The Power of a Story: Reading Live and Electronic Storybooks to Young Children

Kevin M. Wong and Susan B. Neuman

Abstract Stories play a critical role in the literacy development of young children, providing them with rich experiences that support their growth as readers. In this chapter, we first describe the landscape of stories in e-books and educational media. We then move to examine the potential for media to reach preschoolers from low-income communities, presenting two case studies of children who read stories in both live and digital media. The research question guiding these case studies was: How effectively can digital books reach young children from underserved populations? Findings from the first case study revealed no differences between the digital or live platform. Preschool children were able to learn from digital platforms and had similar early literacy gains as children who experienced live presentations of storybooks. Findings from the second case study demonstrated that the content of the storybook actually had a stronger influence over a child's comprehension than the medium did itself, suggesting children's interest in stories are critical for early literacy. Accordingly, this book chapter does not recommend against the use of digital storybooks, but pushes for a both-and agenda between digital- and live-story use to cultivate emergent literacy among young children and unlock the power of a story.

Keywords e-Books · Preschoolers · Low-income · Early literacy development · Vocabulary · Case study

Stories play a critical role in the literacy development of young children, providing them with rich experiences that support their growth as readers. Before ever setting foot in a school, children are exposed to letters, sounds, stories, and illustrations in their home environments, which shape their interests, imaginations, and inner representations of text. Child development specialists agree that these literacy skills

K. M. Wong (✉) · S. B. Neuman
Department of Teaching and Learning, Steinhardt School of Culture, Education, and Human Development, New York University, New York, NY, USA
e-mail: kevinwong@nyu.edu; sbneuman@nyu.edu

J. E. Kim, B. Hassinger-Das (eds.), *Reading in the Digital Age: Young Children's Experiences with E-books*, Literacy Studies 18,
https://doi.org/10.1007/978-3-030-20077-0_9

that are cultivated in stories are foundational for reading development and oral language comprehension (Justice and Kaderavek 2002; Justice and Piasta 2011).

However, longitudinal studies demonstrate that children with limited oral language comprehension are at risk for encountering difficulties in their early literacy development and future schooling (Cunningham and Stanovich 1997). Research reveals that oral language comprehension and vocabulary knowledge are closely related to the quantity of books that children are exposed to, which is unfavorable for children residing in "book desert" communities – low-income neighborhoods where books are notably sparse due to structural inequalities (Neuman and Moland 2016). To provide children from book-sparse communities with greater exposure to stories, researchers are turning to digital platforms to reach more children and provide them with access to early literacy skills that are used in schools (Korat and Shamir 2007; Van Daal et al. this volume; Verhallen et al. 2006).

In fact, global trends indicate that children today are reading digitized books more than ever before (Rideout 2013). The number of households with non-television screened devices has doubled over the past 5 years in the United States alone (Anderson 2015). Yet, research continues to investigate the conditions under which interacting with digital stories can support or hinder literacy development in young children (Bus et al. 2015; Courage this volume; Bus et al. this volume). In this chapter, we first describe the landscape of stories in e-books and educational media. We then move to examine the potential for media to reach preschoolers from low-income communities, presenting a case study of children who read stories in both live and digital media. Together, this research raises the critical question: How effectively can digital books reach young children from underserved populations?

1 The Importance of Stories

Shared storybook reading promotes emergent literacy in young children. In the preschool years, children gain knowledge about reading and writing through adult-child reading interactions, observing and participating in informal literacy events in the home. These events provide children with foundational literacy prerequisites that help them understand the role of print as a communication device (print awareness), the sound structure of oral and written language (phonological awareness), the nature of letters and other print symbols (alphabet knowledge), and the vocabulary used to describe literacy constructs (metalinguistic awareness; Justice and Kaderavek 2002). Children who acquire these emergent skills before school are more prepared for the demands of conventional school literacy than their counterparts who have not had opportunities to master these specific skills (Stuart 1995).

Relatedly, it is not uncommon for preschool teachers to receive a class of 4-year-old children with strikingly diverse literacy needs. Coming to school with varying levels of word and world knowledge, many teachers find that some children can name all the letters of the alphabet with appropriate letter-sound correspondence, while others can name only one or two letters. Some children enter classrooms able to identify

and label words in a print-rich classroom environment, while others remain unaware of the role that print plays in their surroundings (Justice and Piasta 2011). These differences are reliably correlated with income inequalities, and are also associated with the amount of exposure children have to storybooks in their preschool years.

Consequently, scholars make a case for early storybook reading, highlighting ways that stories can support emergent literacy skills. First, vocabulary acquisition is supported when books contain words that children rarely encounter in spoken language. These vocabulary words can also be repeated multiple times as parents read and reread books with their children, facilitating vocabulary development (Sénéchal et al. 1996). Second, print knowledge – a multidimensional construct of children's emerging knowledge of forms and functions of the written language – is also supported through storybook reading. Through adult-child interactions, children gain a variety of emergent literacy skills including book and print organization, print meaning, letters, and words, which are foundational for later reading achievement (Justice and Piasta 2011).

