Parent–child interactions during traditional and computer storybook reading for children's comprehension: Implications for electronic storybook design☆

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ABSTRACT

The purpose of this study was to examine how parents and children interact during traditional and computer storybook reading in their home. Thirty-nine, 4-year old children read both a traditional and a computer storybook with a parent. Parent responsiveness and child verbalizations were coded during each type of book reading experience (traditional vs. computer). Parents' interactions during traditional and computer storybooks were similar for many variables but differed on overall parent engagement in favor of computer storybooks. Children's story comprehension scores were not significantly different between the two types of storybooks. For both types of storybooks, child attention, child language, and parent engagement were significant predictors of story comprehension. Our results suggest that a storybook is a storybook, whether the story is presented on paper or electronically, although the ways in which parents and children engage with the storybooks may differ as a function of the platform.

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Recent nationally representative survey data of children ages 0–8 found that most young children (60%) read or are read to on a daily basis for approximately 30 minutes per day [1], an essential activity for creating a literate nation [2]. Despite the increase in families who own a computer, tablet, or smartphone in recent years, ebook reading is still less common with young children than traditional book reading [1]. In particular, recent data suggest that only 28% of children ages 8 and under have ever been read books on an ereader or tablet device [1], but these findings do not include children's use of ebooks on a desktop or laptop computer. Despite the slow increase in children's ebook reading, companies are dedicated to creating ebook content for a young audience. Considering the potential for children to download and read or to have books read to them on some kind of electronic device, it is important to understand how parents and children may interact differently when reading storybooks on electronic devices versus traditional storybooks.

The purpose of this study was to describe parent and child interactions during traditional and computer storybook reading with particular interest in how parent–child story-related conversation and engagement with both types of storybooks predicts story comprehension. Because very little data are available on the ways in which parents read traditional and computer storybooks to their children, our research question was: How do parents and children behave and engage with one another while reading computer and traditional storybooks?

Because parents vary their interactions based on the context of the interaction [3] and the computer skills of their children [4] and because the story narrative largely drives comprehension [5], we hypothesized that:

H1: Parents will be more interactive and engaged with their children during a computer storybook than with a traditional storybook as a result of the novelty of the platform and the interactive nature and prompts provided by the device.

H2: Parents will vary their interaction styles when engaging with a traditional and a computer storybook.

H3: Children will vary their verbal interactions when being read a traditional and computer storybook.

H4: Story comprehension will be influenced by the child's attention to the story and by children's prior verbal comprehension skills, as well as by their parent's interactions with them during storybook reading.

1. Vygotsky's theory and media

Vygotsky's [6] sociocultural theory focuses on the importance of language and social interactions on child cognitive development and learning. According to Vygotskian theory, the expertise brought by mature members of a society, in this instance the parents, assists the child in using and understanding cultural tools such as language and media that transmit knowledge. It is through these interactions with a parent, that a child learns about his social world and is able to expand his cognitive skills and knowledge. According to Vygotsky, optimal learning occurs when children are engaged in interactions or experiences that are challenging, but manageable and still within their zone of proximal development (ZPD). The ZPD was defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" [6, p. 86]. This zone of proximal development continues to change and develop with the child. Therefore, as children's cognitive capacities improve, parent–child interaction should become more complex to ensure that the child is continually asked to master new skills, thereby advancing cognition and learning.

Beyond the role of the parent, Vygotskian theory [6] discusses the important role of tools and tool use on development. Vygotsky [6] explains that a tool is something that can be used in the service of something else. In this sense, media are both tools and signs that can mediate cultural knowledge acquisition. That is, it is possible that the child may also be influenced or supported by their interactions with the digital media itself, especially if the device or tool is interactive and responsive to the child's input and needs. If the device or technology adapts language to respond and interact with the child in ways that are both challenging but still within the child's ZPD, the interaction between the device and the child may resemble the interaction between the parent and child. Therefore, based on Vygotskian theory, we explore how parents and children interact with each other and with traditional and computer storybooks at home and focus on the types of interactions parents use to help their children learn plot-relevant, central story content.

