

ICANREAD: The Effects of an Online Reading Program on Grade 1 Students' Engagement and Comprehension Strategy Use

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Abstract

This pilot study explores the impact of online electronic storybooks (e-books) on the reading motivation and listening comprehension of six grade 1 students (aged 7 years) from Ontario, Canada. The researcher measured participants' perceived enjoyment of the online e-book reading experience using standardized listening comprehension tests, motivation questionnaires, behavioural observation checklists, and take-home e-book reading logs. The researchers used a scoring rubric to assess participants' oral responses to a set of embedded literal, inferential, and evaluative comprehension questions within each e-book read during the program sessions. The results from this study indicate that all of the participants increased their comprehension scores from pretest to posttest after using the online e-book reading program, enjoyed the e-book reading experience, and frequently read the online e-books at home in their free time. (Keywords: E-books, Internet, listening comprehension, comprehension strategy use, beginning reading instruction, early childhood)

For literacy learning experiences to motivate and be personally relevant to students, they must reflect their out-of-school literacy experiences (Guthrie, Wigfield, Metsala, & Cox, 1999). According to a 2009 U.S. Census Bureau report, more than three out of four children (77%) between ages 3 and 17 use the Internet at home, which is more than three times as many as in 1997 (22%). With these staggering numbers, there is little doubt as to the proliferation and popularity of Internet use among young children. The Internet offers new tools for effective early reading instruction and expands the definition of 21st century literacy (Leu, 2002). Further, a position statement from the International Reading Association (2002) called for “an intensive program of research on literacy and technology issues that will enable us to better understand the rapid changes taking place in the nature of literacy and literacy instruction” (as cited in Leu, 2002, p. 2).

Young children are becoming increasingly exposed to and interested in reading via online electronic storybooks (e-books), which have been found to promote language and literacy skills such as phonological awareness, word recognition, and fluency (Plowman & Stephen, 2003; Valmont,

2000; Van Kleeck, 2008). With respect to story comprehension, however, previous research on e-books has relied on only low-level literal questions and/or story retelling as a way of evaluating the children's understanding of the story (Doty, Popplewell, & Byers, 2001; Grimshaw, Dungworth, McKnight, & Morris, 2007; Matthew, 1997; Pearman, 2008). Additionally, these studies have examined the use of e-books only in CD-ROM format (Doty et al., 2001; Grimshaw et al., 2007; Matthew, 1997; Pearman, 2008). The effectiveness of e-books for young children using newer forms of media, such as the Internet, which have become increasingly available and popular, has not been adequately studied. In addition, although a research base supports comprehension instruction in the early primary grades, most of this research has been conducted with grade 3 students and older (National Institute of Child Health and Human Development [NICHD], 2000). For quite some time, theorists have demonstrated that even the youngest readers need opportunities to be "meaning makers" (Muspratt, Luke, & Freebody, 1997). In support of this, the National Reading Panel (2000) suggests that strategies for increasing literacy development should focus not only on improving phonological and phonics skills, but also 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 (NICHD, 2000). As children have more opportunities to practice these strategies while reading, they will habituate them and transfer them to other appropriate settings independently (Stahl, 2004).

The purpose of this pilot study was to investigate whether a researcher-developed online reading program that was designed to supplement regular school-based reading instruction would promote positive attitudes toward online reading as well as improve listening comprehension and cognitive strategy use among early primary grade students from Ontario, Canada. The research questions that this paper addresses are:

1. What are the effects of the online reading program on grade 1 children's attitudes toward online reading?
2. What are the effects of the online reading program on grade 1 children's listening comprehension?
3. What are the effects of the e-book question-answering tasks on grade 1 children's listening comprehension and reading engagement?

Literature Review

Perhaps the most potentially rewarding insight for literacy educators is the potential role of online technology in reading acquisition and instruction, especially for primary grade populations (de Jong & Bus, 2002). In fact, the National Council of the Teachers of English (NCTE, 2007) advocates that

developmentally appropriate information and communication technologies such as the Internet have the potential to help beginning readers develop traditional and electronic literacy skills while meeting national curriculum expectations (Roschelle, Pea, Hoadley, Gordin, & Means, 2000).

Electronic books (e-books) are one example of how teachers of beginning readers can use technology to advance the goals of their reading programs (Alexander & Jetton, 2003; Blok, Oostdam, Otter, & Overmaat, 2002; Castek, Bevans-Mangelson, & Goldstone, 2006; de Jong & Bus, 2002; Korat & Shamir, 2006; Labbo & Kuhn, 2000; Lefever-Davis & Pearman, 2005; Wepner & Ray, 2000). The visual and aural elements of e-books contribute to higher levels of motivation, interest, and involvement in readers, which may increase the probability that reluctant readers will persevere in their interactions with text (Lewis, 2000). For example, some e-books contain realistic digitized speech and digital text, accompanied by rich, colourful, and dynamic illustrations, music, and sound effects that dramatize story details and transform the traditional, static print book into a “living, talking storybook” (Lewis, 2000, p.3). The computer’s pronunciation of text reduces the burden of decoding for the reader, so he or she can devote more attention to processing and comprehending to derive meaning (Pearman, 2008). Most e-books also include optional hidden hotspots or a built-in dictionary, which are devices embedded in various screen locations that are intended to provide additional information about the characters, to repeat or elaborate on text (words), to activate the pronunciation of or explain a word, to duplicate a sound, or to provide entry into games and other activities meant to promote the story’s understanding (Roskos, Brueck, & Widman, 2009). However, Labbo and Kuhn (2000) as well as Lefever-Davis and Pearman (2005) caution that these embedded hotspots, albeit helpful at times, may encourage passive participation and distract learners from text, thereby impeding comprehension.

Doty et al. (2001) were interested in determining whether grade 2 students score higher on oral retellings and comprehension questions when reading an interactive CD-ROM storybook or when reading the same story in the hardcover version. Doty et al. (2001) measured reading comprehension through the use of oral retellings and six (literal) comprehension questions (Doty et al., 2001). The senior author of this study asked both text groups to read and retell the story (e.g., what the story was about and what he or she remembered about the events in the story) individually (Doty et al., 2001). The results from Doty et al.’s (2001) study showed that there was no significant difference between the groups when the students were asked to orally retell the stories. However, the mean scores on a comprehension test were significantly higher for the group reading the story from the computer than for the group reading the story from the book. Similarly, Grimshaw et al. (2007) focused on the differences in the comprehension of 132 children aged 9–11 years while reading CD-ROM storybooks. Half of the

participants read a CD-ROM storybook with narration, whereas the remaining participants read the same storybook without narration. The comprehension tests consisted of multiple-choice questions that required a direct retrieval of information. The results from Grimshaw et al.'s (2007) study indicated that the provision of a narration resulted in a significant increase in the comprehension scores. The results also showed that children who had experienced the extract on CD-ROM with narration scored significantly higher on the comprehension test than those who had experienced the extract on CD-ROM without narration. The narration that accompanied the electronic versions of the stories likely reduced the load on working memory, and the use of correct intonation and emphasis served to integrate the text and provide a richer context to the storyline (Grimshaw et. al., 2007).

These studies were conducted with multimedia storybooks in CD-ROM format rather than electronic books on the Internet, assessed children's comprehension of e-books through story retellings and literal recall, and did not examine children's perceived enjoyment of and attitudes toward these digital tools. Further research that explores the effects of online e-books with inferential questions on the reading motivation and listening comprehension of early primary-grade students is warranted.

Theoretical Framework

The current study was informed by two theoretical perspectives that lend themselves to the focus of this pilot study: constructivism/meaning-making and motivation.

