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Incorporating Electronic Books into a Graduate Reading Methods Class: Improving the Comprehension of Students in Grades K-12 ---

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The purpose of this paper was to explore how various features of electronic books captured students' attention and built their confidence and knowledge base, and to what extent, if any, reading electronic books supported critical thinking skills and understanding of the text of students in grades K-12; the experienced teachers were enrolled in a summer reading/writing literacy program, offered by a mid-western university. The graduate reading methods course consisted of a tutoring session utilizing electronic books to improve the comprehension of students in grades K-12. The experienced teachers implemented electronic books to provide a context that helped their students to build conceptual and experiential background as they construct meaning and develop important literacy skills. The electronic books helped K-12 students expand their knowledge of fluency and retelling as they followed along reading for meaning and pleasure. The interactive capabilities of electronic books made the screen more attractive to K-12 students and thus supported their understanding of the text. They demonstrated what they understood from the text in book discussions; therefore, the electronic books were useful to them. The electronic books, multimedia applications, and audio recordings were part of the instruction and played

a prominent a role in increasing levels of comprehension. The experienced teachers, who were exposed to electronic books, responded positively to implementing them into the curriculum. This paper may serve as a model for both professors in teacher education and reading teachers to integrate technology in a meaningful context in their instruction.

Electronic story books offer an important avenue for supporting reading and writing experiences with students who exhibit limited comprehension and word knowledge. Whether available on CD-ROM, the Internet, or special disks, electronic books always have different structures from printed texts. Some electronic books incorporate aural and visual reinforcement and others offer illustrations that complement the story. The speech component offers a digitized reading of the story elements as well as pronunciations of specific words within the literature; it supports and scaffolds students as they read the elements of the story (Leu, 2000; McKenna, 1998). Electronic books and online texts are accompanied with hypermedia, text, data, graphics, audio, or video. As students read the story, they are able to click on the illustrations, animations, and video— all of which can increase their understanding of the concepts. The aural and visual reinforcement and interactive features may aid in comprehension (Leu, 2000). McKenna (1998) suggested that electronic books increase motivation to read as well as promote comprehension and word recognition. According to some research, the use of talking books has shown positive results as an aid to help children improve their comprehension of texts (Hastings, 1997; Lewin, 1997; McKenna, 1998; Reitsma 1988). In addition, children's word analysis skills have been shown to improve with the use of electronic books (Miller, Blackstock, & Miller, 1994; Olson & Wise, 1992; Reitsma, 1988; Wise & Olson, 1994). In general, electronic books have been found to support reading instruction by providing contextual activities, background information, and explanatory notes. Electronic books also show promise of accelerating reading growth by offering contextual exercises to decode unknown words and by pointing troublesome pronunciations; they can provide feedback to teachers, enabling them to identify particular categories of words for further word study.

Research Questions

Research indicates that electronic books have positive effects on student learning and comprehension (Anderson-Inman & Horney, 1998; Anderson-Inman, Horney, Chin, & Lewin, 1994; Hillinger, 1992; Hillinger & Leu, 1994; Leu & Hillinger, 1994). Based on previous research, the researcher intends to address two research questions: (1)What are the advantages of teaching reading and writing with electronic books? (2) What evidence exists to

confirm that electronic books can be effective in support of literacy instruction with students who exhibit limited comprehension and word knowledge?

The Research

Research suggests that current high quality software can increase the efficacy of classroom instruction (Winn, 2002). Digitized high quality electronic books have been incorporated into reading programs focusing on rhyming words, word parts, phonemes, position words and meaning while the student is reading and writing stories. Multimedia applications, along with interesting illustrations and drawings, have supported the development of reading programs that are inspiring for readers (Kamil, Intrator & Kim, 2000). Multimedia applications, hypermedia, and hypertext can help bring reading to life for readers (Rouet, Levonen, Dillon, & Spiro, 1996; Purves, 1998).