2. Reading in the digital age

Young children are avid media consumers [7,1,8]. In this rapidly changing 21st century media environment, 53% of 2–4 year olds and 90% of 5- to 8-year olds have used a computer at some point, with children beginning to use a computer at 3.5 years [7]. Parents value computers; nearly 70% of the parents of 6-month to 6-year-old US children reported that computers helped their young children's learning [9].

Parents also consistently view books and reading positively [9] and research confirms the thesis that parent–child book reading supports literacy skills [2,10]. However, comprehension of content has been shown to vary as a function of format, with children learning more from traditional books than electronic books [11,12]. With so much time spent using traditional and emerging media platforms, it is timely to consider what kinds of family interactions occur during these types of media experiences in the home, especially the role that parent–child interactions play in children's story comprehension.

The demands of the media platform likely influence how or whether parents co-engage with their child during reading experiences, and thus how much they may interact with their child during those experiences. Since most preschoolers cannot read, parents understand that they must read a traditional book in order for the child to comprehend the content. Similarly, using a computer may be challenging for young children because the user must operate the mouse and keyboard in order to manipulate and move through the computer storybook [4], though new touch-screen tablet interfaces are simplifying that experience. While in some instances the computer may read the story to the child, in many instances the words are just presented for the child or adult to read in the same way they appear in a traditional storybook, thus requiring parental participation for pre-reading children in ways that are similar to a traditional storybook.

Parent and child interactions during traditional book reading. Research on parent–child interaction during joint book reading provides evidence that interaction during book reading complements children's cognitive skill development. For example, Reese and Cox [13] found that parents' interactions with preschool-aged children during joint book reading were positively associated with vocabulary development and literacy skills. Moreover, mothers' warmth, perspective taking, and communication during book reading were associated with the child's level of socio-emotional development [14].

Although specific parent–child interaction characteristics like warmth are associated with socio-emotional development and academic skills, parent–child interactions do vary across different situations [3]. When reading storybooks to their preschool-aged children, for instance, only 50% of the mothers used the same strategies when reading familiar and unfamiliar books [15].

Consistent with Vygotskian theory [6], parents also adjust their interactions depending on the age and abilities of the child to remain in the ZPD. As children age, the type and amount of information provided by the parent changes during book reading [16]. Studies with preschoolers also demonstrate that parents adjust their verbal demands to meet the communication abilities of their children [17]. Taken together, these findings suggest that during book reading, parents adjust their interactions based on the child's age and developmental needs as well as the specific media content or context of the interaction.

Parent and child interactions during computer use. With children using new technology and the Internet more than ever before [7,1], researchers have begun to examine the ways in which children interact with the computer device directly or with other people via online interactions like Skype (e.g., [18,19]). Research on children's interactions during computer use indicates that the type of computer interface influences the child's engagement with adults on the computer. For example, research demonstrates that when children engage with *Family Story Play*, an online system that allows family members to read storybooks over the Internet to a child, children are more engaged and have higher quality interactions with the online reader when compared to a traditional Skype interaction session [18]. Studies have also shown that increasing the activities available during the online interaction, such as providing opportunities for the child to see themselves in an online storybook [20] or providing opportunities for photos to be sent between the users [19], can increase children's involvement in the online interactions.

Research on patterns of early computer use have found that children shift from using a computer while sitting on a parent's lap at around 2.5 years of age to using a computer independently at approximately 3.5 years of age [21,1]. While children may sit independently while using the computer, parents remain involved and regularly co-use the device with their young children [22]. Specifically, 40% of parents of children between 2- and 5-years old co-use the computer "all or most" of the time their child uses the computer [22].

Given that parents are still co-using computers with young children, another line of research has begun to examine parents' verbal interactions during computer co-use (e.g., [12,23]). For example, children can interact with their parents while co-using the