Besides vocabulary and print knowledge, there is also increasing evidence that the type of book – or genre of book – influences children's conceptual knowledge and understanding. More specifically, different genres of children's books encourage different types of adult-child interactions while reading. On the one hand, storybooks that include predictable sentence patterns or consistent rhyming patterns facilitate back-and-forth dialogue between parents and children as parents may encourage children to complete sentences or guess the next rhyming word. Nonfiction texts, on the other hand, which are saturated with academic language and situated within specific contexts, often encourage parents to ask questions that relate content to children's prior knowledge and lived experiences (Pappas 1991). Like storybooks, they have the potential to encourage conversation between parent and child. Moreover, exposing children to different genres and text types scaffolds their cognitive skills and prepares them for cognitively demanding literacy tasks like making predictions and drawing inferences. In sum, research demonstrates that the amount, genre, and quality of storybooks are reliably correlated with both reading development and schema-building world knowledge.

2 The Potential for Media

Since the mid-1990s, digital storybooks have become increasingly popular in the preschool book market (Burnett 2010; Rideout 2013). Sales in children's electronic books have risen exponentially from 7 million dollars in 2011 to 23.3 million in 2017 (Publishers Weekly 2017). As screens become increasingly ubiquitous in households, many program developers and media producers create educational media programs that claim to promote early literacy, leading researchers to evaluate the circumstances under which technology-enhanced storybooks and educational media might actually promote emergent literacy (Bus et al. 2015; Wong and Neuman 2019).

In a review study on the affordances and limitations of electronic storybooks on young children's emergent literacy, Bus et al. (2015) examined when children would retain information from electronic storybooks. Evaluating the effects of digitized narratives, which included both oral text and multimedia information sources (e.g., animations, visual and sound effects, background music, hotspots, games, dictionaries), Bus and associates recommend that e-books and other multimedia be "developmentally appropriate in form and function for young children" (p. 81). In other words, electronic books should recognize the cognitive demands placed on children as they juggle both story comprehension and on-demand forms of assistance, like dictionaries or word pronunciation features. Children will unlikely develop emergent literacy skills when stories "include task switching between the story text and embedded features" (p. 92).

Still, theories supporting electronic books as appropriate platforms for emergent literacy skills stem from Paivio's dual-coding theory (Paivio 1986), which posits that information is processed in two distinct areas of the brain: one for visual information (on screen) and the other for verbal information (through speakers). Together, the two channels of information provide a robust representation of information presented in e-books. Dual-coding theory is corroborated by Bus et al.'s (2015) review study as "close congruency" between the narration and non-verbal information offers opportunities to promote story and text comprehension on digitized platforms. In an empirical study that used multimedia-enhanced read-aloud vocabulary instruction in pre-kindergarten through second grade classrooms, Silverman and Hines (2009) reported positive effects for English learners (ELs) that narrowed the gap between EL and non-EL vocabulary knowledge. This may be attributed, in part, to the dual-coding scaffolds that digital media might provide ELs (Wong and Samudra under review).

Although digital books appear to be an accessible source of information for diverse populations, there has been increasing concern regarding children's ability to comprehend stories in this form. Anderson and Pempek (2005), for example, have coined the term 'video deficit,' to account for the differential between learning from real-life events and learning from video. Studies report that while young children can imitate what they see on video, word learning and comprehension is limited, indicating video deficits that may persist beyond 36-months of age. Still, electronic picture storybooks exhibit many advantages for young children's emergent literacy (Bus et al. 2015). This is substantiated by cognitive-based theories of learning through media (Neuman 1991, 1997; Paivio 1986), and a number of empirical studies (Neuman et al. 2017; Roskos and Burstein 2013; Smeets and Bus 2012, 2014; Verhallen and Bus 2011; Wong and Samudra under review).

3 Blending Reading Experiences in the Digital Age

Research on the effects of medium (i.e., digital or live) on emergent literacy skills present mixed findings. While some studies demonstrate the advantage of digitized stories over live presentations (Korat 2010; Segal-Drori et al. 2010),

others uncover stronger gains in print presentations than electronic books (Terrell and Daniloff 1996). Such mixed results suggest that the distinction between what is printed in books and displayed on screens may not be so different after all. Instead, as screens move towards becoming everyday household objects, literacy development begins to emerge naturally through live *and* digital representations of storybooks, blending the reading experience in both media (Neuman et al. 2017).

Consequently, studies that draw opposing conclusions need to be interpreted within the specific contexts of both the child and the platform (Bus et al. 2015). For example, Korat (2010) examined the effects of e-books and printed storybooks on the reading comprehension of kindergarten and first-grade Israeli children. Assigning 90 children to treatment and control groups, and running posttest measures, Korat found that children in the e-book condition exhibited greater progress in word meaning and word reading compared to those in the printed condition. On the other hand, Terrell and Daniloff (1996) compared the effects of reading to 78 preschoolers through computer, video and live presentation. In these presentations, novel words (e.g., nouns, verbs and adjectives) were incorporated into the story. Findings indicated that live reading was significantly more effective, though the effect sizes were small. Interpreting these two studies side-by-side, learning through digitized storybooks varied according to the medium (e.g., e-book vs. computer), the child (e.g., preschool vs. kindergarten; Hebrew- vs. English-speaking), and the study design (e.g., story comprehension vs. novel words). For this reason, Bus et al. (2015) sought to synthesize and understand both "whether, and under what conditions technology-enhanced storybooks can be a viable option for the development of emergent literacy" (p. 80).