Constructivism and Meaning Making

Constructivism (Dewey, 1916; Piaget, 1973) may be theoretically applied to the use of online resources such as e-books for teaching reading in primary-grade classrooms. One of the axioms of the (cognitive) constructivist theory is that learning occurs by building upon previously learned real-life experiences, and that teaching in familiar contexts appears to help learners to relate new information to those experiences (Ladbrook, 2008; Piaget, 1973).

Current reading research, which stresses the interactive, constructive nature of reading, suggests the need for all students (especially struggling ones) to become "constructively responsive" readers (Pressley & Afflerbach, 1995, p.83) and "thoughtfully literate" individuals (Allington, 2000, p.94) who are engaged, motivated readers in control of their own learning (Alvermann & Guthrie, 1993). This type of constructively responsive, thoughtful, and engaged reading clearly involves much more than simply having good decoding skills, an adequate reading vocabulary, and an ability to recall what the text said. Accordingly, the constructivist theoretical perspective views reading as an active, constructive, meaning-making process (Bowyer-Crane & Snowling, 2005). Learning from text, like all learning, demands readers who are "strategically engaged in the construction of meaning" (Alexander

& Jetton, 2000, p. 295). According to Bowyer-Crane and Snowling (2005), effective assessment of listening 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, visualizing, evaluating (expressing personal thoughts, feelings, and judgments about what has been read), and synthesizing.

Motivation

A reader's goals, beliefs, and attitudes toward reading both printed and electronic texts can greatly influence how he or she employs cognitive reading strategies while reading such texts (Chapman & Tunmer, 1995; Guthrie & Alvermann, 1999; Horner & Shewry, 2002; McKenna, Kear, & Ellsworth, 1995). Thus, comprehension is also dependent upon a reader's motivation and interest to simultaneously connect and apply one's prior knowledge of topic in an effort to locate, understand, and use information effectively. Accordingly, this study also drew on the central constructs of motivation in relation to grade 1 students' reading experiences (Ames, 1992; Deci & Ryan, 1985). From an educational point of view, motivation refers to "the likelihood of choosing one activity over another, as well as the persistence and effort exerted when participating in the chosen activity" (Malloy, Marinak, & Gambrell, 2010, p.2). Motivation has also been recognized as an important aspect and requirement of constructivism and the building of new knowledge (Piaget, 1973; Vygotsky, 1978). As the constructivist theory claims that knowledge is actively constructed by the learner, learning depends to a significant extent on the learner's internal drive to understand and promote the learning process. Thus, intrinsic motivation is required to initially arouse students to want to participate in learning, and it would also be needed throughout the whole process until knowledge construction has been completed. Contemporary perspectives of reading comprehension also suggest that motivational variables such as choice, curiosity, feedback, interest, involvement, and control all intersect with cognitive reading processes to enhance reading achievement (Baker & Wigfield, 1999; Guthrie & Wigfield, 2000). For example, offering students their choice of reading material in the classroom has been found to increase students' motivation, effort, and performance (Randi & Corno, 2000). 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.

Contextualization also appears to have a strong motivational component; learning in a familiar context may make learning more personally relevant than decontextualized learning (Piaget, 1973). Students entering school today are growing up in a technology-driven, digital world. Children and young people are accessing and using the Internet at an increasing rate

(Clark & Foster, 2005). These children spend on average of 2 hours a day with some type of screen media (e.g., Internet, mobile devices, video games), which is about the same amount of time they spend playing outside and four times longer than the amount of time they spend reading or being read to with print-based texts (Rideout, Vandewater, & Wartella, 2003). It is apparent that reading instruction should integrate technologies that are familiar to students and complement their out-of-school lives (Scheiter & Gerjets, 2007). The constructivist goals of learner control, autonomy support, choice, active problem solving, and use of relevant and authentic texts in beginning reading instruction are preferred to traditional teacher-directed and print-based instruction (Gambrell, Palmer, Codling, & Mazzoni, 1996; Renninger, 2000; Schiefele, 1998). In line with both constructivist and motivation theories, granting students control of and engagement in the learning experience permits them to make their own meaning of reading materials rather than being passive recipients of information (Flowerday & Schraw, 2000). That is, involving learners in the decisions regarding their reading activities should increase their intrinsic motivation to learn and read (Randi & Corno, 2000).

Research Rationale

These theoretical stances provide a framework for an examination of connections between grade 1 students' perceived enjoyment of and attitudes toward e-books and their listening comprehension and cognitive strategy use while engaging with such texts. Specifically, this article reports data from a pilot study designed to trial a researcher-developed online reading program for subsequent use in a large-scale study. The program contains a collection of leveled fiction and nonfiction e-books with embedded comprehension questions found throughout each e-book. Specifically, the purpose of this pilot study was to investigate whether the online reading program would promote positive attitudes toward online reading as well as improve listening comprehension and cognitive strategy use among early primary grade students from Ontario, Canada.

The research questions that this paper addresses are:

1. What are the effects of the online reading program on grade 1 children's attitudes toward online reading?
2. What are the effects of the online reading program on grade 1 children's listening comprehension?
3. What are the effects of the e-book question-answering tasks on grade 1 children's listening comprehension and reading engagement?

Method

Six single-case studies conducted in Southern Ontario, Canada, served as an exploratory tool for investigating whether the researcher-developed online reading program would promote positive attitudes toward online reading as

well as improve listening comprehension and cognitive strategy use among primary grade children. A case study is “a detailed examination of a single individual, several individuals separately or in a group, a program, events, or activities” (Creswell, 2010, p.255). Convenience, access, and geographic proximity were the main criteria for selecting the six case study participants. Case study is an approach that allows “study of uniqueness of the particular in order to understand the universal” (Simons, 1996, p.231). Thus, this pilot study is concerned with the uniqueness of individual learning experiences with the online reading program. One of the main characteristics of the present study is that it deals with several case-study participants and includes certain types of comparisons between them; however, each participant is also portrayed with his or her own unique features and context (Yin, 2009). Lastly, although the sample size in this case study is small, the understanding derived from the present pilot study will provide useful preliminary information for a subsequent larger study.

Participants

I recruited six child participants through convenience sampling. 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 profiles contain brief details of each of the six participants. The names of the participants have been changed to preserve confidentiality.

Elizabeth was a very outgoing 7-year old girl in grade 1. In her spare time, Elizabeth loved to read Judy Moody chapter books, play teacher, and read to her little brother at bedtime. According to Elizabeth’s mother, one of the comments written on her last report card was that “she can read sentences fluently but has difficulty comprehending what she reads and cannot remember details of a story.”

Ben was 7 years old and in grade 1. Ben indicated that he enjoys reading nonfiction books about natural disasters such as tornadoes and hurricanes, sea animals such as sharks and whales, and sports such as hockey and soccer. However, according to his mother, Ben was “a very capable student but struggled with focus and being attentive to [reading] tasks.”

Christopher was a 7-year-old grade 1 boy. Like Ben, Christopher also enjoyed reading books about hockey and sea creatures. When he is at his home computer, Christopher liked to play online car, dirt-bike, and monster-truck games. Christopher was the youngest in his class with a late November birthday and trailed behind his peers in his reading ability at the beginning of the school year. Christopher’s mom decided to sign him up for an after-school reading program that consisted of short and intensive one-on-one reading instruction sessions. By the middle of the school year, Christopher had showed very large gains and eventually caught up with his peers.

