Understanding Interactive CD-ROM Storybooks and their Functions in Reading Comprehension: A Critical Review

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Abstract
With dramatic changes and recent advances in multimedia, digital technologies through computers propose new ways for introducing kids to the literacy. Literacy educators have stated that traditional printed books are not sufficient and electronic books have the potential to change reading skills. As a valuable tool in educational settings new and varied forms of technology, specifically, interactive CD-ROM storybooks have been used in classroom literacy learning by students and teachers. Although, several studies indicate that interactive CD-ROM storybooks help children develop visual recognition and increase reading comprehension, the results of the experimental studies previously carried out in this area have been conflicting and often hard to interpret. Therefore, the main purposes of this review are to identify the potential benefits, functions and disadvantages of interactive storybooks and assess mixed results of previous studies related to interactive CD-ROM storybooks.

Keywords: Literacy and technology, interactive CD-ROM storybooks, reading comprehension.

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Introduction

Reading comprehension is influenced by new technology and literacy. Recent literature has stated a long tradition of book and print media is insufficient, students and teachers use new and varied forms of technology. The need for changes in the way we think about reading comprehension is inevitable (Coiro, 2003). Rand Reading Study Group (2002) pointed out "an explosion of alternative texts" and "interactive texts that incorporate hyperlinks and hypermedia introduce some complications in defining comprehension because they require skills and abilities beyond those required for the comprehension of conventional, linear print" (p. 14). These new reading environments bring out cognitive and aesthetic challenges to comprehension (Spires & Estes, 2002) and there is a need for theoretical description of the new reading environments (p.123).

Research findings are optimistic about the future of multimedia applications for readers. The National Reading Panel [NRP] meta-analysis has found the 21 studies used to assess computer technology that showed promising results (National Institute of Child Health and Human Development [NICHD], 2000). Many features of interactive CD-ROM storybooks are well matched for phonemic awareness, phonics, fluency; vocabulary, and comprehension (Pearman & Lefever-Davis, 2006). Computer software has the exceptional capacity to bring individualized practice to students who need to enhance their reading fluency (Oakley, 2003). The ability to recognize sound-symbol relationships is essential, but it is not enough for comprehension. Students must also activate their prior knowledge and use context hints to comprehend what they read. There is growing indication that computer-supported effects such as animation and sound allow students to make these connections (Matthew, 1997). Greenlee-Moore and Smith (1996) indicate that the use of interactive CD-ROM storybooks may help improve reading comprehension for elementary students. In addition, CD-ROM storybooks develop the story setting through animated graphics and sound effects indicating story mood and events and thus supporting comprehension (Lefever-Davis & Pearman, 2005). Visual aids in interactive CD-ROM storybooks are helpful for understanding text and building coherent mental representation.

Interactive CD-ROM Storybooks

As valuable tool in educational setting, interactive books have been used in classroom literacy learning in the early school years (Chen, Ferdig, & Wood, 2003; Matthews, 1996; Underwood, 2000). Interactive CD-ROM storybooks are reading software for children in illustrated storybooks that help children develop visual recognition. Interactive storybooks are mainly designed to integrate text, graphics, animations, music and other multimedia components in order to bring support to the story line (Chen et al., 2003). Children could read the stories on their own or listen to the stories read and activate dialogue or animated part of illustration. According to Doty (1999), interactive CD-ROM storybooks refer to software which presents readers with several options for interaction. The text is usually highlighted as it is read allowing students to follow the words as they are read. Text is statically displayed on a computer screen or interactive computer text, on CD-ROM, that allow readers to activate graphic animations. In addition, some CDs also contain games and other interactive features based on the story

(Unsworth, 2003). Interactive CD-ROM storybooks may also be known as electronic texts, talking books, or electronic books (Pearman, 2003).

Benefits of Interactive CD-ROM Storybooks

Probably the most significant benefit of interactive CD-ROM storybooks provides reader control. The readers can make choice for themselves when and where they need help. The pronunciation, definition, hearing of the words provides minimum interruption in reader's comprehension (Lefever-Davis & Pearman, 2005). Also these features help students to not spend too much mental energy to decode words nor do they have to struggle with new vocabulary. Therefore, students have more time and energy to process meaning for comprehension (Lefever-Davis & Pearman, 2005; Pearman, 2008).