With the potential to foster emergent literacy among preschoolers, particularly among children who are at risk, books *and* e-books serve as important tools with the potential to affect the trajectory of their long-term achievement (Hirsch 2006). Video representations of narratives on digitized platforms bring stories to life through ostensive and attention-directing cues that work in concert to promote literacy development (Neuman et al. 2019). Interactive storybook read-aloud activities that mimic the read-aloud experience provide children with the ability to gather additional information about characters, definitions, and pronunciations of words in stories and can support low-income children's vocabulary development and print knowledge (de Jong and Bus 2004; Korat and Shamir 2007). Also, socially contingent videos that facilitate quick, incidental vocabulary learning are parallel to naturally occurring adult-child interactions while reading a storybook (Krcmar and Cingel 2014; Neuman et al. under review). In sum, both blended and independent presentations of storybooks have the potential to provide multi-sensory supports for vocabulary and content learning. In light of this, the current chapter examines a case study conducted by the authors to understand the overarching question presented earlier: How effectively can digital books reach young children from underserved populations?

4 A Tale of Two Stories: Digital and Live Platforms

This case study draws from a larger study conducted by our lab at New York University. The purpose of our study was to investigate the influence of digital and non-digital storybooks on low-income preschoolers' oral language comprehension. Employing a within-subjects design, we collected data from 38 children in a Head Start program aged 4.15 years old (*SD* = .22) and used the *Speakaboos* platform to provide storybooks to children (Neuman et al. 2017). Drawing from this sample, the current case study qualitatively examines three children's responses to the live and digital storybooks, illustrating the influence that these media have on children's oral language comprehension and vocabulary learning.

Speakaboos is an award-winning reading app for children aged 2–6 years old that "turns screen time into reading time" (Speakaboos 2017). Providing a library of interactive educational storybooks to children, *Speakaboos* has been named "one of the great websites" by the American Library Association, received an A+ from Education World, been a Featured 5-star app in the App Store and received accolades from *Parenting*, *Kidscreen* and *Publisher's Weekly* (Crunchbase 2017). *Speakaboos* also offers a number of interactive features that distinguish it from traditional e-books, highlighting read-alongs to capture attention and build early reading skills, and providing touch screen interactions to engage children in reading and improve comprehension.

To compare the effect of both live and electronic storybooks on children's comprehension, we created the same story in both formats. Because digital books are much more challenging to create than printed books, we selected four stories from *Speakaboos* for the study. The four digital books selected were comparable in length, lexical difficulty, and clarity of storyline (i.e. setting, plot, conflict, resolution). They were also fiction and varied in theme to cater to different student interests. Books included *Sid the Science Kid: Hello Doggie*, *Ish*, *The Valentine Contest*, and *Superkids: A Sticky Situation*. Table 1 provides details of each story. Unlike cartoons, these electronic books had animated pages that turned, characters that moved, and text that lit up during narration. Non-digital versions of each story were created using screenshots of each page and boxes for the text (see Fig. 1). Because *Speakaboos* books were read aloud by a narrator and characters in the story, we added a few words in the printed versions to indicate when characters were speaking: e.g., "I want to play with the dog," *said Sid* (changes noted in italics).

To isolate differences between live and digital storybook reading, we wanted to make two comparable story reading experiences. In the live presentation, children were read to by trained research assistants. Researchers read the book to children at a regular pace, using natural inflections, tone, and pause throughout the story. They also did not stop to ask children questions, and quickly addressed children's questions if they commented on the story's content. To make the experience parallel to the live reading presentation, we did not choose the "Read and Play" function of *Speakaboos*, which would provide children with the autonomy to turn pages at their own pace and click on hotspots to make characters speak and move on screen.

Table 1 Description of storybooks included in study

Title	Synopsis	Duration	Vocabulary words	Difficulty level (Flesch's scale)
Ish	Ramon loved to draw all the time. One day his older brother laughed at a drawing of his vase. After that, Ramon felt like he couldn't draw well. He tried over and over until his little sister helped him see that his drawings didn't need to look like a vase, but to look vase-ISH	6:04	Vase Silent Crumpled Gallery Haunted	90.5; easy to read
Sid the Science Kid: Hello Doggie	Sid hears a dog barking outside his window and wonders whether animals can talk. At school, he learns about how different animals communicate using sounds and body language. In the end, Sid is able to guess what some animals are trying to say	7:53	Bark Chest Communicate Attention Popcorn	102; easy to read
Superkids: A Sticky Situation	Noodle Boy goes to Superhero School to become a superhero. However, he thinks the other SuperKids have better superpowers than he does. When Dr. Goo goos up their playground, Noodle Boy and the other SuperKids go to stop him. In the end, Noodle Boy saves the day	7:30	Bounce Zoom Goo Whirlwind Villain	80.7; easy to read
The Valentine Contest	At this year's Valentine's Day party, Princess Ana wants someone to dance with. King Carlos holds a contest to see who can create the perfect valentine for Princess Ana. From the three contestants, Princess Ana chooses Morris the Monster's yucky valentine	7:50	Contest Bakery Yucky Glittery Valentine	79.5; easy to read

Note: Vocabulary words were given in order, arranged according to level of difficulty

We also did not select the "Read it Myself" option as this would eliminate the narrator and character voices. To mimic the live reading experience on the digital platform, we used the "Read to Me" function in the *Speakaboos* app. In this version, pages of the storybook would automatically turn after the narrator or character finished reading through the text on the page.