Seven-year-old Karen was a timid grade 1 student. When she was on her home computer, Karen enjoyed playing games on Club Penguin and Pop-tropica, as well as reading fiction and nonfiction books from the Scholastic BookFlix website at school. Karen reported that her preferred reading material was the wildly popular children's book series Junie B. Jones, written by Barbara Park.

Brittany was a very quiet 7-year-old girl whose favourite pastime was playing hockey with her two older brothers. Brittany was an avid reader of all books involving cats and dogs as well as *National Geographic* magazines. Brittany also reportedly enjoyed online reading materials from the Scholastic BookFlix website.

James was a 7-year-old grade 1 boy whose favourite winter sport was hockey. With enthusiasm and pride, James showed the researcher his large collection of LeapFrog's Tag books during the first pretest session. During the pretest session, James excitedly showed the author how to use this touch reading system. With his electronic pen, James independently navigated through the books' pages, making words, symbols, and characters on the page talk and pictures sing.

Procedure

I arranged and held a total of 12 e-book reading sessions (including the pre- and posttest sessions) during a 3-month period with each participant during weekday, after-school hours in an Internet-equipped room at my institutional affiliation. To reiterate, the ICANREAD (Ciampa, 2011) e-book materials were designed to supplement regular school-based reading instruction.

In the first session, each participant individually completed a listening comprehension test and a questionnaire assessing his or her reading motivation toward print-based and electronic texts. Following this, I provided each participant with familiarization sessions and instructions in how to use the online e-book reading software. I also gave each child's parents an e-book 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 e-book reading sessions began with each participant one week later. Each participant read two e-books per session once a week for a total of 3 months, with each session lasting approximately 45 minutes. During the online e-book reading sessions, the participants worked individually next to me. In the 12th and final session, each of the participants completed a different version of the listening comprehension test and the same motivation questionnaire with a few additional items included. I collected the e-book reading logs at the end of the posttest session. Participants were able to self-navigate throughout the ICANREAD (Ciampa, 2011) website and did not experience any technical difficulties during the computer sessions. The following section will further describe the online e-book and all data collection instruments.

Intervention: Online E-Book

ICANREAD (<http://www.icanreadcanada.com>; Ciampa, 2011) was the researcher-developed online e-book guided reading program I used in this study (see Figures 1 and 2, pp. 37 and 38, for sample screenshots of an e-book available on the ICANREAD [Ciampa, 2011] website). I specifically designed this website for children in the early primary grades (K–2), and it comprised a collection of levelled nonfiction and fiction e-books ($N = 36$) from the Big Universe Learning (2011) website, as well as embedded comprehension questions that I developed. These e-books were levelled from A through K based on the Fountas and Pinnell Text Level Gradient (1996). I chose the e-books found on the Big Universe Learning (2011) website because they were freely accessible and provided a large library of levelled fiction and nonfiction e-books. I received written approval (via e-mail) from the Big Universe Learning (2011) creators to use and modify the e-books for this study.

The e-books on the Big Universe Learning (2011) website originally consisted of static text and images, similar to print-based picture books. I added more interactivity to the e-books using Adobe Captivate, an e-learning authoring tool that enabled me to create, maintain, and deliver rich animations and interactive content through standard web browsers. For example, I added sound effects as well as entrance, emphasis, and exit animation effects to the text and objects on a page (slide), which included highlighting and presenting each word individually as it was read aloud in a different colour (red). The online e-books 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, I asked the participants to listen to the e-books using the read-aloud feature. My voice was the narrator, and it played automatically when each page (slide) appeared on the screen, thereby focusing the child's attention on the relationship between the written text and its oral reading (de Jong & Bus, 2002). 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 e-books also 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.

Embedded comprehension questions appeared on a separate page within the e-book after the participants clicked on the Forward button to turn the page. Table 1 (p. 36) includes sample questions that I asked participants before, during, and after their e-book readings, which were also closely aligned with the grade 1 language curriculum expectations (Ministry of Education of Ontario, 2003).

I composed these questions according to the three levels of Question-Answer Relationship (QAR; Raphael, 1982) questions: literal, inferential, and evaluative. I also included at least one question in each e-book to assess

Table 1. Sample Guided Comprehension Questions/Alignment with Grade 1 Ontario Language Curriculum Expectations

Grade 1 Ontario Language Curriculum Expectations	Sample Guided E-Book 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	What does this story remind you of in your life? Does this story remind you of something else you have read? Does this story remind you of anything you saw on TV or in a movie? Have you ever been on a train before? Where were you going? What did you see during your train ride?
Responding to and Evaluating Texts 1.8: Express personal thoughts and feelings about what has been read	Have you ever been as upset as Sam? What happened? How did you feel? What did you do to make yourself feel better? How does the ending of this story make you feel? Why? If you could change the ending of this story, what would happen? What was your favourite/least favourite part of the story? Why?

each one of the aforementioned critical-thinking skills (making predictions, making connections, visualizing, evaluating, and synthesizing). Each e-book contained 10 questions, 3 of which were literal questions, 4 of which were inferential questions, and 3 of which were evaluative questions. Each question appeared on a separate page in the e-book. I presented the literal questions in a multiple-choice format and created a hyperlinked correct response slide (“Well Done!”) and a hyperlinked incorrect response slide (“Oops, try again!”) for each one that the participants viewed after clicking on answers. I scored students’ responses to the inferential and evaluative questions using a rubric.

Instruments

My Motivation to Read Questionnaire. I combined questions from the Motivation for Reading Questionnaire (Gambrell, Palmer, Codling, & Mazzoni, 1996) and the Reading Activity Inventory developed by Guthrie, McGough, and 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. I used the questionnaire, which was a combination of the two inventories, to determine whether the participants’ reading motivation and attitudes aligned with their listening comprehension scores and reading behaviours during the e-book sessions. At the beginning of the program, the 28-item My Motivation to Read Questionnaire #1 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. I scored the items 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*),

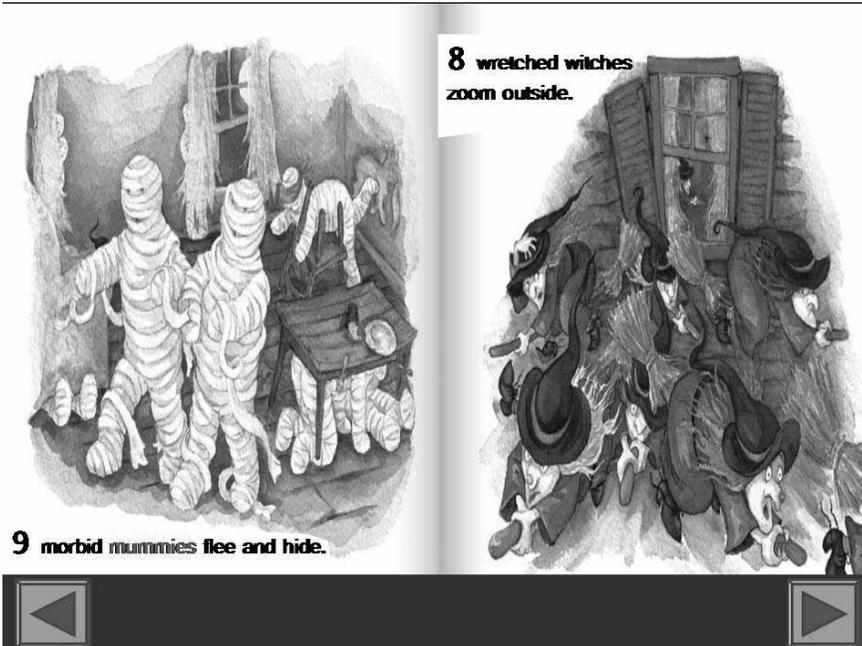


Figure 1. Screenshot of online e-book book from ICANREAD (Ciampa, 2011).