Another benefit of reading and interacting with interactive storybook has likely to be an influential motivating force for even the most unwilling readers (Matthew, 1996). Multisensory features of interactive storybooks such as the sounds effects accompanying the narration, the animations, the colorful pictures and the variety of text styles provide powerful advantages like facilitating the process of constructing meaning, expanding schemata and assisting reader's difficulties (Matthew, 1996; McNabb, 1998; Pearman, 2008; Reinking, McKenna, Labbo, & Kieffer, 1998). Studies also reveal that interactive CD-ROM storybooks give immediate help to students, eliminating the need for teachers to provide students with instant attention (Chen et al., 2003; Doty, Popplewell, & Byers, 2001; Pearman, 2008). Several studies indicate that CD-ROM storybooks increase reading comprehension (Doty, 1999; Doty et al., 2001; Matthew, 1997; Pearman, 2003, 2008).

Pearman (2008) expresses that traditional print texts are passive, static, and cannot respond to individual readers, are restricted by their linear composition, and rely heavily on the reader's internal strategies to activate prior knowledge. However, interactive CD-ROM storybooks can provide a literal interaction between the reader and the text (Reinking, 1992). Chen et al. (2003) also investigated and characterized features of interactive storybooks. They explained several benefits of interactive storybooks: (1) They are excellent tools for the integration of technological media and instructional design. (2) Interactive storybooks assist teachers to rebuild their teaching and ideas of how to use stories in their classroom. (3) Interactive storybooks provide exceptional methods of instruction and they also expand the variety of them.

Disadvantages of Interactive CD-ROM Storybooks

On the other hand, some studies disagree with the view that characteristics of interactive CD-ROM storybooks are useful for children's literacy development (DeJean, Miller, & Olson, 1997; De Jong & Bus, 2002; Labbo & Kuhn, 2000; Matthew, 1996; Nibley, 1993; Okolo & Hayes, 1996; Scoresby, 1996; Trushell & Maitland, 2005; Underwood & Underwood, 1998). Many interactive reading environments bring in a new set of cognitive barriers that can cause experienced readers of traditional print text to be cognitively overloaded (Delaney & Landow, 1991). De Jong and Bus (2002) revealed that children's understanding of a story's content was less supported by the electronic version than the traditional print book format. Interactive

features of electronic storybooks can offer too many choices and too many animations that may distract and confuse struggling readers (Coiro, 2003). Furthermore, if the illustrations, games, attractive pictorial options included in the interactive storybooks do not support the story, they can distract and draw attention away the children's focus on the story rather than support the narrative's comprehension, could cause passive reading, and delay children's early literacy development (De Jong & Bus, 2002; Labbo & Kuhn, 2000; Matthew, 1996; Shamir & Korat, 2006; Underwood & Underwood, 1998).

The interactive text features that improve context and activate background knowledge may be disadvantageous to students (Pearman, 2008). Over time, dependence on interactive text features may delay literacy development of younger readers because the use of reading strategies does not become an integral part of the reading process (McKenna, 1998). Also, the computer does not offer help or provide instruction in reading strategies as long as the reader does not ask for help (Pearman, 2008). Many of the software programs contain some features such as animations, reading aloud words, sentences, pages, or the whole book. Lewin (1996) and Pearman (2008) expressed concern that with these features readers could rely on the computer to decode words or to read the story instead of developing their own abilities. Moreover, the CD-ROM books, dissimilarly, using hyperlinks to the Internet's resources, exist in a closed environment, which engages the learner in the simulated situation completely on the CD. The CD-ROM is more object-oriented and focused on knowledge delivery or guidance in some specified topic (Chen et al., 2003).

CD-ROM Storybooks and Reading Comprehension

Pearman and Lefever-Davis (2006) reported that as one of five critical components of reading instruction, comprehension can be supported by CD-ROM storybooks. They claim comprehension skills mainly appropriated to being developed through an interactive CD-ROM storybooks format include construction background knowledge, story schema and metacognition. For example, sound effects and animation functions of CD-ROM storybooks rapidly and effectively place the reader directly in the setting thus contributing to reading comprehension. Additionally, metacognition can be supported through CD-ROM storybooks because CD-ROM storybooks provide opportunities to prompt the computer to assist their reading such as pronouncing or defining vocabulary, and contributing reader control (Pearman & Lefever-Davis, 2006).

