E-readers more effective than paper for dyslexic readers

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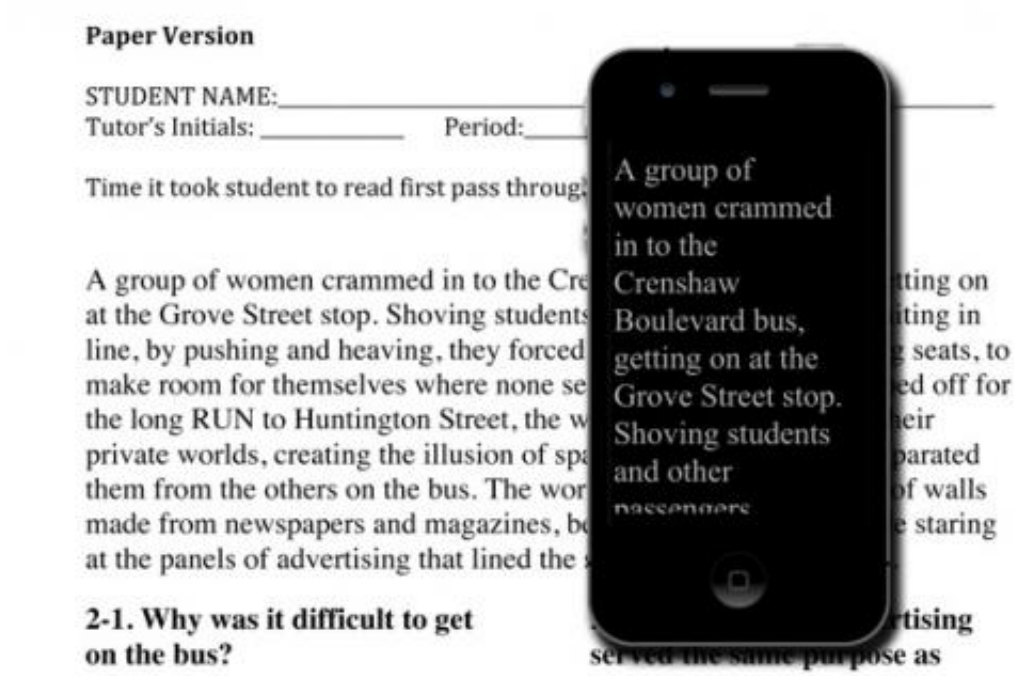

In the paper condition students read passages from the Gates-MacGinitie Reading Tests and answered multiple choice questions as shown. In the iPod condition the reading passage was displayed on the iPod (scrolled vertically using a finger on the touchscreen) and questions were answered on paper, as in the paper condition, except that the text passage was not displayed. Following standard protocol for this test, students were allowed to re-examine the text when answering questions, in both conditions. Credit: PLoS ONE 8(9): e75634. doi:10.1371/journal.pone.0075634

As e-readers grow in popularity as convenient alternatives to traditional books, researchers at the Smithsonian have found that convenience may not be their only benefit. The team discovered that when e-readers are set up to display only a few words per line, some people with dyslexia can read more easily, quickly and with greater comprehension. Their findings are published in the Sept. 18 issue of the journal *PLOS ONE.*

An element in many cases of dyslexia is called a visual attention deficit. It is marked by an inability to concentrate on letters within words or words within lines of text. Another element is known as visual crowding—the failure to recognize letters when they are cluttered within the word. Using short lines on an e-reader can alieviate these issues and promote reading by reducing visual distractions within the text.

"At least a third of those with dyslexia we tested have these issues with visual attention and are helped by reading on the e-reader," said Matthew H. Schneps, director of the Laboratory for Visual Learning at the Smithsonian Astrophysical Observatory and lead author of the research. "For those who don't have these issues, the study showed that the traditional ways of displaying text are better."

An earlier study by Schneps tracked eye movements of dyslexic students while they read, and it showed the use of short lines facilitated reading by improving the efficiency of the eye movements. This second study examined the role the small hand-held reader had on comprehension, and found that in many cases the device not only improved speed and efficiency, but improved abilities for the dyslexic reader to grasp the meaning of the text.

The team tested the reading comprehension and speed of 103 students with dyslexia who attend Landmark High School in Boston. Reading on paper was compared with reading on small hand-held e-reader devices, configured to lines of text that were two-to-three words long. The use of

an e-reader significantly improved speed and comprehension in many of the students. Those students with a pronounced visual attention deficit benefited most from reading text on a handheld device versus on paper, while the reverse was true for those who did not exhibit these issues. The small screen on a handheld device displaying few words (versus a full sheet of paper) is believed to narrow and concentrate the reader's focus, which controls visual distraction.

"The high school students we tested at Landmark had the benefit of many years of exceptional remediation, but even so, if they have visual attention deficits they will eventually hit a plateau, and traditional approaches can no longer help," said Schneps. "Our research showed that the e-readers help these students reach beyond those limits."

These findings suggest that this reading method can be an effective intervention for struggling readers and that e-readers may be more than new technological gadgets: They also may be educational resources and solutions for those with dyslexia.

More information: Schneps MH, Thomson JM, Chen C, Sonnert G, Pomplun M (2013) E-Readers Are More Effective than Paper for Some with Dyslexia. PLoS ONE 8(9): e75634. DOI: 10.1371/journal.pone.0075634

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