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 program, I administered the 35-item My Motivation to Read Questionnaire #2. 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 e-book reading, including their most and least favourite aspects of the program. To enhance content validity, I 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.

Listening comprehension. I used the fourth edition of the Gray Oral Reading Test (GORT-4; Wiederholt & Bryant, 2001) to measure participants' listening comprehension abilities. The individually administered, norm-referenced test consisted of two parallel forms (I administered Form A and Form B during the pre- and posttest sessions, respectively), each containing 14 developmentally sequenced expository and narrative reading passages with five multiple-choice comprehension questions following each passage. I orally read the passages and follow-up comprehension questions while the text remained in the participant's view. Passages and comprehension questions increased in difficulty and complexity as students progressed through the test. To establish the comprehension ceiling, I tested each participant

What does this story remind you of in your own life?

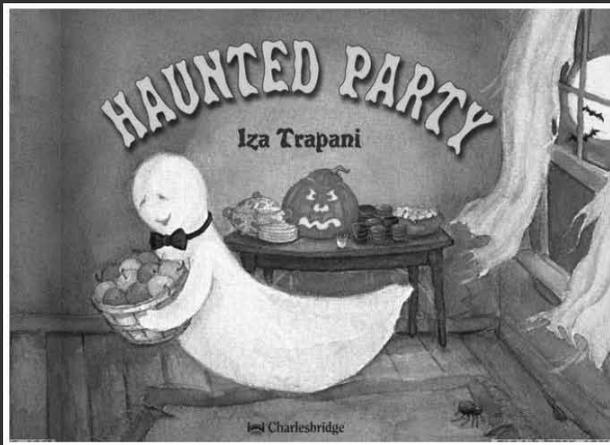


Figure 2. Screenshot of comprehension question from ICANREAD (Ciampa, 2011).

until he or she answered three out of five comprehension questions incorrectly for any one story. Internal consistency reliability was reported as .90 in the test manual (Wiederholt & Bryant, 2001). I calculated percentages (of correct responses) for participants' raw comprehension scores on each story (out of 5).

Behavioural Observation Checklist. I used the Behavioural Observation Checklist, which I developed, during the online reading session to record the responses and behaviours of the child participants during the digital reading sessions, including the frequency of on- and off-task behaviour and level of engagement with the instructional program. I 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 me to adopt time-on-task as a proxy measure for engagement, using observable behavioural measures. I 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"). I defined a child's low level of engagement (e.g., 1 = rarely) during

both the read-aloud and postreading 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, I also considered them to be off task. I 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).

E-book reading log. According to Edmunds and Tancock (2003), reading motivation should be examined using a variety of measures, including book logs. I used book logs in this study to measure the participants’ motivation to read the e-books at home, of their own volition and in their own time, which was based on the number of times they visited and read the e-books on the ICANREAD (Ciampa, 2011) website. I asked participants to provide the following information for each e-book they read: title of e-book, level of e-book, 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]).

Comprehension Strategies Rubric. I used a scoring rubric for assessing the participants’ responses and use of the following comprehension strategies when answering the literal, inferential, and evaluative questions: making connections (prior knowledge), questioning, visualizing, inferring and making predictions, and synthesizing. I used the rubric found in The PM Benchmark Reading Kit 2 (Smith, Randell, Nolley, & Giles, 2002), which is an assessment tool used by many Ontario primary-level teachers to evaluate their students’ comprehension skills. I 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 I checked for agreement. I used an intra-class coefficient to calculate the degree of reliability between the coders (McGraw & Wong, 1996). There was strong interrater reliability among the three coders ($r = .87, p < .05$). I therefore concluded that the coders were reliably and consistently using the coding framework (Hurlburt, 2003).

Data Analysis

I analyzed the quantitative data collected from the Gray Oral Reading Tests (Wiederholt & Bryant, 2001), My Motivation to Read Questionnaires, e-book reading logs, and Comprehension Strategies Rubric using simple descriptive statistics, such as frequencies, means, and percentages. I transcribed and manually coded observational field notes, then analyzed these data using an exploratory, emergent, inductive approach to create a profile of the online e-book reading

Table 2. Preprogram and Postprogram Frequency of Internet Use at Home and School

	Frequency of Internet Use at Home	Frequency of Internet Use at School
Preprogram	1 = every day 5 = some days	2 = every day 2 = some days 2 = once a week
Postprogram	4 = every day 2 = some days	2 = every day 2 = some days 2 = once a week

experiences of grade 1 children. I began with an open coding of the data by creating tables. Once I had coded the raw data according to the category systems described, I retrieved, assembled, and viewed data belonging to each category. I then identified commonalities and differences among student responses, experiences, and behaviours and analyzed them using axial coding (Creswell, 2010). 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% inter-rater reliability was reached on categories, subcategories, and interpretations. Findings from this study are presented next in narrative and tabular form to offer a description of each participant case.

Results

The first section summarizes the findings from the My Motivation to Read Questionnaire and e-book reading logs to answer this study’s first research question: *What are the effects of the online reading program on grade 1 children’s attitudes toward online reading?* In relation to the second research question, *What are the effects of the online reading program on grade 1 children’s listening comprehension?*, the second section reports the participants’ GORT Listening Comprehension pre- and posttest scores. Lastly, this section discusses and examines the observational field notes and scoring rubric that assessed participants’ oral responses to the embedded comprehension questions during the e-book reading sessions to address the third and final research question: *What are the effects of the e-book question-answering tasks on grade 1 children’s listening comprehension and reading engagement?*

My Motivation to Read Questionnaire

In addressing the first research question about the effect of online e-books on first graders’ reading motivation, the findings based on pre- and posttest data from the My Motivation to Read Questionnaires showed that all six students believed that it was very important to read well. All of the students provided the same response to the item: *How often do you read for fun on your own time?* On both the pretest and posttest, six participants stated that they enjoyed spending their free time reading *some days*. The importance of choice was also evident, as five participants were *very happy* when they were given an opportunity to decide what text they would like to read.

Table 3. Preprogram and Postprogram Purposes of Internet Use

	Frequency	Participant Quote
Preprogram		
Play games	5	"Play games on the Barbie, Treehouse, and Playhouse Disney websites" "Play dirt-bike and sports games" "Play games on Poptropica and Club Penguin" "Play math games"
Read e-books	1	"Read books on the Tumble-books website at the school library"
Postprogram		
Play games	2	"I play games on Poptropica and Club Penguin" "I play dirt-bike games"
Read e-books	4	"I read the books and answer the questions on your [author's] website [ICANREAD]" "I read books from the Tumble-books and Scholastic website, but I do not do answer any questions like yours [on the ICANREAD website]"

The participants were asked how often they took books out of their classroom, school, and public library for recreational reading purposes. There was no change in the frequency of visits to the library from pretest to posttest; all of the participants said that they *rarely* took books out of their library. Table 2 examines participants' pre- and postprogram frequency of Internet use.

At preprogram, five out of six participants used the Internet at home some days (about two to three times a week), whereas an almost equal proportion of participants used the Internet at school every day ($n = 2$), some days ($n = 2$), and once a week ($n = 2$). At postprogram, all of the participants reported a higher frequency of Internet usage at home where four out of six participants accessed the Internet every day. The frequency of Internet use at school remained the same at postprogram. Table 3 examines participants' pre- and postprogram purposes of Internet use.