As seen in Table 1, there are three groups of studies. The first group has supported and favored Pearman and Lefever-Davis' claim that comprehension can be supported and developed by CD-ROM storybooks (Greenlee-More & Smith, 1996; Grimshaw, Dungworth, McKnight, & Morris, 2006; Matthew, 1997; Miller, Blackstock, & Miller, 1994; Pearman, 2003, 2008; Shamir, Korat & Barbi, 2008). The second group found detrimental effects on comprehension (Labbo & Kuhn, 2000; Okolo & Hayes, 1996; Scoresby, 1996; Trushell, Burrell, & Maitland, 2001; Trushell & Maitland, 2005; Trushell, Maitland, & Burrell, 2003; Underwood, 2000). The third group of studies found mixed results with increase in comprehension depending on the assessment tool or no evidence that storybooks support or distract comprehension (De Jong & Bus, 2004; Doty, 1999; Doty et al., 2001; Kim, Yoon, Whang, Tversky, & Morrison, 2007; Lefever-Davis & Pearman, 2005; Matthew, 1996).

A study conducted by Greenlee-Moore & Smith (1996) to explore the effects of interactive CD-ROM software on children's reading comprehension when reading shorter and easier narrative text against longer and more difficult narrative texts on printed pages as compared to reading the same narrative texts using interactive CD-ROM software presented by the computer. Thirty-one fourth-grade children were involved in her study. Comprehension was measured by six multiple-choice comprehension questions, two literal, one vocabulary, and three inferential questions. The results of study revealed significantly higher comprehension scores when students were reading the longer and more difficult narratives from the interactive software. There was no difference when two treatment groups were reading the shorter and easier narratives. The interactive CD-ROM software caused higher scores on comprehension questions related to the story on more difficult and longer narratives.

There has been other research on how interactive computer software and CD-ROM books influence children's reading achievement. Kathryn Matthew conducted a study comparing the reading comprehension of third-grade students who read CD-ROM storybooks with those who read traditional printed books. The students' story retelling scores on the two CD-ROM storybooks were compared to traditional print storybooks. Thirty third-grade students were participated in the Matthew's study (1997). Matthew (1997) explains that the comprehension of students may be more accurately reflected in retellings than in the answers to comprehension questions. A statistically significant difference was found between students' story retellings of print stories and their retellings of CD-ROM storybooks. Students scored significantly higher on retellings when reading the CD-ROM stories. Matthew (1997) also declared that additional research is necessary to corroborate these findings.

McNabb (1998) did a qualitative study of four subjects ranging in age from 7-12 years old. These subjects were under one or two grade levels their expected grade reading level. The purpose of this study was to understand comprehension strategies used by struggling readers when reading interactive CD-ROM storybooks differed from those strategies used when reading paper storybooks. Struggling readers were allowed to use animations to help them in words analysis, recognition and fluency. The results of the study showed that multisensory and interactive features and the context expansion features of CD-ROM storybooks assisted struggling readers to read without difficulty and comprehend better than static paper books. Another result was that struggling readers were able to apply reading strategies individually when support from teacher, tutor, or parent was not available during reading interactive CD-ROM books.

Pearman conducted two studies (2003, 2008) on second grades students with oral retellings. The purpose of first study was to investigate whether second grade students with varying degrees of reading proficiency scored higher on an oral retelling assessment of comprehension when text was presented in an interactive, electronic format than when text was presented in a traditional print format (Pearman, 2003). Participants were 54 second-grade students from a rural elementary school in the Mid-South. A repeated measures design was used with each student reading both an interactive and a traditional print text at their developmental level of Low, Medium, or High as designated by teacher. The results of the study indicate that interactive, electronic text may facilitate reading comprehension for students that are reading below grade level or are struggling with developing reading skills and strategies. In the second

study by Pearman (2008) 69 second-grade students were participated. Interactive, CD-ROM storybooks and the traditional print texts were used in this study. Evidence from the study indicates that interactive, CD-ROM storybooks group scored significantly higher in comprehension than traditional paper group. Therefore, the use of CD-ROM storybooks could be beneficial for young readers.

