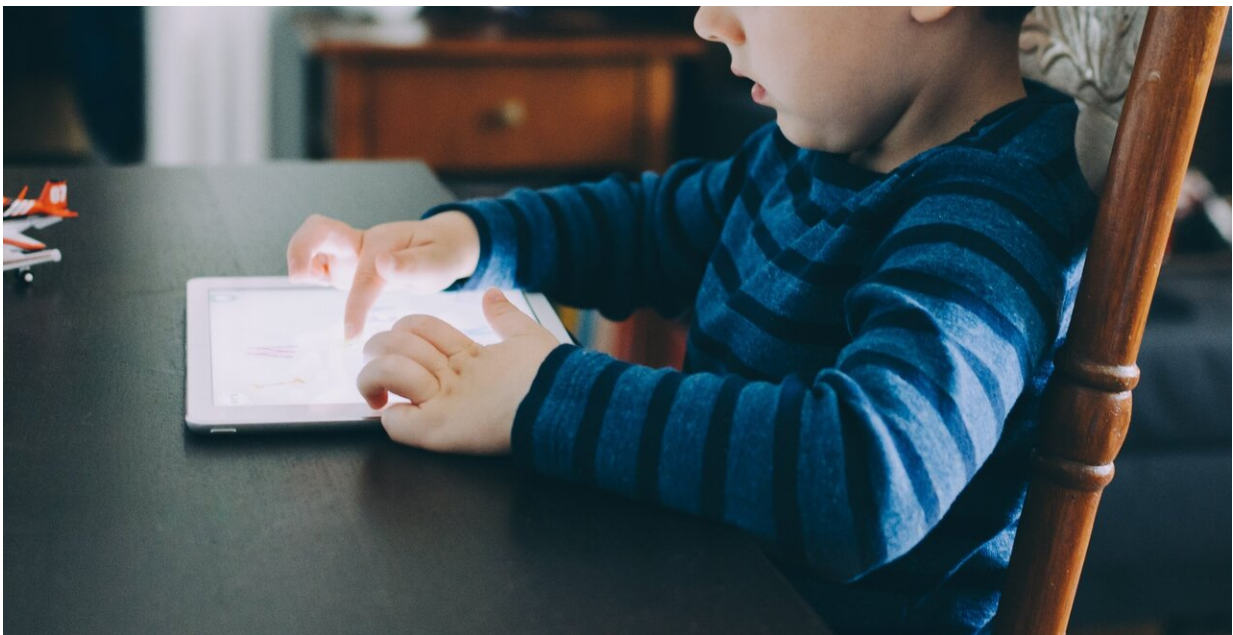


Digital books harm young children's learning—unless the books have the right enhancements

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A comprehensive meta-analysis of prior research has found, overall, that children ages 1 to 8 were less likely to understand picture books when they read the digital, versus print, version. However, when digital picture books contain the right enhancements that reinforce the story content, they outperform their print counterparts. The results were published

today in *Review of Educational Research*, a peer-reviewed journal of the American Educational Research Association.

Authors Natalia Kucirkova at the University of Stavanger in Norway and The Open University in the United Kingdom, and May Irene Furenes and Adriana G. Bus at the University of Stavanger, analyzed the results of 39 studies that included a total 1,812 children between the ages of 1 and 8. For their analysis, the authors compared children's [story](#) comprehension and vocabulary learning when they read a book on paper versus on screen, and assessed the effects of story-related enhancements in [digital books](#), the presence of a dictionary, and the role of adult support. The bulk of the studies were carried out between 2010 and 2019, and for the greater the part, in the last four years of that time span.

"The wide availability of digital reading options and the rich tradition of children's [print books](#) beg the question of which reading format is better suited for young readers' learning," said Kucirkova, a professor of early childhood development at the University of Stavanger and The Open University. "We found that when the [print](#) and digital versions of a book are practically the same and differ only in the voice-over or highlighted print as additional features in the digital book, then print outperforms digital."

The authors found that the digital device itself and sometimes digital enhancements that are not aligned with the story content—such as a dictionary—interfere with children's story comprehension.

When digital enhancements are designed to increase children's ability to make sense of the narrative—for instance, by prompting children's background knowledge to understand the story or providing additional explanations of story events—digital books not only outweigh the negative effects of the digital device but also outperform print books on children's story comprehension.

"Our overall findings may reflect the rather low quality of enhancements in the digital books available for young children," said Kucirkova.

"Many digitized versions of picture books are inferior to the print version, yet young children widely use them."

With a few exceptions, the commercially published digital books in the studies did not include storytelling techniques that adults provide during book sharing, for example attracting children's attention to the main story elements and focusing their attention on the chain of story events.

"If we want to support all children, we need to understand the impact of digital books and make them of higher quality," said Kucirkova. "Digital books are low-cost to access and thus more readily available to students from disadvantaged backgrounds. Furthermore, we can customize digital books to a child's level of learning by including interactive features responsive to the child."

"For reasons that need to be clarified by additional research, our meta-analysis shows that children from disadvantaged socioeconomic backgrounds are more likely to be distracted from story content on digital books by their interactive features and by the reading devices themselves," said Bus, a professor at the University of Stavanger. "As a result, these children are experiencing the most difficulty comprehending digital [picture books](#)."

"Makers of children's digital books need to be careful about the enhancements they make, and educators and parents need to choose carefully which digital books young children read," said Kucirkova.

"Internationally, it is important to promote the production of exemplary prototypes including text in a range of languages and provide incentives to publishers, authors, designers, and illustrators to change the status quo."

The authors found that digital books may be more effective than print books for enhancing children's vocabulary if the digital [books](#) use a dictionary that defines infrequently used words and expressions. However, digital dictionary features hinder children's ability to understand the story they are reading, indicating that focusing attention on word meanings distracts [children](#)'s attention from the story content.

"This is further evidence that digital book designers need to exercise caution with seemingly small and popular additions that may be helpful for isolated outcomes such as vocabulary learning but hinder the reading session overall," Kucirkova said.

More information: May Irene Furenes et al, A Comparison of Children's Reading on Paper Versus Screen: A Meta-Analysis, *Review of Educational Research* (2021). [DOI: 10.3102/0034654321998074](https://doi.org/10.3102/0034654321998074)

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