As shown in Table 3, when asked about the main purpose of their Internet use at pretest, the majority of participants ($n = 5$) stated that they visited gaming websites. All of the participants were familiar with and had used e-books at school, such as Tumble-books and Scholastic Book Flix; however, they noted that, unlike the e-books found on the ICANREAD (Ciampa, 2011) website, the other e-books did not ask them to answer any questions, but rather were used by their teachers solely for "listening to the stories and playing games on the websites." In contrast to their pretest responses, the participants' postprogram usage of the Internet for playing games was much lower. The majority of participants ($n = 4$) now used the Internet for reading e-books, including those from the ICANREAD (Ciampa, 2011) website. The e-book reading logs also provided information that confirmed the validity of these questionnaire results. Table 4 (p. 42) reports the results from the participants' e-book reading.

According to their reading logs (Table 4), all six participants frequently visited the study's website at home and engaged in e-book reading in their free time. When they evaluated each of the books using a 3-point Likert

Table 4. Frequency of Visits to the ICANREAD Website

Participant	Total Number of E-Book(s) Read
Elizabeth	4
James	5
Karen	5
Ben	12
Brittany	13
Christopher	16

Table 5. Selected Participant Responses to “What Did You Like the Most/Least about the Online Reading Program?”

Codes	Response Frequency	Participant Quotes (Examples)
Most		
Immediacy of Feedback	2	“Knowing if I was right or wrong right away”
User Interactivity	3	“The questions that were asked when I was reading a story” “I got to move back and forth between pages” “I got to click on my answers”
Independence/Control	3	“Got to read the stories by myself without an adult helping me”
Text features	4	“The red words that moved when it was reading to me” “The talking voice that read the stories to me”
Choice	4	“I got to choose which books to read” “I like picking books about sea animals”
Personal Interest	4	“I really liked the books about whales” “I liked reading about cats and dogs a lot”
Least		
Limited selection of e-books	2	“I wished there were more books like Judy Moody and Dr. Seuss” “I wished there were books on dirt bikes”

scale (happy face, neutral face, sad face), all of the participants circled the happy face for every e-book they read, which reflects their reported enjoyment of the program. Only one of the six participants, Brittany, was prompted by her parents to visit the website, whereas the remaining participants read the e-books of their own volition.

Therein lies the question: What enticed the participants to visit the website and voluntarily read the e-books during their free time? When discussing their reasons for enjoying and visiting the site, several factors (displayed in Table 5) arose.

Table 5 highlights the most frequently occurring comments from the participants’ questionnaires, which focused on personal interests, choice, e-book text features (e.g., digitized speech and highlighting of words), user interactivity (ability to answer questions during reading), independence, control, and immediacy of feedback. Personal interest appeared to be the most important factor that influenced the frequency of site visits and the participants’ e-book reading behaviours. This might be explained by its novelty; however, many of the participants were already familiar with and engaged in similar e-book reading programs. Similarly, the element of choice was equally as important for a majority of participants because they

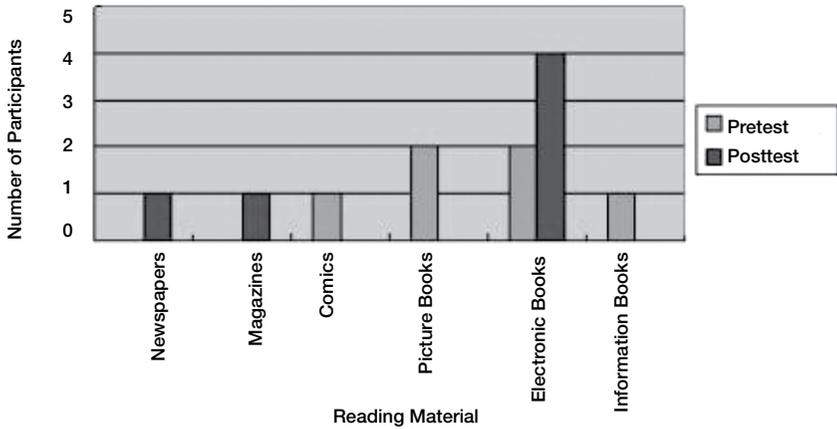


Figure 3. Participants' preferred reading materials.

had topical interests they wished to pursue. For example, Ben's and Christopher's fascination with sea mammals led them to each re-read the same e-books, *Whales and Swordfish*, four times. Brittany's questionnaire responses indicated that she enjoyed reading books about cats and dogs. Similarly, Brittany also repeatedly read the same two e-books, *Puppies and Cat Life Cycle*, whose topics were of great interest to her. In fact, one of the suggestions made by two participants for improving the ICANREAD (Ciampa, 2011) website was to offer more books related to their personal interests. The importance of choice was also revealed in the questionnaire responses, as participants were reportedly happier when they were able to choose the kind of reading material they read rather than have it assigned by their teachers.

As evident in Figure 3, when asked to indicate their most preferred type of reading material at pretest, picture books and e-books emerged as the most preferred choice. At posttest, e-books became the most preferred reading choice for more than half of the participants; four students had a higher preference for reading e-books 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 (see Figure 4, p. 44).

Figure 4 illustrates that a majority of participants preferred electronic reading material to printed material by the end of this study. Compared with traditional print books, five students perceived e-books to be "easier to read and follow along with the moving red words." In addition to this, as reported in their posttest 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 pretest, four out of six participants were *very happy* answering comprehension questions using paper and pencil. At posttest, however, five out of six participants were

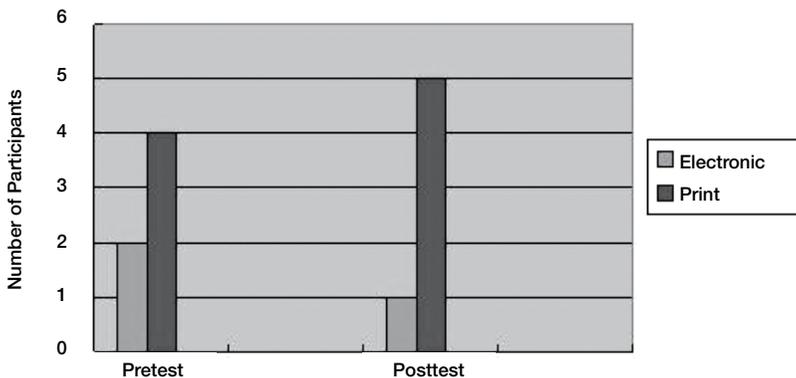


Figure 4. Preferred media type (print or electronic).

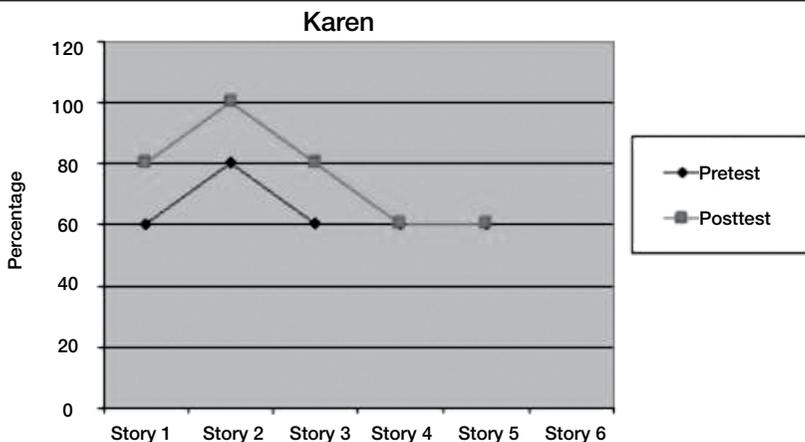


Figure 5. Karen's GORT Comprehension Test scores before and after the intervention.