To examine the effects of digital books on reading comprehension and motivation in our larger study, we used a within-subjects study design. In the within-subjects design, each student received both the experimental (digital) and controlled (non-digital) conditions, serving as his/her own control, which reduced between-subjects variability, extraneous variables, and threats to internal validity. Children were escorted by a research assistant one-by-one to a quiet corner of the library at the Head Start center. Over the course of 2 days, children listened to four stories. Each child was randomly assigned two stories in the experimental condition (digital) and two stories in the controlled condition (non-digital). In the experimental condition,

Just as the SuperKids arrived at the playground, they heard a loud KAPOW! BLAMMO! SPA-LOOSH! SQUATCH! Standing at the top of the slide, was the ooey-est, gooey-est, slimiest bad guy the SuperKids had ever seen!

"I am Dr. Goo! The baddest bad guy around! And I've covered your playground with… GOO! No one will ever be able to play… AGAIN!"

"No! We love our playground! You won't get away with this!"

"Yes I will! No one can stop me and my slippery goo wand!"

Fig. 1 Resolution of the *Superkids: A Stick Situation* story

children listened to the book with headphones and were asked to refrain from touching the tablet screen. In the controlled condition, the research assistant read stories to children. The current case study closely examines the experiences of three of these children.

After each storybook experience, research assistants completed three assessments with children. First, drawing from Morrow's (1988) work in story retelling among preschoolers, we asked children to recall events in the story to assess comprehension. Children were only prompted one time during the assessment. Free recalls were recorded and transcribed verbatim. Two assessors then coded transcriptions according to Morrow's story retelling checklist. This checklist looked for seven elements: an introduction, main character(s), supporting characters, story setting, story theme, plot episodes, and resolution. The inter-rater reliability between these two assessors was .87.

Second, to capture another facet of children's story comprehension, we constructed a receptive sequencing activity that included five pictures. These pictures presented five distinct scenes in the storyline to children. A card with the title page

was placed at the beginning, and a blank card was placed at the end. Children were then given the remaining cards in randomized order and asked to sequence them. The assessment was scored with a Spearman's rank order coefficient.

Third, five vocabulary words were selected from each story. These words were identified as "sophisticated" *Tier 2* words in Beck, McKeown, and Kucan's heuristic (2002), which were screened by ten children to determine familiarity. The number of known words did not reach above chance and were included in the study. The meanings of these words were supported by the text and picture during the reading experience. They were also presented to participants in order of difficulty, starting with the easier words. In the protocol, an assessor said the word aloud to the child, which was immediately followed by a sentence that contained the word in the story. Children's responses were recorded and transcribed verbatim. These transcriptions were coded on a three-point scale as correct, partially correct and not correct. The inter-rater reliability was .91. The order of these measures was intentionally sequenced to maximize comprehension output. Each story and assessment protocol took approximately 20 minutes to complete, and included a five-minute break between books to prevent fatigue.

5 Case Study 1: No Influence by Medium

This first case study addresses the main question guiding this study: How effectively can digital books reach young children from underserved populations? Looking at the medium, we examine the responses of two preschoolers who encounter complementary versions of stories in digital and live media. Child 1, for example, receives the *The Valentine Contest* and *Superkids: A Sticky Situation* in live book format, while Child 2 receives these two stories in electronic formats. Similarly, Child 1 receives *Sid the Science Kid* and *Ish* in digital form, while Child 2 receives these on paper. The two preschoolers selected for this case study are in the same class, 4 years old, male, African-American, and have comparable levels of literacy measured approximately one standard deviation below the norm by the Peabody Picture Vocabulary Test-IV (Dunn and Dunn 2007).

We analyzed the two children's responses in two ways (Table 2): First, we examined them side-by-side, comparing free recall, story sequencing and vocabulary knowledge by story to understand how stories are interpreted across medium (by row). Second, we examined responses according to each child to understand how

Table 2 Analysis of storybooks for first case study

Storybook	Live version	Digital version
The Valentine Contest	Child 1	Child 2
Superkids: A Sticky Situation	Child 1	Child 2
Sid the Science Kid: Hello, Doggie	Child 2	Child 1
Ish	Child 2	Child 1

medium might affect comprehension within each child, corroborating findings and enhancing the trustworthiness of our claims (by column).

Comparing the two children side-by-side, there are striking similarities in their responses. Whether by book or digital format, both children demonstrated analogous levels of understanding. Using an adapted version of Morrow's (1988) story checklist, children received similar scores for each story. For example, in the first story, *The Valentine Contest,* children received 4 out of 7 points for story recall in both contexts, suggesting no effect on the medium. They also received 3 out of 5 points when sequencing the story in both contexts, further substantiating this conjecture. Examining transcripts qualitatively, children in both contexts applied cognitive activity to recall the narrative of each story. In the first story, *The Valentine Contest*, Child 1 was able to recall the three suitors who created valentines to win the princess' affections.