Combining text and narratives with illustrations, print and sounds/speech facilitate comprehension and remediate specific difficulties in literacy acquisition (Ferrier & Shane, 1987). Technology-based, dynamic, and interactive literacy instruction helps students synthesize and analyze literary information more rapidly and motivates students more effectively than traditional modes of instruction (Plass, Chun, Mayer, & Leutner, 1998; Mayer, 1997; Sharp et al., 1995). Digitalized high quality speech, interactive CD-ROMS, and electronic books can be incorporated for teaching decoding and comprehension strategies such as high frequency word practice, rereading, reviewing word families, and creative writing (Mayer, 1997). Problem solving applications and instructional software have been integrated into reading programs for letter identification, the development of the lexical skills such as naming vocabulary, receptive language skills in the area of syntax, and the developmental conceptions of written language (Sharp, Bransford, Goldman, Risko, Kinzer, & Vye, 1995). Many multimedia programs such as electronic books and the electronic process writing utilize text, graphics, animation, video, and sound to reinforce the letter-sound and picture word relationships and encourage children to listen and follow printed material (Willis, Stephens, & Mathew, 1996). Multimedia CD-ROMS and electronic books facilitate the spelling-sound knowledge and growth in vocabulary and reasoning skills.

Students can be trained to utilize clip art, graphics, animation, drawings, charts, and graphs into a linear presentation (Gunning, 2003). Zhao's (2005) work showed that well-designed software programs for supporting literacy development can inspire students to express themselves in many different ways. Such computer software can reinforce word analysis and comprehension strategies and improve reading outcomes. Technology applications, such as digital and electronic books, provide the means to teach literacy competencies in a meaningful context. Sophisticated software

multimedia and interactive CD-ROMS also allow students to have choices in expressing ideas with visual representations, illustrations, print, and voice/communication tools, which in turn, may facilitate more rapid literacy acquisition (Mayer & Moreno, 1998). Esteller and Sitzer (2003) explained how electronic books guide and encourage students to listen and follow printed materials. The Digital Storytelling Association (2002) describes digital stories as the most modern interactive process because they integrate reading, writing, speaking, and listening in a meaningful context. The latest report by DeBell and Chapman (2006) suggests that 91 percent of the students in nursery school through grade 12 can use computer technology and electronic books which have digitized high quality synthetic speech along with graphics, animation, videos, and sound.

Technological innovation also encourages educators to move into areas of problem solving, critical thinking, inquiries, analysis, and evaluation and move away from recall of facts, principles, or correct procedures (Bates, 2000). For all these reasons, the experienced teachers decided to use a variety of reading strategies, multimedia applications, hypertext, digital and electronic books to motivate and teach the K-12 students who were enrolled in the summer reading/writing literacy program.

The Summer Reading/Writing Literacy Program

The literacy teachers inspired struggling readers who were enrolled in a summer reading/writing literacy program by using different reading strategies and multimedia applications, hypertext, digital and electronic resource materials. A summer reading/writing literacy program was offered for students in grades K-12 by a mid-western university's Department of Early Childhood and Elementary Education. The program began on Thursday, June 23. Tutoring sessions occurred on Monday, Tuesday, Thursday, and Friday; with the final session on Friday, July 15. The program was designed to present frequency of exposure of vocabulary building and to develop language and thinking skills. The program offered activities that used cognitively challenging talk by discussing vocabulary words, summarizing texts, eliciting evaluative responses about the text, and making connections between the text and real-life experiences. Tutoring was provided by experienced teachers enrolled in a graduate reading methods course.

The course was designed to provide teachers with approaches and techniques that research and practice have indicated to be successful. The basic premise of this course was to allow teachers to implement a variety of research-based reading strategies for building literacy skills of struggling readers. Challenging activities utilized multimedia presentations that actively integrate text and visuals. Multimedia applications such as interactive CD-ROMS and

scan and read computer program were used which allowed the students to accomplish cognitive and learning tasks. Teachers were encouraged to incorporate technology-enriched instruction to expose K-12 students to newer, more sophisticated tools such as electronic books, interactive software, integrated media and problem-solving applications. The ultimate purpose of the reading/writing literacy program was to provide instruction for motivating students with literacy problems through the use of authentic literacy instruction.

