# Integrating Technology into Children's Literature

By Hannah Monk

As technical communicators, one of the most important concepts we can learn is how to best educate our target audience. An area where this is lacking is children's literature. Children are becoming less interested in reading earlier and earlier the more technology becomes the backbone of our society. Studies have shown children are more engaged and better comprehend what they are reading when it is interactive. Despite this and the advancements in E-readers and other reading software and devices, interactive technology for literature is underutilized. The text (whether it is in digital or print format) remains largely static and it is more fun to pick up interactive devices, like video games. Printed text even creates a disadvantage for children who have cognitive, motor, or visual disabilities and children from lower-income families and schools. Reading is an aspect of life that is vital to functioning in society, yet the importance and interest in reading books dwindles as technical advances increase in functionality and entertainment value. By using interactive technology, similar to videos games and electronic encyclopedias, children can become lifelong readers and gain the benefits of both reading and newer technologies. Technical communicators should help integrate children's literature with technology to increase the percentage of readers, improve digital literacy and reading comprehension, and bring reading into the 21-century.

The Lack of Interest in Reading

Teri S. Lesesne, former teacher, published author, and lifelong reader, explains "when I began my career as a middle school teacher, most of my students were still avid readers in the seventh and eighth grade. Now, teachers of third, fourth, and fifth graders are reporting a startling lack of interest in reading... Kids are potion out of reading earlier and earlier" (Lesesne 2). The Scholastic Corporation, an American publishing, education, and media company known for providing books and other educational materials to schools, parents, and children, have confirmed Lesesne's suspicion. Not only are children reading less as the get older, interest levels in reading have decreased every year for every school-age range (Scholastic).
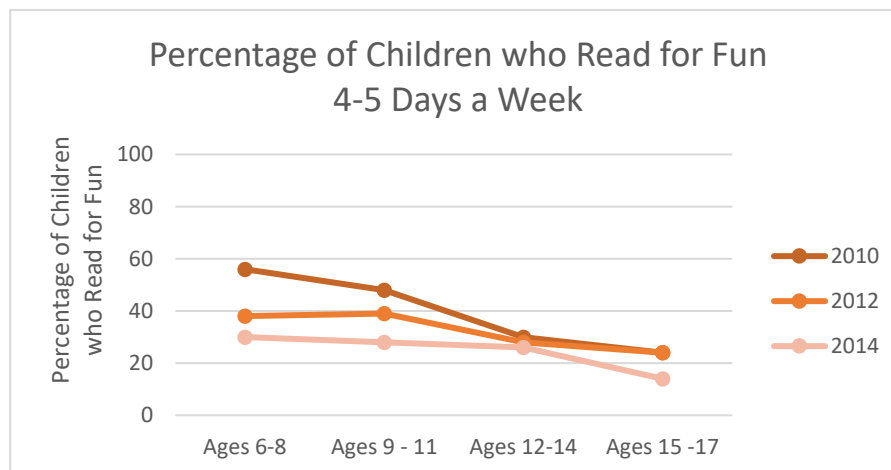
Graph 1:

Even though 44% of the children in 2014 study liked reading more at their current age than when they were younger, every year, including 2014, showed a drop in the percentage of children who read for fun at every age range. This may be in part because of the use of technology. In the same study done by the Scholastic Corporation, 46% of 12 to 14 year-olds use a computer for fun rather than education and 59% use electronic devices to play games, this is compared to 17% and 46% of six- to eight-year-olds who do the same (Scholastic). Electronics can easily grab the attention of children. I believe if technical communicators use their communication, rhetorical, and technical skills to combine interactive apps and websites with children's reading material, the interest in reading will increase.
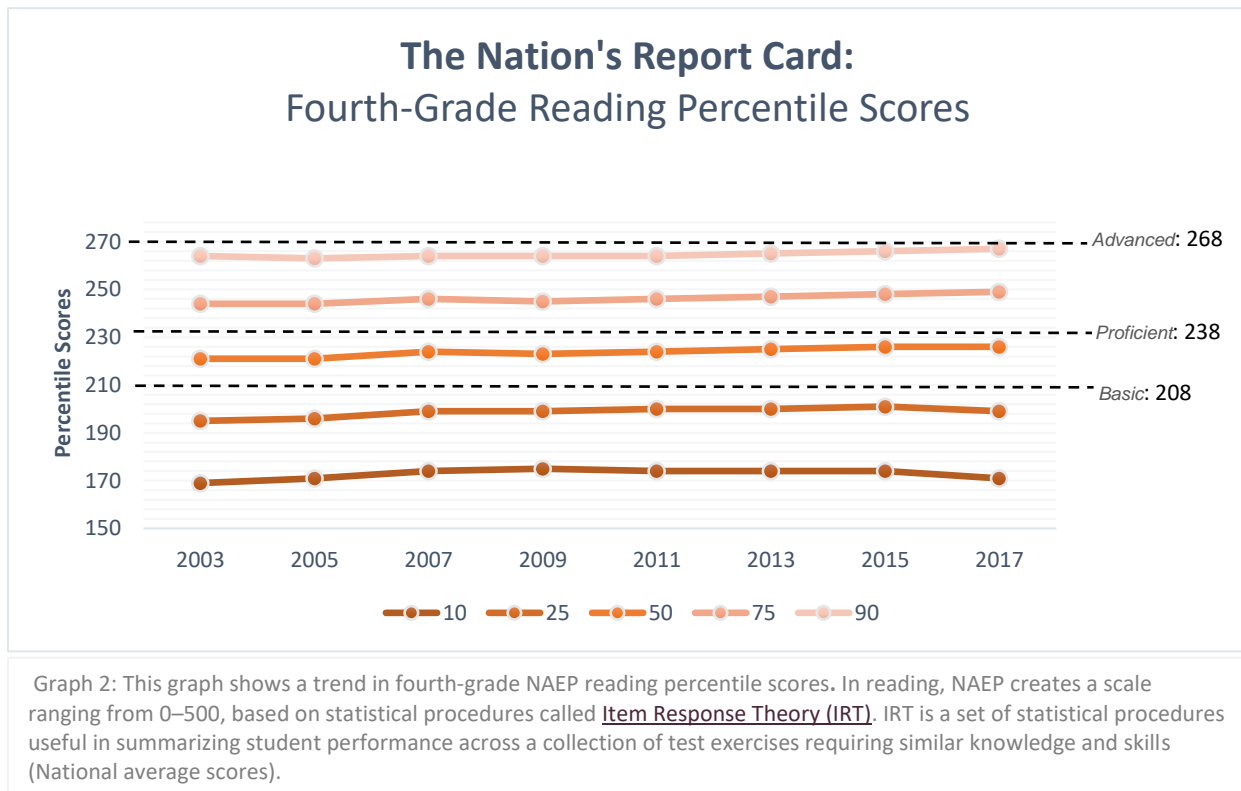
Benefits from Interactive, Electronic Reading

With interactive, reading apps and websites, not only will the interest in reading increase, so will focus and reading comprehension. Even though the current model of the Internet involves lots of reading, Nicholas Carr, author of *The Shallows: What the Internet is Doing to Our Brains*, says technology is changing the way people think; the internet is causing a loss of the ability to focus for long amounts of time, like the amount of time it takes to read a book, in lieu of "high speed data processing" because of the way online reading is formatted and technology is used (Carr 16). Current studies about the link between technology and children's attention spans done by the Pew Research Center and Dr. Larry Rosen, a psychology professor at California State University, agree with Carr and report his observations are especially noticeable in children. Carr believes the current model of the internet, a fast-paced environment with short, skimmable information and lots of multimedia, is creating an irreversible effect on people's ability to think for long periods of time. While this may be true for how people currently use technology, it does not have to remain that way and the lack of long-term focusing is certainly a reversable side-effect. There is nothing stopping interactive technology from perpetuating an interest in reading long, complicated texts and shorter, fast-paced articles. Both of these types of information processing are skill based and can be developed and enhanced by online, interactive reading. Clickable links, videos, and other interactive elements on a page that mimic the current style of the internet can help children see and gain the benefits of short-term focusing while remaining engaged in longer texts. These elements can provide enough white space and interactivity to give children a mental break to increase longer focusing on other parts of the text.

Along with the interactivity provided by the features that engage short-term focusing, online reading provides opportunities to improve long-term focusing. Jack Mostow and his colleagues at Carnegie Mellon developed a "computer-guided reading tutor that builds readers' fluency and comprehension using speech-recognition to give spoken and graphical feedback as students read instructional texts aloud" (Biancarosa and Griffiths 144). This software enables students to better immerse themselves in what they were reading and Mostow found that it lead to a much longer attention span then just having students read silently from static text. This is just one example of interactive software that improves long-term focusing while reading. Interactivity can also be provided by the ability to highlight and after-reading quizzes, which can help maintain focus on text.