> The cooker man made the the cookie one with frosting on it and he put gum on it, and, and, he che…, and the dragon made it, the dragon valentine one.
> And the monster one made the yuckiest one and the girl said the monster is the winner. And the cooker man and the dragon who made valentine thing and they were sad.
> Cause the princess picked the dragon.
> No the monster. (Child 1, *The Valentine Contest*, live presentation)

After reading the live presentation of the book, the child systematically recollected the cooker man, the dragon and the monster. In the digital version of the story, Child 2 did not identify the specific characters involved, but recalled that "everybody tried to make the best [Valentine], all three." He similarly noted that the monster "made the yuckiest valentine" and eventually won. In both the live and digital storybooks, children recalled the main characters, supporting characters, plot episodes, and resolution.

A similar trend was found in *Superkids: A Sticky Situation* where there were no differences between medium. *Superkids* was a story with six plot episodes: (1) Superkids were at Superhero School, (2) Superkids compared each others' super powers, (3) Noodle Boy had an un-super superpower, (4) Superkids attacked the villain at the playground, (5) Noodle Boy saved the day, (6) Superkids became friends with the villain. Children in both the digital and live presentations scored 1 out of 5 correctly in the story sequencing task, indicating a similar understanding of the story across platform. Children were also able to provide key details in the free recall in both conditions, identifying three to four plot episodes in each format. Interestingly, both the setting at Superhero School (1) as well as the resolution (6) were recounted in both conditions.

Looking closely at what these children described between the beginning and resolution, we noticed that children in the live presentation condition quoted what characters actually said, but did not do this in the digital condition. In *Superkids*, the child who read the live presentation said, "And then the gooey man said, 'You will play with me? How?'" In contrast, the child who read the digital book described the events from a narrator's perspective, saying, "Gooey man make the playground all

yucky. And they [the superheroes] made the playground all nice and clean." This distinction between what children decided to recall is striking. When children listened to a book that was read to them in person, they recalled impressionable quotes from characters that helped drive their recount of the story forward. This was consistent in three of the four books, leading us to wonder why children might have used these quotes in their free recalls.

In *The Valentine Contest*, the child quoted the princess when he said, "the girl said, 'The monster is the winner.'" In *Superkids: A Sticky Situation*, the child quoted Dr. Goo when he said, "And then the gooey man said, 'You will play with me? How?'" In the third story, *Sid the Science Kid: Hello, Doggie*, the child quoted the dog when he said, "The dog bark at the … then he say, 'Woof!' Then he trying to say, 'Hello!'" In each scenario, the child changed the inflection of his voice to mimic the voice of the character. Looking closely at these three instances, the quotes all occurred near the end of the story narrative, capturing the climax of the story. In *Valentine*, the princess finally chose a winner of the contest. In *Superkids*, the villain, Dr. Goo, shared about how he became bad and confessed that he just wanted to play with other kids. Figure 1 shows a screenshot of this plot episode where the *Superkids* offer to play with Dr. Goo, to which he says, "But how?" Like in *Valentine*, the child captured the final – and arguably most critical – plot point in the narrative, using character speech to convey this message. Likewise, in *Sid the Science Kid*, the big idea of the story was that animal sounds are used to help animals communicate. Throughout the story, and particularly at the end, Sid discovers that dogs say "woof" to communicate.

In this first case study, we note that there are no differences in oral language comprehension when children are presented storybooks in either digital or live formats. There are, however, interesting nuances between the two conditions that warrant further exploration. Although neither condition included elements of dialogic reading, whereby adults prompt children with questions and engage them in discussion while reading, it appears that children were more likely to recall what characters specifically said when they listened to stories in person. This may be related to the different voices put on by adults when reading what characters say while storytelling, which are noticeable to children (Wright 1995). In contrast, children used narration to cohesively describe the story from beginning to end when reading the digital book. These findings are aligned with previous studies that show differences in story recall among elementary-aged children who recollect story actions or verbs that drive the story forward when read to on screen (Meringoff 1980). Future studies may consider examining this discrepancy on a larger scale, analyzing trends and patterns of recall in both formats. This may have important implications for genres of text that feature conversations between characters (e.g., fiction) or emphasize factual statements (e.g., non-fiction). It would be interesting to explore, for example, whether children comprehended fiction texts better in live presentations and non-fiction texts in digital formats, as there would be direct applications for school-based electronic book use and home-based reading.

6 Case Study 2: Stories Matter

This second case study examines the question about how digital books reach young children from underserved populations by looking beyond the medium to the content of what children are reading (i.e., the story). In the first case study, we noted no difference between medium, but uncovered trends in the quality of children's responses in the free recall. We noted this pattern in the first three books, but also noticed that children's responses to the book, *Ish*, were both quantitatively and qualitatively different from the other three stories. More specifically, children did not appear to comprehend the story as well as the others, according to the free recall, story sequencing, and vocabulary assessments. These differences informed this second case study, where we examined one child's (Child 3) responses to all four stories (Table 3). Comparing the influence of stories side-by-side, we deduced that when there was no extratextual talk about the story, the content of the storybook actually had a stronger influence over a child's comprehension than the medium did itself.

The child chosen in this case study has a similar background to the two children in the first case study. Looking at his assessments across storybooks, there were few differences between the first three stories in the free recall, story sequencing task, and vocabulary assessment with this child. Most notable of the three assessments was story sequencing, where the child was asked to order five screenshot images of each story chronologically. In *Valentine*, *Sid the Science Kid,* and *Superkids*, this child was able to order all images correctly, scoring 5 out of 5. However, with the book, *Ish*, the child only sequenced one image correctly, suggesting confusion or a lack of comprehension.