Characteristics of Struggling Readers

Reading skill should be acquired in a relatively predictable way by children who have normal or above-average language skills. Children need experiences in primary grades that foster motivation and provide exposure to literacy. They need information about the nature of print through opportunities to learn letters and to recognize the internal structure of spoken words, as well as explanations about the contrasting nature of spoken and written language. Disruption of any of these developments might increase the possibility of delayed reading. The association of poor reading outcomes with poverty and minority status also might reflect the accumulated effects of several of these risk factors. Lack of access to literacy-stimulating preschool experiences and excellent coherent reading instruction also might impede reading development. In addition, a number of children without any obvious risk factors might also develop reading difficulties. These children may require intensive intervention and extra help in reading and accommodations for their effort throughout their lives.

The Summer Reading/Writing Literacy Program and the Characteristics of Students enrolled in the Program

To prevent the loss in literacy skills over the summer, a summer reading/writing literacy program was offered for students in grades K-12. Twenty-six students were enrolled in the program. Out of twenty six, thirteen were male and thirteen were female. Students were drawn from general classrooms in rural elementary schools in the mid-west. With regard to ethnicity, ninety-nine percent of the students were white. There were three potential stumbling blocks that were identified which threw K-12 students on the journey to be skilled readers. The first obstacle was to understand the use of the alphabetic principle, the idea that written spellings systematically represent spoken words. It was hard to comprehend connected text if word recognition was erroneous or protracted. The second obstacle was a failure to transfer the comprehension skills of spoken language to reading and to acquire new strategies that can be used with a wide variety of texts. The third obstacle to reading was the lack of an initial motivation to read or failure to develop the value of reading.

Working with Struggling Readers

My role as a researcher varied from a university instructor instructing a graduate reading method course, to a reading coordinator during supervised tutoring sessions. Each tutoring session, facilitated by an experienced reading teacher, included multimedia packages such as the electronic books for struggling readers and writers with the goal of enabling these struggling readers to become more independent in their reading.

To practice research-based reading strategies, teachers worked with individual students enrolled in the summer reading/writing literacy program during their first reading period of the day, which took place early each afternoon. The teachers spent the remaining one hour with the course instructor in a classroom to discuss how to integrate skills with strategies. Since students who are struggling readers are part of every classroom, teachers were informed about how best to provide strategic instruction.

Measuring Dynamic Indicators of Basic Early Literacy Skills (DIBELS) and Using Multiple Means of Gathering Information

Because students' classroom teachers were unavailable during the summer, the responsibility for reading assessments fell into the hands of elementary literacy teachers who were enrolled in a graduate reading methods course. Dynamic Indicators of Basic Early Literacy Skills (DIBELS) (http://dibels.uoregon.edu), the Developmental Reading Assessment (DRA) (Beaver & Carter, 2006), running records, and an attitude survey were used to measure students' reading behaviors and to detect patterns of abilities and needs. These classroom assessment methods were easy to implement and reasonably quick to administer to determine where these students were in their reading development, and thus provided elementary teachers with needed information for planning instruction. These students differed from skilled readers in their use of general knowledge to comprehend text, in their ability to draw valid inferences from texts, in their comprehension of words, and in their use of self-monitoring and self-correcting strategies. They exclusively used sounding-out strategies for figuring out unknown words rather than multiple strategies such as meaning, structure, picture cues, and background knowledge. They didn't know how to focus on meaning, how to monitor, how to reread when the text was confusing, or how to use context to help figure out unknown words. Their comprehension suffered from a lack of relevant word knowledge.