Shamir et al. (2008) explored the effects of interactive storybooks for kindergarteners' emergent literacy skills within the context of paired peer versus individual use of the interactive books. The sample of 110 kindergarteners had a mean age of 5.64 years in a low social economic status. No one had been diagnosed with learning disabilities. Participants were randomly assigned to four groups: 30 tutors, 30 tutees, and 30 individual learners, all of whom used the interactive book and 20 children in a control group who were only exposed to their regular kindergarten program. Pre- and post-intervention emergent literacy measures included story comprehension, phonological awareness, and word recognition. The overall improvement of the children in the three experimental groups was higher than that of the children in the control group. In addition, interactive book activity increased story comprehension, phonological awareness, and emergent reading, over those who worked with it individually (Shamir et al., 2008).

Grimshaw et al. (2006) investigated the differences in children's comprehension and enjoyment of storybooks according to the medium of presentation. Participants in Grimshaw's study included 132 children aged 9-11. The type of medium did not significantly affect the children's enjoyment of storybook, but it took the children longer to read the interactive versions. For the interactive versions of storybooks, comprehension scores were higher for retrieval-type questions than for inference ones. The use of the online dictionary in the interactive condition was significantly greater than that for the printed dictionary. The provision of narration in the interactive version led to significantly higher comprehension scores than when narration was absent.

However, several studies reported that the same interactive nature of the interactive storybooks can sometimes serve as a distraction from the storyline (De Jong & Bus 2002; Labbo & Kuhn, 2000; Trushell & Maitland, 2005; Okolo & Hayes 1996; Scoresby, 1996; Trushell, Burrell, & Maitland, 2001; Trushell, Maitland, & Burrell, 2003; Underwood, 2000). For example, Okolo and Hayes (1996) evaluated the use of children's literature presented via one of three conditions: an adult reading a book to the child; the child reading a CD-ROM version of a book on the computer but without animation; and the child reading the book on computer with high level animation. The study, in one primary grade classroom, involved 10 students with learning disabilities and 10 students without disabilities. Students preferred the high animation condition, spending almost four times as much time reading the book but Okolo and Hayes (1996) found that the high animation misled students into drawing wrong conclusion about the text.

Labbo and Kuhn (2000) distinguished between considerate and inconsiderate CD-ROM talking books. Considerate CD-ROM talking books contain multimedia effects that are congruent with and integral to the story. Inconsiderate CD-ROM talking books contain multimedia effects that are incongruent with or incidental to the story. They found that while considerate CD-ROM

talking books supported the children's understanding and retelling of the story and involved in meaning making process, inconsiderate talking books fostered children's passive viewing and did not support their story understanding.

Scoresby (1996) assessed the effects of animation and reading ability on recall of illustrated and non-illustrated text information. Eighty-four second graders were included in the study and twenty four open-ended questions were used to test student' recall of story details. The results of the study indicate that readers who viewed animations being able to recall fewer story details once the story was complete.

Underwood (2000) compared both interactive (talking book software) and paper format designed to provide supplementary reading practice. A mixed empirical methodology combining both quantitative and qualitative techniques was employed. Learning gains were measured by story writing, observations and interviews. Sixty-two 8-year old children took part in study. Underwood (2000) reported that pupils' recall of the story of an interactive talking book was poor. In addition, children found the talking books highly motivating.

De Jong and Bus (2002) observed 4–5-year-old children exploring interactive books that included games and other activities. They found that the children's understanding of the content of the story was less well supported by the interactive version compared to the regular book format. They concluded that "the many attractive options of interactive books seem to distract children's attention from text, and number of readings of the text in favor of iconic and pictorial explorations" (p. 154).

Trushell, Burrell, and Maitland (2001) study examined Year 5 primary pupils' behaviors when reading and their recall of an interactive storybook. Pupils from three Year 5 classes participated in the study. Data were collected by observations and multiple-choice questions. This study found that pupils' recall of the storyline of an interactive storybook was poor and interactive storybook may provide mere entertainment.

Trushell, Maitland, and Burrel (2003) administered a study on year 4 primary school pupils (8-9 years-old). Data collected by multiple-choice questions, verbal recollections and opinions, and observations. They found that graphic animations and sound effects provide contextual support for readers. However, those do not support the storyline or story events and detriment to readers' ability to recall story events.

Another study, Trushell and Maitland (2005) included Year 5 and Year 4 pupils participating and two interactive storybooks on CD-ROM were used in this study. Pupils' recall of the interactive storybooks was gauged by two measures, collaborative verbal story retelling and short multiple choice quizzes. The outcomes of the study indicate that access to cued animations and sound effects did have adverse effects on pupils' story recall. The story grammar recall of Year 5 and Year 4 pupils who had read an interactive storybook was found to have deteriorated throughout the event structure.