Also striking, the child was able to define vocabulary words in the first three books, describing words like *contest* as when "you want to win", *attention* as "looking at people", and *villain* as "he gooed the slide everywhere" (referring to what the villain did in the *Superkids* story). Like the story sequencing task, the child was not able to define the words taught in the *Ish* story. For example, he defined the word *vase* as "papers" and the word *gallery* as a "horse, like gallop". This suggests that his lack of comprehension of the narrative may have influenced his understanding

Table 3 Analysis of storybooks for second case study

	Valentine	Sid	Superkids	Ish
Format	Live	Digital	Live	Digital
Free recall	3/7	4/7	4/7	2/7
Story sequencing	5/5 correct	5/5 correct	5/5 correct	1/5 correct
Vocabulary	Contest: you want to win	Chest: beating	Villain: he gooed the slide everywhere	Vase: papers
	Glittery: glitter and shiny	Attention: looking at people	Goo: sticky	Gallery: horse, like gallop
Enjoyment	Yes	Yes	Yes	No

of new vocabulary words, or vice versa. This is unsurprising considering the interrelationship between vocabulary and comprehension in the literacy development of young children (Sénéchal et al. 1996).

Adding to our understanding of this child's ability to sequence and recall vocabulary are issues of child interest. After each story presentation, children were asked whether they enjoyed the story. While Child 3 enjoyed *Valentine*, *Sid the Science Kid,* and *Superkids*, he said that he did not like the story *Ish*. From the free recall, we noticed that the narrative stopped after the first few plot episodes, as he said,

> There was pictures on the wall.
> And the boy was drawing pictures.
> And he was mad.
> He was throwing the papers. (Child 3, *Ish*, digital presentation)

Unlike the other stories, his recount of *Ish* did not include the climax or resolution of the story. It only included one main character and one plot point, which is why it received 2 out of 7 points on Morrow's (1988) checklist. The other stories received 3, 4, and 4 points on the checklist. There were also approximately double the number of words used to describe the stories in *Sid* (38 words), *Superkids* (54 words), and *Valentine* (44 words) than in the *Ish* recount (21 words), suggesting he had more to share about the stories that he comprehended better.

Overall, evidence from this second case study uncovers the importance of the story in facilitating children's comprehension and vocabulary development, regardless of live or digital platform. In other words, if children are interested in a particular story, they are more likely to follow its narrative and gain vocabulary knowledge (Neuman et al. 2017). It appears then that no amount of bells and whistles offered by electronic books in this *Speakaboos* context could compensate for a child's lack of interest in a story. Thus, the power of a story should not be underestimated in our current age of digital books.

7 Reading in the Digital Age: A Both-And Approach

As our case studies revealed, reading books on digital platforms was not a magical one-shot answer to preparing children from low-income backgrounds with early literacy skills. Despite the proliferation of electronic devices in households across North America, where parents are using tablets as digital "babysitters" in restaurants, doctor offices and airplanes, this study cautions parents to consider *what* the children are engaging in as going digital does not equate to better learning. Still, findings from the first case study demonstrate that there were *no* differences between the digital or live platform. Preschool children *were* able to learn from digital platforms and had similar early literacy gains as children who experienced live presentations of storybooks. These findings should be carefully interpreted as the study was originally designed to strictly compare the differences between live and digital

media, which resulted in live presentations that did not include dialogic reading or extratextual conversations that may enhance comprehension. Accordingly, this book chapter does not recommend against the use of digital storybooks, but pushes for a both-and agenda between digital- and live-story use to cultivate emergent literacy among young children.

Building on this agenda, our second case study validated the importance of story content and child interest in stories on both live and digital platforms. Children enjoyed *Valentine*, *Sid the Science Kid*, and *Superkids* more than they did *Ish*, which uncovered striking differences in their oral language comprehension and vocabulary knowledge of the storybooks. The four stories were comparable in lexile difficulty, story structure, length, and genre. Still, the medium did not have as powerful an influence on children's comprehension as did the story. Rather than adopting an either-or approach to storybook reading, where parents and educators choose to read stories to kids exclusively in one medium or another, adopting a both-and approach integrates both media in an intentional manner to promote emergent literacy in young children.

Still, how does one implement a both-and approach intentionally? Recognizing the blended landscape of reading in this digital age, the takeaway message from our study is that when stories are picked well, they have the power to enhance literacy development in low-income preschoolers, and the potential to prepare children for the literacy skills demanded in schools. Without a doubt, further studies need to examine how and under what circumstances digital and live presentations of books should be provided to children. Important questions surrounding this exciting field include pinpointing optimal proportions of digital and live presentations of books according to children's varying stages of linguistic and cognitive development. As suggested in our first case study, research may also investigate whether different genres of books or other distinguishing features of stories might be better suited for digital or live platforms. Exploring answers to these questions could provide parents and early childhood educators with key principles and strategies for reaching low-income children and preparing them for the literacy demands of school.