The DIBELS subtests identified students as either needing further assistance or intensive instruction (i.e., low-risk to at- risk respectively) in the areas of phonemic awareness, alphabetic principle, and oral reading fluency. Two test booklets, benchmark and progress monitoring, were used to measure

early literacy development. The benchmark books were comprised of nine passages divided into groups of three parallel passages. During each administration a student read aloud for one minute in each of the three parallel passages while the teacher marked the frequency of errors. The median score was then recorded based on a predetermined criteria as to whether the student was low risk, some risk, or at-risk for reading difficulties. By determining the classification, the teachers then provided varying amounts of support. For instance, if a student in first grade read below twenty words per minute, the teachers then provided intensive intervention.

Based on *DIEBELS*, it was determined that students needed word-directed activities to acquire a basic vocabulary and to understand and appreciate the alphabetic principle. They needed many phonemic awareness activities to blend phonemes to make words (e.g., /b/-/a/-/t/= bat) and to segment words into phonemes (e.g., dog = /d/-/o/-/g/). They needed explicit instruction and practice with sound structures that led to phonemic awareness. They needed familiarity with spelling-sound correspondences and common spelling conventions in identifying printed words. They needed to gain enough strategies and confidence to read independently.

Developmental Reading Assessments (DRA) and Running Records were administered to identify the specific strengths and weaknesses of each student. Based on DRA and running records, the teachers determined that students' fluency disappeared at their frustration level and errors in word recognition were numerous. A majority of the students' comprehension was faulty, recall was sketchy, and signs of emotional tension and discomfort became evident. Both comprehension and reading growth itself were impeded because too many of the words of a text were problematic. Achievement was measured through the analysis of teachers' reports and reflections.

An attitude survey was used in conjunction with the observational data to elicit students' perceptions about reading and writing. Based on informal assessment data, it was determined that the students needed more opportunities to learn about print through engaging in interesting, lively, and socially meaningful literacy activities such as literature conversations around excellent literature. They needed more structured activities focusing on phonics in which sound-spelling patterns are systematically embedded in connected text. They needed a comprehensive program based on the inquiry approach – investigating, problem solving, discovering, and forming ideas about word patterns, concepts, and meaning.

Incorporating Electronic Texts

Various forms of multimedia motivated and challenged students'

natural processes as they engaged in literacy activities. Interactive electronic books http://www.surpluscdrom.com/livingbooks1.html helped students learn the important word meaning. As they gained experience, they were able to find meaning cues within words as well as from the context of a CD-ROM's passage. Teachers immersed students in language to explore words through interesting and engaging activities. Many CD-ROMS, based on cognitive and constructivist methods, reinforced students' comprehension strategies that emphasized phonetic pattern, sound, and meaning. The electronic books taught students how to use context clues to unlock meaning and how to use structural analysis to make sense of unfamiliar words. Students were fascinated with all the following formats: print, graphics, still and moving images, sound, and voices. Multimedia presentations allowed for discovery and investigation of words and patterns and for making and testing hypotheses, solving problems, and applying knowledge to new words.

The electronic books, which animated popular story books like Mercer Mayer's *Grandma and Me,* reinforced students' listening and speaking skills (Figure -1). The story was read by an amusing critter, Mercer Mayer, and the words were highlighted through the audio visual reinforcement. Many of the objects danced, sang, spun around, or made humorous comments if they were accessed. The critter read any single word in the text if the word was clicked. The students read along, cross-checked information, tried that again and reheard those words through the video and sound. Because the books were very appealing, students spent lengthy periods of time repeating readings.

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Figure 1: Electronic Book
A screen from Just Grandma and Me