Interactive features that improve long-term focusing can also improve a child's reading ability. Studies conducted by Ofra Korat, a professor at Bar Ilan University's School of Education in Israel, have shown that interactive, reading tools can improve vocabulary, provide background knowledge on reading materials, and increase phonological awareness in young children. To prove this Korat added multimedia supports, like text being read aloud expressively, the ability to highlight and look up words,

and in-text activities, to online text and they improved the children's vocabulary and subsequent recognition of words. These supports also lead to improvements in phonological awareness and reading skills. The same study done by Jack Mostow that improved children's long-term focusing while reading, also proved that his interactive technology improved comprehension strategies, phonological analysis, and reading fluency (Biancarosa and Griffiths 144).

In this day in age, reading skills need to be improve. According to National Assessment of Educational Progress (NAEP), a congressionally mandated project administered by the National Center for Education Statistics (NCES), within the U.S. Department of Education and the Institute of Education Sciences (IES), nationally, only 35% of public school fourth-graders are proficient at reading at a fourth-grade reading level or above. This percentage did not change for eight-grade students. While any score increasing or decreasing by half a percent is a significant difference, the national average has remained largely static for the past 10 years (National average scores). The lack of interest in reading and the potential damaging effect of technology on long-term focusing will not help these scores increase. In order for a change to occur, children's literature should evolve in a similar way that current technology is evolving. Because E-reading is digital, it can easily be combined with digital tools and can significantly improve a child's ability, and potentially their desire, to read. The studies by Jack Mostow and Ofra Korat prove that interactive, readings apps and websites would be more beneficial to children of all ages over printed reading material or digital, static text.

Graph 2: This graph shows a trend in fourth-grade NAEP reading percentile scores. In reading, NAEP creates a scale ranging from 0–500, based on statistical procedures called Item Response Theory (IRT). IRT is a set of statistical procedures useful in summarizing student performance across a collection of test exercises requiring similar knowledge and skills (National average scores).

Closing the Reading Gap

Not only are national proficient reading scores relatively low, the gap between low-scoring readers and high-scoring readers is increasing. Because students who have a disability or come from a low socioeconomic class make up a large portion of the students with low reading scores, they are being put at an even great disadvantage.

As shown in Graph 3, children with disabilities have been a minimum of 30 points below students without disabilities in their reading ability since 2003, with a 40 point gap in 2017. Digital, interactive books can help to close this gap (National student group scores and gap scores). "E-reading technology has shown promise in developing early reading skills and in giving readers with visual impairments or language-based disabilities access to texts" (Biancarosa and Griffiths 143). Unlike printed books, digital content can easily allow for text-to-speech software in the form of human or computer-generated voices. These functions allow for children with visual impairments or cognitive disabilities, like ADHA or dyslexia, to improve their reading comprehension and confidence in their reading abilities while also benefiting their peers without a disability. Interactive activities, like matching or typing games, can help children with down syndrome and non-verbal and verbal autism with story comprehension, engagement, vocabulary and focus (Hughes). Because of the wide variety of integrable technology for web content and apps that can aid in the reading process for children with physical, visual, auditory, or cognitive disabilities, while also provided beneficial, interactive functions for children without disabilities, technical communicators should try to enhance and promote current interactive reading technology.
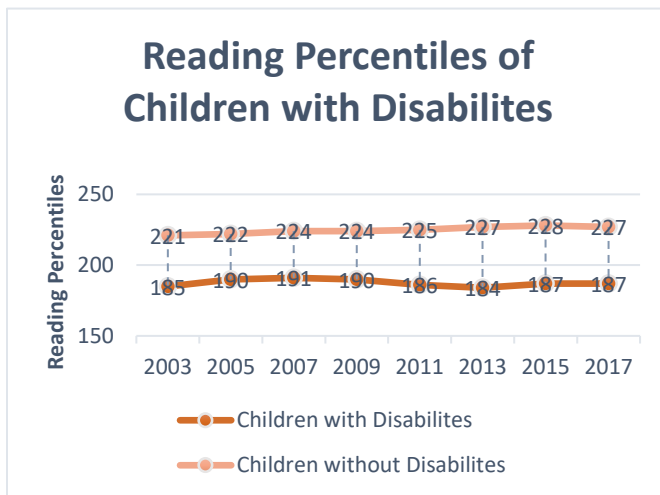
Graph 3: Status as Students with Disabilities (National student group scores and gap scores)
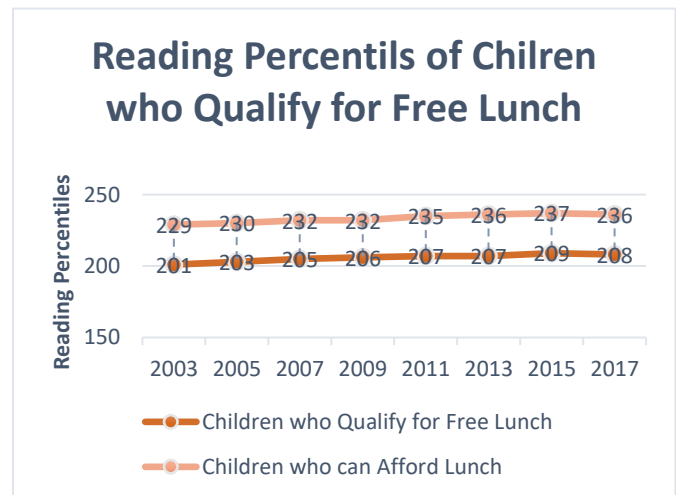
Graph 4: National School Lunch Program Eligibility (National student group scores and gap scores)