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.

Gray Oral Reading Test Scores

I used the fourth edition of the Gray Oral Reading Test (GORT-4; Wiederholt & Bryant, 2001) to measure the listening comprehension of the six participants. I gave two parallel forms of the test to the students prior to and after the intervention. Mean listening comprehension raw scores (calculated as percentages) for each participant are shown in Figures 5–10 (pp. 44–47).

Before the intervention began, Karen reached a ceiling at Story 6. At the end of the study, Karen also attained a ceiling at Story 6. Her average pretest percentage score was 56.7%, and her posttest score was 70%. This indicates

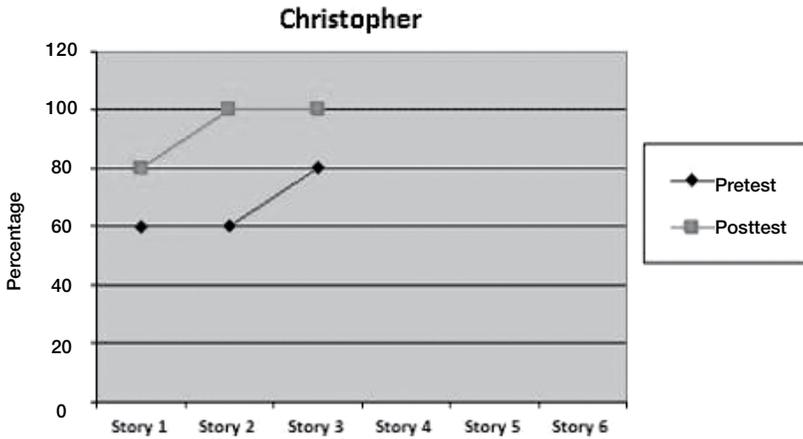


Figure 6. Christopher's GORT Comprehension Test scores before and after the intervention.

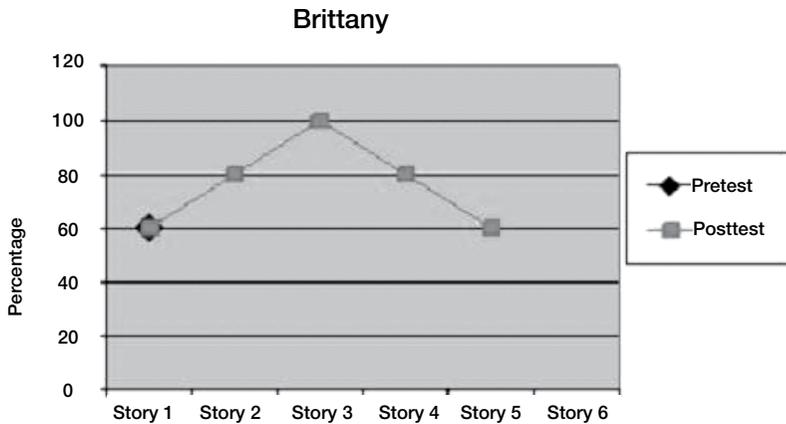


Figure 7. Brittany's GORT Comprehension Test scores before and after the intervention.

that, although Karen did not reach a high ceiling, she still had a moderate increase in the total number of correct comprehension responses after the program; the mean difference between Karen's pretest and posttest scores was 13.3%.

During pretest and posttest, Christopher reached the same ceiling (Story 4). However, his average pretest percentage score was 55%, and his posttest score was 80%, which indicates a mean comprehension score increase of 25% by the end of the intervention.

At pretest, Brittany reached a ceiling at Story 2. At posttest, Brittany increased her comprehension and reached a higher ceiling (Story 6). Brittany achieved a higher comprehension score after the intervention, as evidenced by her pretest mean score of 50% and posttest mean score of 70%.

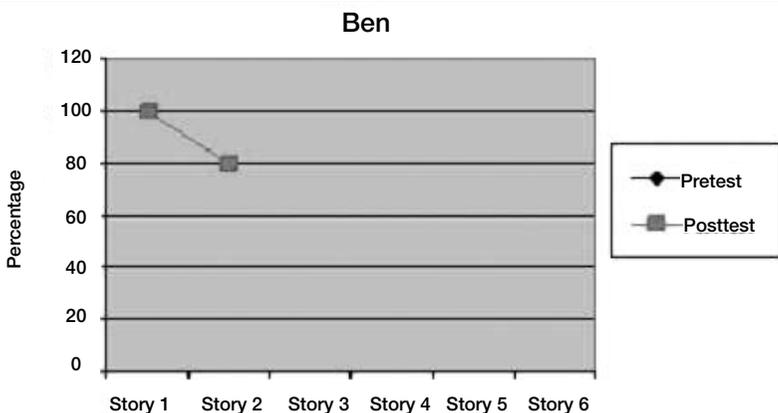


Figure 8. Ben's GORT Comprehension Test scores before and after the intervention.

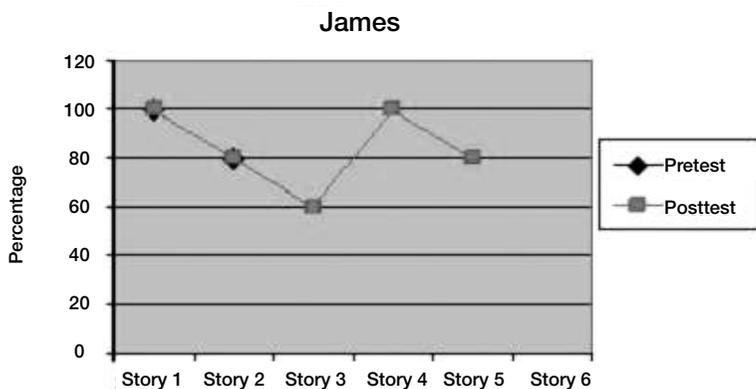


Figure 9. James' GORT Comprehension Test scores before and after the intervention.

Ben had a low ceiling before the intervention (Story 1) with a pretest percentage score of 40%. At the end of the study, Ben reached a ceiling at Story 3 and significantly increased his mean comprehension score by 33.3%.

James made the largest gains in listening comprehension, as evidenced by his ceiling-level performance from pretest to posttest. At pretest, James reached a ceiling at Story 6; by posttest, he reached a higher ceiling (Story 6). James had a slight increase in his posttest comprehension score; his average pretest percentage score was 73.3%, and his posttest score was 76.7%; the mean difference between these two scores was 3.4%.

The sixth participant, Elizabeth, exhibited poor listening comprehension and memory, as evidenced by her pretest comprehension score (20%). This finding confirms the previous comment made by Elizabeth's mother in the first session, when she informed me that Elizabeth has difficulty remembering parts of a story. However, the results of the GORT comprehension posttest showed improvement in Elizabeth's listening comprehension skills.

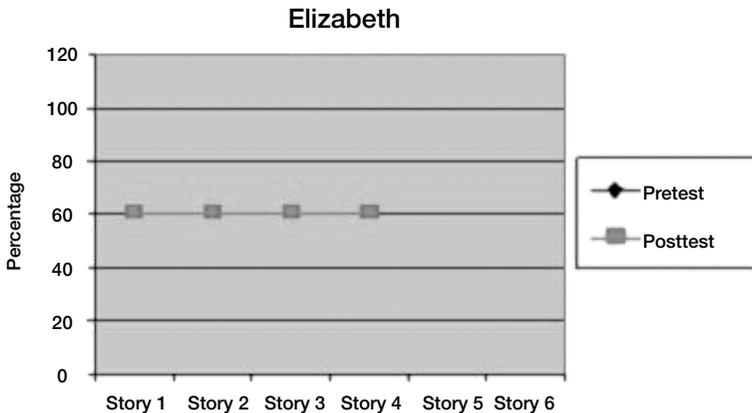


Figure 10. Elizabeth's GORT Comprehension Test scores before and after the intervention.