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Note: Arthur's Teacher Trouble by Marc Brown stimulated critical thinking skills and challenged the students to formulate thoughts and linked them to images or visual representations (Figure -2). Using software like Arthur's Teacher Trouble, students learned the book structure in a hands-on and creative activity.
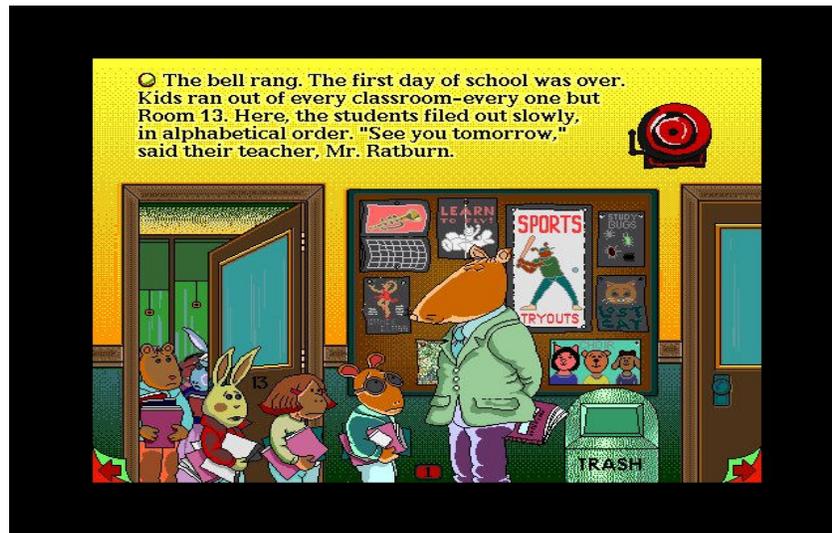
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Figure 2: Electronic Book
A screen from Arthur's Teacher Trouble

Immersed in the language of the book, students learned to use the meaning and context clues. The electronic books helped students understand literature on multiple levels and they wanted to talk more about the stories using text, images, video, sound, and animation. Many electronic books were equipped with a tracking devise that provided feedback to the teachers on the words that were problematic as the student attempted to read aloud, thus providing clue for further instruction. Another feature of some electronic books was searchable tool that enabled students to find information with ease. One feature that was helpful for many students was that the text could be modified and a larger font could be selected. Many electronic books highlighted each word as it was pronounced so that the students could get immediate feedback on a word's pronunciation as they read the text on screen.

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A resource teacher used *DIBELS* to develop data and reading intervention lesson plans for a first grade student enrolled in the summer reading program. She wrote:

> Computers makes stories more interactive and it is a familiar media that kids love to use. I think it is a fun ways for kids to read stories. You can do a lot with the animation, sound, illustrations, videos, and interactions in the stories to reinforce new vocabulary. Also students can navigate the electronic books themselves and read at their own pace.

A graduate student and 7th grade teacher wrote a report of the reading/writing literacy Program.

> The electronic books also enable beginning readers to become more familiar with phonemic awareness, semantics, and comprehension. Personally, I find it vital to incorporate technology into interactive, integrative lessons in order to ensure the best possible outcome for developing reading strategies and comprehension. I used *electronic books* (Figure 3)as an alternative to promoting phonemic awareness and to invite my students to empathize with various characters and their situations. The children absolutely loved these programs and were eager to learn.
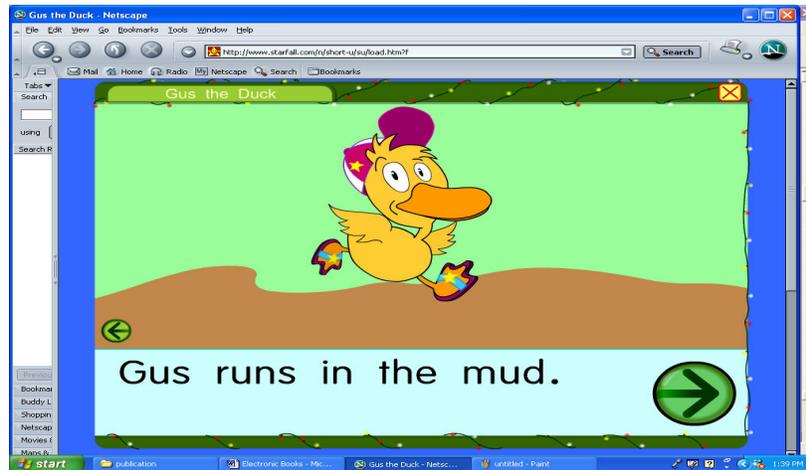