Children from a lower economic class would also benefit from digital reading technology. Lower-income neighborhoods have less access to books. Studies have found that the ratio of age-appropriate books in lower-income neighborhoods is one book for every 300 children, while the ratio in middle-income neighborhoods is 13 books to one child. The school programs that are available to children from lower-income families isn't much better. 80% of preschools and after-school programs in these neighborhoods don't have any age-appropriate books for kids (Super). Because of this, children living in lower-economic homes have fewer literacy opportunities and have a smaller vocabulary when they enter school. These are some of the reasons for the literacy gap and why these children tend to do worse in school, which leads to high high-school dropout rates (Super). E-reading technology could be

par of the solution to solving this problem. Because of the amount of storage, websites and apps can house hundreds of thousands of books and with the potential of customizable algorithms, access to thousands of age-appropriate books about a child's interests and hobbies. Making digital reading interactive has also been shown to improve results of children with lower socioeconomic backgrounds. "Studies that focused on "embedding multimedia practice opportunities into e-reading technology that can be sent home with students, find that the technology increases children's, especially at-risk children's, practice at home… and that they made greater gains in both word-recognition skills" (Biancarosa and Griffiths 143). A small scale study even suggested that children from lower socioeconomic backgrounds benefited more from reading with interactive materials. Because of these findings, interactive, e-reading technology "could be useful for closing both procedural and conceptual skill gaps in literacy" (Biancarosa and Griffiths 143).

Current E-Reading Technology

Despite the fact that evidence shows that digital, interactive reading could be very beneficial to all children, most of the current technology is either not interactive, too interactive, out-of-date, or underutilized. The very first E-reader, the Amazon Kindle, was released in 2007. Since then the Kindle has been remodeled and there have been several devices created from other companies, like the Barnes & Nobel Nook and the Kobo Clara. The Apple iPad has also expanded digital reading with numerous reading apps. Many let children read, while also learning spelling, vocabulary or social skills. These devices and apps are important because they provide a larger library of books, which can allow for a more personalized reading experience, and they usually provide the opportunity to change font size, text-to-speech, collaborate on learning activities, and click on links to learn background information or look up new words, but they simply are interactive enough to differentiate themselves from the traditional paper book.

Interactive CD- ROM storybook's are a form of interactive reading; they are children's stories that use animated graphicsm sound, and other interactive software that are usually published on CD-ROMs. An older study comparing how comprehended and enjoyed reading the interactive storybooks vs traditional print found that "comprehension is enhanced by the multisensory environment of interactive CD-ROM storybooks and perhaps the increased motivation to read electronic texts". Students who read the interactive story scored slightly higher on the comprehension test and all reread the book while waiting after they had taken the test; none of the students who read the printed book reread them (Matthew 263-284). CD-ROM stories can enhance a child's reading experience and prove that interactive stories can be beneficial to reading skills and focus on the book; but because of their outdated technology, it would not be the most efficient way to present interactive literature to children.