Table 6. Change in Pretest and Posttest GORT Comprehension Raw Scores (% Correct)

Student	Pre (%)	Ceiling Level (Story #)	Post (%)	Ceiling Level (Story #)
Elizabeth	40	1	60	5
Christopher	67	4	93	4
Brittany	60	2	76	6
Ben	40	1	90	3
Karen	64	6	76	6
James	84	3	90	6

At posttest, Elizabeth reached a much higher ceiling (Story 5) than at pretest (Story 1). Her average posttest score was 60%; the mean difference between her pretest and posttest scores was 40%. Elizabeth's low test scores were also indicative of her motivation for completing these reading measures. Similar to her questionnaire response, Elizabeth avoided answering story comprehension questions after reading a story, but she was more willing to answer questions using the computer, which was her preferred medium. Although she made substantial improvements in her test scores, Elizabeth's poor performance on the print-based listening comprehension test was still below that of her same-aged peers at posttest.

As depicted in Table 6, three participants reached higher ceilings, and all of the participants gained in their listening comprehension performance from pretest to posttest. Total average comprehension scores dramatically increased, as evidenced by a pretest mean score of 49.2% and a posttest mean of 71.7%.

Engagement and Comprehension Performance during E-Book Reading

I used the Behavioural Observation Checklist to record the responses and behaviours of the child participants during the online e-book reading sessions, including the frequency of on- and off-task behaviour and level of

Table 7. Participants' Mean Level Achieved in Response to the Literal, Inferential, and Evaluative E-Book Questions

Question Type:	Literal Questions			Inferential Questions			Evaluative Questions								
	Synthesizing			Making Predictions			Visualizing			Making Connections			Expressing Personal Thoughts and Opinions		
Month:	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Ben	4	4	4	3	3	3	2	2	2	1	1	1	1	2	2
Christopher	4	4	4	3	3	3	2	2	2	1	1	1	1	2	2
James	4	4	4	3	3	3	3	3	3	2	3	3	1	3	3
Brittany	4	4	4	3	3	3	2	2	2	3	3	3	1	2	3
Karen	4	4	4	3	3	3	3	3	3	3	3	3	1	3	3
Elizabeth	4	4	4	3	3	3	2	2	2	1	2	3	1	2	3

Note. 1= not meeting expectations, 2 = minimally meeting expectations, 3 = fully meeting expectations, 4=exceeding expectations

engagement with the instructional program. With regard to their levels of engagement, all six participants were always on task and highly engaged during every 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. For example, Karen voluntarily made a text-to-world connection relevant to one of the characters in the story *Halloween Party* when she exclaimed, “That man looks just like the man who scares people on Club Tropica [a popular children’s gaming website]!” Similarly, James freely offered his comments about the pictures in the e-book, *The Life Cycle of a Cat*: “Look at the cat’s belly! It’s getting bigger and bigger.... That’s crazy!” 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 e-book 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 pretest to posttest, 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. Table 7 shows the mean level of achievement for each participant’s responses to the literal, inferential, and evaluative questions in the e-books they read during the 3-month intervention period.

Consistent with Miller and Smith’s (1985) as well as Van Kleeck’s (2008) findings, all of the participants were more successful at answering literal questions than they were at answering inferential and evaluative questions, as these tasks require a deeper level of processing (Alptekin & Erçetin, 2009).

The mean level on the literal questions was 4 (exceeding expectations). All of the participants correctly answered the literal questions on their first attempt. When the “Well Done” slide appeared on the screen, the participants’ eyes lit up and smiles crept across their faces. In accordance with the attribution theory (Weiner, 1986), 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). The visualizing process may have significantly improved some of the participants’ listening comprehension (Zwiers, 2004). Prior to reading the e-book *Haunted Party*, I asked Karen to close her eyes and visualize what the haunted house in the story would look like. The following excerpt illustrates Karen’s ability to describe with vivid accuracy the mental image she had seen:

I see a dangerous house with holes, slime, lots of witches and bats flying around it, thousands of dead trees, a graveyard in the backyard, an old squeaky, blue glowing door with a scary door knob, and when you open it, something invisible comes out, like a ghost.

After describing her mental image, Karen seemed more eager to turn the page and see if her prediction was accurate. After doing so, Karen stared intently at the picture of the haunted house and excitedly pointed out all of the features that she envisioned. Karen also indicated to the researcher that Halloween was her favourite holiday and that this e-book reminded her of a television show she watched. The associated discussion and Karen’s effective use of mental imagery during reading may have contributed to her increased level of engagement and improved comprehension of the text, as imagery relies heavily on the activation and utilization of the reader’s own background experiences (Farah, 1995; Romeo, 2002; Woolley & Hay, 2004).

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 I 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 James, who always went beyond the literal text and readily shared his personal stories with me, the remaining participants seemed more reluctant and unwilling to elaborate on their answers. For example, after reading the e-book *Cinderella*, I asked Christopher, “How do you think Cinderella feels when her stepsisters are being mean to her?” and he said, “Sad.” Similarly, when I asked Ben to predict what the story *Whales* would be about, he simply replied, “Whales.” When I asked him why he would feel that way, he replied, “I don’t know.”

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). As illustrated in the excerpt below, six participants typically provided specific but underdeveloped support from the text or their own ideas, with the exception of Ben, whose response included some specific but underdeveloped support:

Christopher: “When the whale jumped out of the water because it was cool.”

Brittany: “When they [Poko and his dog] were dancing because it was funny.”

James: “When they [the penguin and angel] put the streetlight on the Christmas tree, because why would you put that on a tree?”

Elizabeth: “I liked the part about sharing with your best friend.”

Karen: “The part with the teddy bear because I love teddies and my mom always buys them for me.”

Ben: (pointing to the picture of a whale in the story) “I like this picture because it shows how long and smooth the whale is.”

Overall, observation 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. I made several attempts to get all of the participants to expand their responses, but they did little beyond providing a word or two. It became apparent that they were either unable or possibly uncomfortable answering many of the open-ended questions in the absence of verbal prompts, phrases, and cues from me. For example, I frequently intervened during the participants’ e-book reading sessions to insert phrases to prompt the participants, such as, “Can you tell me more about that?” Over the course of the study, the participants made slight improvements in answering the higher-order questions (with additional prompts and probes from me). However, this may have been attributed to the participants’ increased familiarity with the question types and expectations.

In regard to the evaluative question “What does this story remind you of in your own life?” only two female students, Brittany and Karen, were able to make connections between the e-book they were reading and their own experiences—specifically, to other nonprint media. In the observational data, connections were made on the basis of theme, character, or generic features. For example, Brittany responded to the e-book *Haunted Party* by recounting a show that she had seen on television: “This book reminds me of a TV show that I watched about the scariest vampire of all called ‘V!’” Similarly, Karen made a connection between the girl that turned into a wolf in the e-book *Wolf Camp* and a “boy who turned into a grizzly bear” in the movie *Brother Bear*.