Figure 3: Electronic Books
A Screen from www.starfall.com

A first grade teacher from McCracken County School District wrote:

> These brightly illustrated, interactive stories and activities captivated our students' attention, providing practice and reinforcement to meet individual needs. A wide variety of electronic books, software, and numerous websites allowed us to accommodate different interests and learning styles. The *Starfall*, *Bookpop*, and *Magic Keys* sites appeared to be among the favorites. Overall, the technology enhanced learning and promoted a love for reading. In fact, many students were not ready to go home.

Implications for Instruction

The gains in reading and writing achievement obtained through DIBELS, DRA, and running records post tests led to the conclusions that instructional interventions made a difference for the development and outcomes of literacy skills. An elementary teacher said that the student's reading ability changed from being a student considered to be at some risk for reading difficulties to a student at low risk for reading difficulties after receiving the tutoring services provided by the summer reading/writing literacy program.

Supporting students' literacy through electronic books represented a number of advantages. For students who were struggling with comprehension, electronic books offered concrete, immediate feedback on the connections between expressive language and printed text. Interactive capabilities of electronic books made the screen more attractive while deepening the students understanding of the subject matter. Repeated reading procedure along with the visuals, graphics animation, video, sound, and comprehensible input contributed to students' ability to read fluently with expression. Electronic books provided instant access to illustrations, video, animation, aural and visual reinforcement to simplify words and to support students' understanding while they were reading. Out of twenty six students, sixty-five percent of the students began noticing sounds in words. Recognized written letters and associating sound cues with visual and context clues produced greater growth in phonemic awareness. Eighty-five percent of the students advanced in their understanding to (a) pronounce words by themselves, (b) to recognize sounds in words, and (c) to blend and segment sounds to produce words.

Linking phonemic awareness with letter-sound association training also resulted in greater gains in word identification strategies. Sixty-two percent of the students recalled words at sight easier and made errors less frequently when they read words by sight. Sixty-percent of the students spelled with fewer errors.

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The benefits were significantly stronger for students whose initial phonological skills were lowest. Balancing word identification strategies with reading in expressive texts led to accelerated progress in struggling readers. The systematic teaching of phonemic and language skills promoted more academic engagement. Sixty-percent of the students possessed some comprehension and word analysis strategies needed for reading success. Fifty percent of the students could read easily and fluently without assistance, with few errors in word recognition, and with good comprehension and recall. Growth averaged 1.88 and 1.77 grade levels for the students who respectively participated in the second years. Of the twenty six students only a very few were still unable to read at the grade level by the fall of 2006. Although a very few students were still performing below grade level, and although results were measured against expectable gains, the outcome of the program was impressive.
The gains in reading and writing achievement obtained through informal assessment led to the conclusions that although electronic books might not replace the foundation provided by reading aloud with teachers, they could build on it and extend it.

Conclusions

Software multimedia tools helped experienced teachers display information in lively formats and there was evidence to suggest that technologically integrated, literature based reading was shown to be valuable in increasing comprehension and contributing to students' ability to recognize words. Electronic books offered a digitized reading of the genres, click-accessible definitions, schemata, videos, aural and visual reinforcement, and special features designed to support comprehension. Because electronic books can be CD, DVD as well as the Internet, students could hear a story read and correlate the spoken words with the printed words as many times as they wished. Students were able to understand letter-sound cues, integrate visual and sound patterns, and sort words by sight and sound. Students loved the computer-assisted instructional system used to integrate sound, visual, and meaning knowledge. The electronic books captured students' attention and built their confidence and background knowledge. The animation, sound, aural and visual reinforcement, and story links helped students interpret, enjoy, and reflect on the text. Electronic books encouraged students to travel to the unique people of the world and listen to unfamiliar sound. Many students were able to connect images with text and sound to pursue their interests. Electronic books expanded their schemata and provided a setting to associate sounds with letters and images.

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