Cybertext, interactive narratives that dynamically enhance hypertext, is user-centered and "may be determined by a script that enables the computer to evolve its own stories" (Douglas 3). Because Cybertext is web-based, it have the ability to provide a larger library of books and a more personalized reading experience, like E-readers, and the interactivity of interactive CD-ROM storybooks. This relatively old from of literature is very underutilized today, as it most interactive literature. It needs to be updated, but could be where the digital future of books should end up (Douglas).

Updating Cybertext

In order for technical communicators to effectively enhance and update Cybertext novels, they need to find a better balance between interactivity and current forms of electronic reading. Today's Cybertext relies on too much interactivity. Stories like [The Boat](#) or [The New Burger Capitals of America](#) are distracting from the text they are trying to get people to read. With the use of more white space, technical communicators can better collaborate with users and emphasize the focus on reading (Salvo and Rosinski 110). The interactivity of this project should rely on clickable links that lead to background information of definitions to help with short-term focusing and vocabulary, the ability to highlight words and take notes to encourage reading engagement and comprehension, and auditory functions that read books out loud for increasing long-term focusing and phonological awareness. While most of these functions are available in today's E-readers, to go beyond what is currently available, technical communicators should also include videos, animated graphics, sounds and engaging voices of actions and dialogue, and activities and quizzes inside and outside of the reading material. Creating a space for with adaptive information architecture would also be a way this project would go beyond what is currently available to the public.

The information architecture of this app or website would need to be adaptable to a reader's skill level, background, and interests. "Digital delivery of both text based and multimedia documents allows for a greater variety and size of information chunks that can be included in any given artifact" (Salvo and Rosinski 111). To engage the most children and maintain a large portion of them as readers, this app or website would need to be a library of Cybertext for all levels of readers. Providing children with nonfictions books about their hobbies and heroes and fictions books where the main characters are people they can identify with can create an environment where reading is enjoyable and could potentially help children develop intellectually, emotionally, empathetically, socially, and culturally (Lesesne 86). This type of system would also give children from lower-income homes access to more age appropriate reading materials. Because effective digital spaces can integrate different information delivery systems, an app or website that includes them would be beneficial to increasing the amount of time children spend reading.

Effective ambient design helps users understand the purpose and content of a web site or other virtual object at quick glance (Salvo and Rosinski 115). Giving this digital space a similar atmosphere to current video games and children's apps would be a way to keep children entertained and compete with non-educational digital spaces. Creating a way for this space's look evolve based reading level would entice readers of different ages to keep coming back to this app or website. "By being attentive to the ambient effects of technological artifacts and the ways designed elements interact", technical communicators could effectively communicate with their audience and have a better chance of keeping children reading for longer (Salvo and Rosinski 114). Slowly phasing out of animated graphics and engaging activities is a simple way to stay attentive to the project's audience.

Not only would this project create more readers, slowly phasing out the interactivity that helps with short-term focusing would help smooth the transition between children's literature into more complicated text. Including features similar to current E-reading technology, like highlighting, interactive dictionaries, and audio readers, in complicated texts like the ones from Kant and Plato, this space for children would be beneficial for encouraging current reading and increase the comfortability and familiarity of future reading.

Why Technical Communicators?

While this project would need the assistance of developers, technical communicators would be the most influential piece because of their background with user experience and information design. "As rhetorically trained, human-centered communication specialists, technical communicators are well situated to contribute to the development of usable virtual information spaces and to represent, and even advocate for, user needs in emerging digital spaces" (Salvo and Rosinski 110). Technical communicators don't just produce technical results; they research "effective labeling, headings, and indentations, imagery, information mapping, definitions, objectives, summaries, and repetition" (109). This skill set is how the creation of the correct type of design and ambiance would be developed for children with different needs, interest, and skills (Salvo and Rosinski 112). Because technical communicators are digitally literate and potentially technically trained, they understand how "engines and databases work within specific contexts to organize access to information" and would be able to assist in creating a searchable feature that find different genres and difficulties of books for more individualized reading (Salvo and Rosinski 117). Technical communicators are especially well positioned to manage information design in industry contexts and should help give children's literature the ability to compete with video games and non-education apps to provide a more beneficial, interactive reading experience for children.

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