The following studies had mixed results with increase comprehension depending on the assessment instrument. Doty et al. (2001) investigated interactive CD-ROM storybooks and

young readers' reading comprehension. First grade children students read a conventional print storybook or an interactive CD-ROM version offering word pronunciations, definitions, and labels for illustrations; narration was turned off. Children reading the CD-ROM version of CD-ROM storybooks significantly scored higher than conventional print group on comprehension questions but oral retelling scores were not different.

Matthew (1996) investigated the impact of interactive CD-ROM storybooks on the reading comprehension and attitudes toward reading of 37 matched pairs of third grade students. The students were assessed through story retellings and 10 open-ended comprehension questions. The results pointed out that when comprehension was assessed through open-ended questions, there was no statistically significant difference in reading comprehension. When comprehension was assessed by story retelling, students who read the interactive CD-ROM storybooks obtained significantly higher scores than students who read the print version of the storybooks. There was no significant difference between the reading attitudes of the students in the groups.

Another study of interactive CD-ROM storybooks and reading comprehension was presented by Doty (1999). The purpose of her study was to "determine if there was a difference in the level of young readers' reading comprehension when one group of students read an interactive CD-ROM storybook and one group of students read the same story from a conventionally printed book" (Doty, 1999, p.1). The participants were 39 second-grade children. The study used oral retellings and comprehension questions for data collection. Study findings differed from Mathew's studies (1996, 1997). Doty's study found that there was no significant difference in mean scores on the retellings between the scores but there was a significant difference in mean scores on the comprehension questions between the two groups (Doty, 1999). Doty (1999) concluded that "evidence from this study, as well as others indicates that reading comprehension can be enhanced through the use of interactive CD-ROM storybooks" (p.6).

De Jong and Bus (2004) studied the efficacy of interactive books in fostering kindergarten children's emergent story understanding. The study compared effects of children's independent reading of stories interactiveally with effects of printed books read aloud by adults. Participants were 18 four- to five-year-old Dutch kindergarten children in the initial stages of developing story comprehension. Electronic reading produced experiences and effects similar to adult-read printed books. Children frequently interacted with the animations often embedded in interactive stories, but there was no evidence that the animations distracted children from listening to the text presented by interactive books, nor that the animations interfered with story understanding. Findings suggested that children at this stage of development profited from interactive books.

Lefever-Davis & Pearman (2005) conducted a study on 11 first-grade students. Five girls and six boys representing a wide range of reading levels took part in the study. Each child read two CD-ROM talking books. During each reading, a running record was administered to assess student reading accuracy rate. Results from this study indicate CD-ROM storybooks have the potential to support readers and promote reading skill. In contrast, this study also found that features of CD-ROM storybooks may prove to be distractions for students. The length of time it takes for pages to turn disrupts the reading process, delays the opportunity for students to begin

reading, and increases their frustration level. This frustration seemed particularly evident for the more proficient readers.

Conclusion

Recent advances in multimedia offer new possibilities for introducing children to the world of reading through computer (Bus, De Jong, & Verhallen, 2006). Digital environment supporters in education believe that CD-ROM storybooks have the potential to change reading comprehension. Unfortunately, these claims have yet to be supported by the very limited research. The results of the studies previously carried out in this area have been conflicting and often hard to interpret. Additionally, mixed results have been found for variables reader's prior knowledge, experience with interactive storybooks, and separate functions of interactive storybooks such as animation (Dalton & Strangman, 2006).

Basically, there are three groups of studies related to interactive storybooks and reading comprehension. The first group early works claimed comprehension skills can be supported and developed through interactive CD-ROM storybooks. The second group research on interactive CD-ROM storybooks found detrimental effects on comprehension. The third group of studies found mixed results with increase in comprehension depending on the assessment instrument or found no evidence that storybooks support or distract comprehension. A review of the literature has shown that there are very few experimental studies that investigate the effects of interactive CD-ROM storybooks on readers' comprehension. Therefore, more work is needed to better understand about the effects of interactive storybooks on readers' comprehension.

