? Why?**

---

**11. a) Has your child read more books on the iPad since they started this project with me on their own time?**

Yes

No

**b) If yes, how many times did they read the books on the iPad?**

Never

One time

More than one time

c) If no, why didn't they read books on the iPad?

---

**12. What kinds of things do you think your child enjoyed most about reading the books on the iPad?**

---

**13. What kinds of things do you think your child enjoyed less about reading the books on the iPad?**

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**14. Please provide any additional information you have gathered regarding your child's attitudes (likes/dislikes) toward the electronic books they read during their iPad reading sessions:**

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The following are some statements about reading. Please provide your perception or "best guess" about how much you think that your child enjoys each reading activity. Circle a number from 1 to 4.

4= "enjoys a lot" 3= "enjoys a bit" 2= "dislikes a bit" 1= "dislikes a lot"

**15. This is how much my child enjoys it when he or she spends free time reading.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**16. This is how much my child enjoys reading on the iPad.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**17. This is how much my child enjoys reading a hardcover book.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**18. This is how much my child enjoys being read to by an adult.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**20. This is how much my child enjoys answering questions about a story they read using paper and pencil.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**21. This is how much my child enjoys answering questions about a story they read on the iPad.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**22. This is how much my child can focus when he/she reads a book on the iPad.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**23. This is how much my child can focus when he/she reads a hardcover book.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**24. This is how much my child would enjoy school if his/her teacher used iPads for reading.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**25. This is how much my child enjoys choosing the kind of reading material he/she reads.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**26. This is how much my child enjoys getting immediate feedback on their reading performance.**

4	3	2	1
enjoys a lot	enjoys a bit	dislikes a bit	dislikes a lot

**27. Please provide any additional comments you have regarding your child's involvement in this study, including any changes you may have seen in his/her motivation toward reading (electronic storybooks or hardcover books) as well as their reading skills (listening comprehension, asking questions and making personal connections during reading, etc.)**

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**Thank you so much for completing this survey. Please return your survey in a sealed envelope to your child's classroom teacher.**

## Appendix I

## Wepman Auditory Discrimination Test

	Different	Same
1. tub — tug	D	S
2. lack — lack	D	S
3. web — wed	D	S
4. leg — led	D	S
5. chap — chap	D	S
6. gum — dumb	D	S
7. bale — gale	D	S
8. sought — fought	D	S
9. vow — thou	D	S
10. shake — shape	D	S
11. zest — zest	D	S
12. wretch — wretch	D	S
13. thread — shred	D	S
14. jam — jam	D	S
15. bass — bath	D	S
16. tin — pin	D	S
17. pat — pack	D	S
18. dim — din	D	S
19. coast — toast	D	S
20. thimble — symbol	D	S

	Different	Same
21. cat — cap	D	S
22. din — bin	D	S
23. lath — lash	D	S
24. bum — bomb	D	S
25. clōthe — clōve	D	S
26. moon — noon	D	S
27. shack — sack	D	S
28. sheaf — sheath	D	S
29. king — king	D	S
30. badge — badge	D	S
31. pork — cork	D	S
32. fie — thigh	D	S
33. shoal — shawl	D	S
34. tall — tall	D	S
35. par — par	D	S
36. pat — pet	D	S
37. muff — muss	D	S
38. pose — pose	D	S
39. lease — leash	D	S
40. pen — pin	D	S

## Appendix J

### Behavioural Observation Checklist

**Child Name:**

**School/Classroom Name:**

**Date:**

**Book Title and Level:**

**Duration:**

**Interval: 30 seconds**

Behaviour		Total Count	Percent	
AET (Actively Engaged in Task)				
OFT-M (Off Task-Motor)				
OFT-V (Off Task-Verbal)				
OFT-P (Off Task-Passive)				
	AET	OFT-M	OFT-V	OFT-P
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

## Appendix K

### Semistructured Teacher Interview Protocol

1. How many full years of teaching experience do you have? \_\_\_\_\_
2. What types of reading material are available for your students to read in your classroom?
3. How much control/independence do your students have in their choosing the type of reading material they read in class?
4. On average, what is the total length of time you allocate to storybook read-alouds?
5. During your read-aloud, how do you monitor and assess your students' cognitive strategy use (e.g., what types of questions do you ask?)
6. How do you teach and assess students' metacognitive skills and strategies? (e.g., Do you model and use think-alouds during read-alouds?)
7. Describe your (mobile) computer experience.
8. What types of technology do you and your students have regular access to?
9. On average, how long do your students spend using these technologies at school per week?
10. For what and how have you used technology in your classroom?
11. Please describe the last lesson where you used technology (iPad) with your students.
12. Have you integrated computers into your reading program? If yes, please describe how you have integrated computers into your literacy program. If no, please cite the reasons why you have not integrated computers into your literacy program.
13. What is your attitude regarding the integration of technology into the language curriculum?
14. What type of reading material do your students engage in and enjoy reading most in your classroom (e.g., picture books, non-fiction, electronic books, etc.)?
15. Based on your observations, how much do you think your students enjoy reading an electronic book on the iPad?
16. Based on your observations, how much do you think your students enjoy reading a hardcover book?
17. Based on your observations, have the child participants in your class been using (or asked you to use) the iPads more (for reading purposes) since this study began?
18. Based on your observations, have you seen any changes in the child participants' comprehension and/or cognitive strategy use?
19. Based on your observations, have you seen any changes in the child participants' reading motivation, engagement, and/or attitudes towards reading electronic and/or hardcover books?
20. What are some affordances and constraints of using the iPod or any other digital tool in the classroom for reading instruction?