8 Reaching Families Where They Are

Responding to Bus et al.' (2015) recommendation that e-books and multimedia should be "developmentally appropriate in form and function for young children" (p. 81), findings from our study extend this statement by emphasizing the importance of reader interest. Though children were able to learn through both forms of media, their interest in the story played a relatively influential role in their learning. If we are to reach families where they are and provide them with early storybook reading experiences that promote literacy development, findings from our study suggest that these experiences need to be interesting and relevant to children's lives.

One question then is to identify who is reading these stories and to understand what is considered interesting and relevant. If electronic books are to serve as a tool

to provide children from low-income communities with school-based literacy experiences, then books need to reflect the cultural makeup of their readers and use their contextualized background knowledge to promote literacy development (Hirsch 2006; Neuman et al. 2014). Drawing from theories of cultural relevance that marry cultural background, learner interest, and learning gains together (Ladson-Billings 1995; Paris and Alim 2014), this means that authors, illustrators and producers need to work together to create stories that powerfully appeal to all young children.

Answering the overarching question of this chapter, we can conclude that digital books *can* effectively reach young children from underserved populations. More specifically, this study demonstrates that electronic books as a shared storybook reading platform has the potential to promote emergent literacy in young children from low-income communities. To investigate *how effectively* digital books can reach preschoolers, we suggest that e-books do facilitate literacy development to a large degree when they are developmentally appropriate and sensitive to the interests of young children. While this study does endorse the use of digital books to promote learning among preschoolers, we admonish readers to never underestimate the power of a story that appeals to young children.

References

Anderson, M. (2015, October 29). *The demographics of device ownership*. Retrieved December 12, 2017, from http://www.pewinternet.org/2015/10/29/the-demographics-of-device-ownership/

Anderson, D., & Pempek, T. (2005). Television and very young children. *American Behavioral Scientist, 48*(5), 505–522. https://doi.org/10.1177/0002764204271506.

Beck, I., McKeown, M., & Kucan, L. (2002). *Bringing words to life*. New York: Guilford.

Burnett, C. (2010). Technology and literacy in early childhood educational settings: A review of the research. *Journal of Early Childhood Literacy, 10*, 247–270. https://doi.org/10.1177/1468798410372154.

Bus, A. G., Takacs, Z. K., & Kegel, C. A. (2015). Affordances and limitations of electronic storybooks for young children's emergent literacy. *Developmental Review, 35*, 79–97. https://doi.org/10.1016/j.dr.2014.12.004.

Bus, A. G., Sari, B., & Takacs, Z. K. (this volume). The promise of multimedia enhancement in children's storybooks. In J. Kim & B. Hassinger-Das (Eds.), *Reading in the digital age: Young children's experiences with e-books*. Cham: Springer.

Courage, M. L. (this volume). From print to digital: The medium is only part of the message. In J. Kim & B. Hassinger-Das (Eds.), *Reading in the digital age: Young children's experiences with e-books*. Cham: Springer.

Crunchbase. (2017). *Speakaboos*. Retrieved on 15 November, 2017, from https://www.crunchbase.com/organization/speakaboos

Cunningham, A. E., & Stanovich, K. (1997). Early reading acquisition and its relation to reading experience and ability 10 years later. *Developmental Psychology, 33*, 934–945. https://doi.org/10.1037//0012-1649.33.6.934.

de Jong, M., & Bus, A. (2004). The efficacy of electronic books in fostering kindergarten children's emergent story understanding. *Reading Research Quarterly, 39*, 378–393. https://doi.org/10.1598/rrq.39.4.2.

Dunn, L., & Dunn, D. (2007). *Peabody picture vocabulary test* (4th ed.). Bloomington: Pearson Education.

Flesch Reading Formula. Readability formulas. Retrieved on 15 November, 2017, from http://www.readabilityformulas.com/free-readability-formula-tests.php

Hirsch, E. D. (2006). *The knowledge deficit: Closing the shocking educational gap*. Boston: Houghton-Mifflin.

Justice, L. M., & Kaderavek, J. (2002). Using shared storybook reading to promote emergent literacy. *Teaching Exceptional Children, 34*(4), 8–13.

Justice, L. M., & Piasta, S. (2011). Developing children's print knowledge through adult-child storybook reading interactions: Print referencing as an instructional practice. In S. B. Neuman & D. Dickinson (Eds.), *Handbook of early literacy research* (Vol. 3, pp. 3–19). New York: Guilford.

Korat, O. (2010). Reading electronic books as a support for vocabulary, story comprehension and word reading in kindergarten and first grade. *Computers & Education, 55*, 24–31. https://doi.org/10.1016/j.compedu.2009.11.014.

Korat, O., & Shamir, A. (2007). Electronic books versus adult readers: Effects on children's emergent literacy as a function of social class. *Journal of Computer Assisted Learning, 23*, 248–259. https://doi.org/10.1111/j.1365-2729.2006.00213.x.

Krcmar, M., & Cingel, D. P. (2014). Parent–child joint reading in traditional and electronic formats. *Media Psychology, 17*(3), 262–281.

Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. *Theory Into Practice, 34*(3), 159–165.

Meringoff, L. K. (1980). Influence of the medium on children's story apprehension. *Journal of Educational Psychology, 72*(2), 240–249.

Morrow, L. M. (1988). Retelling stories as a diagnostic tool. In *Reexamining reading diagnosis: New trends and procedures* (pp. 128–149).