Table 1. Summaries of the studies related to interactive storybooks

Author & Year	Participants	Materials	Assessment	Results
Miller, Blackstock, & Miller (1994)	Third-graders	CD-ROM storybooks Discis Books	Miscue analysis	Interactive CD-ROM storybooks increased decoding ability and fluency and decreased meaning related errors
Greenlee-More & Smith (1996)	Fourth-graders	Interactive CD-ROM software	Multiple-choice questions	CD-ROM storybooks increased comprehension when reading longer and difficult narratives. No differences the shorter and easier narratives
Matthew (1996)	Third-graders	CD-ROM stories	Open-ended questions	There were no significant differences in reading comprehension
Okolo & Hayes (1996)	Second-graders with learning disabilities and without disabilities	CD-ROM version of a book Living books Discis books	Retellings and comprehension questions	There were no statistical differences between students
Scoresby (1996)	Third-graders	Interactive storybooks	Open-ended questions	Animations within interactive storybooks were detrimental on story recall
Matthew (1997)	Third-graders	CD-ROM format stories	Story retellings	Students scored significantly higher on retellings when reading the CD-ROM stories

Table 1. Continued

Author & Year	Participants	Materials	Assessment	Results
McNabb (1998)	Struggling readers 7-12-year old	CD-ROM storybooks	Qualitative	Multisensory features of CD-ROM storybooks made them easier for struggling readers to read and comprehend than paper books
Doty (1999)	Second-graders	Interactive CD-ROM storybooks	Oral retellings and comprehension questions	Students who read the CD-ROM storybook scored higher on comprehension questions. No significant difference in the retelling scores
Underwood (2000)	8-year old children	Talking book software	Story writing, observations and interviews	Children's recall of the story of an interactive talking book was poor
Trushell, Burrell, & Maitland (2001)	Year 5 primary school pupils	Interactive CD-ROM storybooks	Multiple-choice questions and observations	Pupils' recall of the storyline of an interactive storybook was found to be poor
Doty, Popplewell, & Byers (2001)	Second-graders	Interactive CD-ROM storybooks	Retellings and comprehension questions	Children who read the CD-ROM scored higher on test, but no difference in mean scores on the retellings
Pearman (2003)	Second-graders	Interactive texts	Oral retellings	Interactive texts facilitate comprehension for kids that are reading below grade level

Table 1. Continued

Author & Year	Participants	Materials	Assessment	Results
Trushell, Maitland, & Burrell (2003)	Year 4 primary school pupils (8-9 year-old)	Interactive storybooks on CD-ROM	Multiple-choice questions, verbal recollections and opinions, and observations	Animations and sound effects could provide contextual support for readers but they negatively affect readers' ability to recall story events
De Jong & Bus (2004)	Kindergarteners (4-5 year-old)	Interactive books	Orally presented short comments and questions	There was no evidence that the animations distracted children, or that the animations interfered with story understanding
Lefever-Davis & Pearman (2005)	First-graders (6-7 year-old)	Interactive CD-ROM talking books	Running record	The digital pronunciations were a predominant feature of the CD-ROM storybooks were interpreted as a support and a distraction for developing beginning readers' skills
Trushell & Maitland (2005)	Year 5 and Year 4 primary school pupils	Interactive storybooks on CD-ROM	Verbal story retelling and short multiple choice quizzes	Access to cued animations and sound effect did have unhelpful effects on pupils' story recall. Storybook was found to have deteriorated throughout the event structure

Table 1. Continued

Author & Year	Participants	Materials	Assessment	Results
Grimshaw, Dungworth, McKnight, & Morris (2006)	9-11 years children	Interactive version of storybooks with an online dictionary.	The comprehension tests (Standard Attainment Tests)	The type of medium did not significantly affect the children's enjoyment. Comprehension scores were higher for retrieval-type questions. The narration in the interactive version led to significantly higher comprehension scores than when narration was absent
Kim, Yoon, Whang, Tversky, & Morrison (2007)	Fourth and sixth graders	Animated computer presentation	True-false comprehension test questions and attitude questionnaire	Animated computer presentation increased enjoyment and motivation, but not comprehension test score
Shamir, Korat & Barbi (2008)	Kindergarteners (5-6 year-old)	Interactive CD-ROM storybooks	Pre- and post-intervention. Comprehension test, six questions about the interactive book	Interactive book CD-ROM provided an advantage in comprehension, phonological awareness, and emergent reading
Pearman (2008)	Second-graders	Interactive CD-ROM storybooks Discis Books	Oral retellings	Interactive, CD-ROM storybooks are beneficial for young readers' comprehension

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