The following example illustrates this when Elizabeth read an e-book that covered a topic with which she was most familiar. When she read the e-book *The Shopping Cart*, Elizabeth was able to accurately predict what the story was about and made personal connections to the story:

It's about a little girl and her mom who go shopping for things to eat and drink... This story reminds me of when I went to No Frills [grocery store] with my mom to get groceries for breakfast, lunch, dinner and snacks.

In another instance, however, Elizabeth experienced greater difficulty making any meaningful connections to the e-book *What Tigers Do*, as she had “never seen or read about a tiger before.” Interestingly, when asked to make text connections, the three male participants similarly responded, “It [the e-book] does not remind me of anything in my life,” and hastily clicked the Forward button to continue reading their story. Similarly, Christopher was unable to predict what the e-book *The Grump* would be about because he did not know what the word grump meant. Karen revised her original prediction when she made a connection between her prior knowledge and the information in the text, particularly the illustrations, while reading *The Grump*:

I think the grump is the dog. Oh no, it is not the dog because it [the grump] has human footprints! I think the grump is the boy's dad because I know dads have big footprints.

James, who was also a great storyteller, confidently informed me that he already knew about and in great detail explained every stage of the cat's life cycle prior to reading the e-book *The Life Cycle of a Cat*.

Discussion

Given the above findings, some assertions can be made in the context of this pilot study. First, the proximity and access to online reading resources cannot be minimized. 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 Internet visits compared to library visits are evident, which highlights the maximizing potential and importance of creating technology-rich classrooms for literacy learning.

The results of this study indicated that a wide variety of reading choices and the opportunity to select books may have an impact on reading engagement and ultimately listening comprehension. A central finding in these data was the strong correlation between enjoyment of the online e-books that the children read and their preference for a choice of books. As Flowerday, Schraw, and Stevens (2004) found, children are highly motivated to read and remain engaged in literacy activities when afforded a choice of what to read. In fact, choice and personal interest translated into and promoted participants' voluntary reading of the online e-books at home (Flowerday & Schraw, 2000). The wide selection of fiction and nonfiction book titles

possible through such online e-book websites as the one used in this study is also motivational for children (Flowerday & Schraw, 2000). This correlation between the number of site visits, the participants' reported enjoyment of the e-books, and their preference for self-selected reading material suggests that the electronic format combined with the opportunity for choosing books was a highly motivating factor for children to read.

The postprogram questionnaire responses revealed that 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 features also helped to capture the participants' attention during the read-aloud sessions without being distracted or influenced by external stimuli. The narrated e-books also decreased or eliminated the need for students to focus on decoding, allowing them to concentrate on constructing meaning from text (Pearman, 2008). The data also revealed that the interactive features of the e-books influenced their desire to use electronic formats as their preferred medium for reading material, and may have contributed to some of the learning gains in participants' listening comprehension skills (e.g., Chera & Wood, 2003; Korat & Shamir, 2006; Segers, Takke, & Verhoeven, 2004). These features have also proved to be valuable tools for supporting the vocabulary acquisition of beginning, struggling readers (Pearman, 2008).

Similar to the findings in Ota and DuPaul's (2002) as well as Acevedo-Polakovich, Lorch, and Milich's (2007) studies, the automatic feedback feature embedded within each e-book was another important reason for the student participants' perceived enjoyment of the program. I observed that these students were eager to receive and respond to immediate feedback. Of particular interest here is Elizabeth's high rate of success in answering the literal questions, which was in stark contrast to her performance during the Gray Oral Reading Test questions. Several factors might have contributed to these changes, one of which is the timing of questions asked (Allington & McGill-Franzen, 2009). The Gray Oral Reading Test, similar to many other comprehension assessment tools, is more product oriented rather than process oriented (Allington & McGill-Franzen, 2009). That is, such tools measure children's comprehension at the "end" of reading (Allington & McGill-Franzen, 2009).

Similarly, 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) also suggest that it is the 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 postreading 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. Educators should ask questions during the course of reading and instruction, as it appears that "the closer the question to the information it asks about, the higher the recall performance" (Dewitz, Jones, & Leahy, 2009).

Differences between the ability to answer each of the three types of questions (literal, inferential, and evaluative) may also be related to the demands made by each on how information is processed. Van Kleeck (2008) argued that literal understanding is not as cognitively demanding as inferential comprehension, which requires the need for schema formation and automation, as well as an extraction of the deeper meanings of the text. Furthermore, inferential questions seem to require not only a recognition component but also a generation component, which is not required by literal questions (Miller & Smith, 1985; Van Kleeck, 2008). This finding may also be related to the motivational processes that are involved in the generation of avoidance behaviours (Elliot & Church, 1997). According to the 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, that they encountered after answering the literal questions may have also removed an important means of sustaining students' engagement with the inferential and evaluative tasks (Deci & Ryan, 1985; Lepper, 1981). These observations indicate that the presence of immediate feedback may have a positive impact on intrinsic motivation among participants.

Furthermore, 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). 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). Thus, it is not surprising that readers' performance may be optimized when they can relate (unfamiliar) material to existing, familiar knowledge (Osborn & Lehr, 1998). Given these findings, 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. This may also explain the participants' lower performance on the inferential and evaluative questions. These findings suggest that young readers require explicit teacher modeling, prompts, and cues to respond to such higher-level thinking questions, connect ideas together, and build connections between them (Cooper & Kiger, 2003).

As primary teachers begin to incorporate electronic reading into their instructional programs, they must also give strong consideration to the quality, quantity, and purpose of the e-books they provide for children to read. That is, e-books should be considered not only an “entertainment source,” but also viewed as an educational tool and supplement to their print-based independent, shared, or guided reading instruction.

Limitations and Directions for Future Research

This study comprises a preliminary investigation of online e-books with embedded comprehension questions and its effects on grade 1 children’s reading motivation, listening comprehension, and comprehension strategy use. Limitations from this study stem from its scope, particularly the size and composition of the sample population and lack of a control group. Although the data reported here are from a pilot study that included a small, convenient sample size, the findings do 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 online e-books 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, alongside parent and teacher reports, to gain a better understanding of children’s reading motivation and experiences with print-based and electronic texts. More large-scale, longitudinal studies examining the effects of online e-books on comprehension for this population should be pursued with rigor. Most important, researchers must consider how e-books contribute to children’s reading outcomes when compared to traditional shared-storybook reading approaches.

It should also be noted that the practice of web-based learning may present some technical problems with which users must deal. Technical frustrations including the perceived delays in webpage loading time and broken hyperlinks in some e-books were reported by the child participants and their parents. I plan to resolve some of these technical issues prior to conducting the subsequent larger study and to maintain and update the website’s content.

Conclusions

This study sought to address the underexplored issues of online e-books and higher-order thinking by developing an online e-book reading program closely aligned with provincial grade 1 language and technology curriculum expectations. By the end of their involvement in this study, the majority of participants preferred electronic texts over printed texts; this finding was also supported by the number of times the participants visited the ICAN-READ (Ciampa, 2011) website and engaged in voluntary e-book reading at home. It is important to note that teacher-directed, explicit instruction, modeling, close monitoring, and guided practice will need to be repeated

many times before students are able to independently and flexibly apply the cognitive strategies when reading in a variety of texts. In sum, the online e-books provided a multisensory reading experience that supported comprehension and critical reading by posing questions before, during, and after reading, which may have facilitated grade 1 children's listening comprehension and increased their level of engagement during e-book reading.

Declaration of Interests

The ICANREAD (Ciampa, 2011) website was developed by the author for non-commercial, educational, and research purposes only. The author did not receive financial or technical support for this study.

Author Note

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