Neuman, S. B. (1991). *Literacy in the television age: The myth of the TV effect*. Norwood: Ablex.

Neuman, S. B. (1997). Television as a learning environment: A theory of synergy. In J. Flood, S. Brice Heath, & D. Lapp (Eds.), *Handbook of research on teaching literacy through the communicative and visual arts* (pp. 15–30). New York: Simon & Schuster.

Neuman, S. B., & Moland, N. (2016). Book deserts: The consequences of income segregation on children's access to books. *Urban Education*, [early view], 1–22. https://doi.org/10.1177/0042085916654525.

Neuman, S. B., Kaefer, T., & Pinkham, A. (2014). Building background knowledge. *The Reading Teacher, 68*(2), 145–148.

Neuman, S. B., Wong, K. M., & Kaefer, T. (2017). Content not form predicts oral language comprehension: The influence of the medium on preschoolers' story understanding. *Reading and Writing, 30*(8), 1753–1771.

Neuman, S. B., Wong, K. M., Flynn, R., & Kaefer, T. (2019). Learning vocabulary from educational media: The role of pedagogical supports for low-income preschoolers. *Journal of Educational Psychology, 111*(1), 32–44. https://doi.org/10.1037/edu0000278.

Neuman, S. B., Flynn, R., Wong, K. M., & Kaefer, T. (under review). *Quick, incidental word learning in educational media: All contexts are not equal among low-income preschoolers*.

Paivio, A. (1986). *Mental representation: A dual coding approach*. Oxford: Oxford University Press.

Pappas, C. (1991). Young children's strategies in learning the "book language" of information books. *Discourse Processes, 14*, 203–225.

Paris, D., & Alim, H. (2014). What are we seeking to sustain through culturally sustaining pedagogy? A loving critique forward. *Harvard Educational Review, 84*(1), 85–100.

Publishers Weekly. (2017, December 7). https://www.publishersweekly.com/pw/by-topic/childrens/childrens-industry-news/article/75555-global-kids-connect-2017-sales-stats-and-hot-topics.html

Rideout, V. (2013). *Zero to eight: Children's media use in America 2013*. San Francisco: Common Sense Media.

Roskos, K., & Burstein, K. (2013, April). *Engagement with e-Books: Does device matter*. In Annual meeting of the American Educational Research Association, San Francisco, CA, USA (Vol. 28).

Segal-Drori, O., Korat, O., & Shamir, A. (2010). Reading electronic and printed books with and without adult instruction: Effects on emergent reading. *Reading and Writing, 23*, 913–930. https://doi.org/10.1007/s11145-009-9182x.

Sénéchal, M., LeFevre, J. A., Hudson, E., & Lawson, E. P. (1996). Knowledge of storybooks as a predictor of young children's vocabulary. *Journal of Educational Psychology, 88*, 520–536.

Silverman, R., & Hines, S. (2009). The effects of multimedia-enhanced instruction on the vocabulary of English-language learners and non-English-language learners in pre-kindergarten through second grade. *Journal of Educational Psychology, 101*(2), 305.

Smeets, D. J., & Bus, A. G. (2012). Interactive electronic storybooks for kindergartners to promote vocabulary growth. *Journal of Experimental Child Psychology, 112*(1), 36–55.

Smeets, D. J. H., & Bus, A. G. (2014). The interactive animated e-book as a word-learning device for kindergartners. *Applied PsychoLinguistics*. https://doi.org/10.1017/S0142716413000556.

Speakaboos. (2017). *Speakaboos*. Retrieved on 15 November, 2017, from https://www.speakaboos.com/

Stuart, M. (1995). Prediction and qualitative assessment of five-and six-year-old children's reading: A longitudinal study. *British Journal of Educational Psychology, 65*(3), 287–296.

Terrell, S., & Daniloff, R. (1996). Children's word learning using three modes of instruction. *Perceptual and Motor Skills, 83*, 779–787. https://doi.org/10.2466/pms.1996.83.3.779.

Van Daal, V. H. P., Sandvik, J. M., & Adèr, H. J. (this volume). A meta-analysis of multimedia applications: How effective are interventions with e-books, computer-assisted instruction and TV/video on literacy learning? In J. Kim & B. Hassinger-Das (Eds.), *Reading in the digital age: Young children's experiences with e-books*. Cham: Springer.

Verhallen, M. J. A. J., & Bus, A. G. (2011). Young second language learners' visual attention to illustrations in storybooks. *Journal of Early Childhood Literacy, 11*, 480–500. https://doi.org/10.1177/1468798411416785.

Verhallen, M. J., Bus, A. G., & de Jong, M. T. (2006). The promise of multimedia stories for kindergarten children at risk. *Journal of Educational Psychology, 98*(2), 410.

Wong, K. M., & Neuman, S. B. (2019). Vocabulary instruction for dual-language learners: A content analysis of educational media programs for bilingual preschoolers. *Bilingual Research Journal, 42*(1). https://doi.org/10.1080/15235882.2018.1561551.

Wong, K. M., & Samudra, P. (under review). *L2 vocabulary learning on educational media: Extending dual-coding theory to dual-language learners*.

Wright, A. (1995). *Storytelling with children*. Oxford: Oxford University.