THE CONVERSATION
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Do students lose depth in digital reading?

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Paper or tablet? Megan Trace, CC BY-NC

Do students learn as much when they read digitally as they do in print?

For both parents and teachers, knowing whether computer-based media are improving or compromising education is a question of concern. With the surge in popularity of e-books, online learning and open educational resources, investigators have been trying to determine whether students do as well when reading an assigned text on a digital screen as on paper.

The answer to the question, however, needs far more than a yes-no response.

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Reading in print versus digitally

In my research, I have compared the ways in which we read in print and onscreen. Between 2013 and 2015, I gathered data from 429 university students drawn from five countries (the U.S., Japan, Germany, Slovenia and India).

The students in my study reported that print was aesthetically more enjoyable, saying things such as "I like the smell of paper" or that reading in print is "real reading." What's more, print gave them a

sense of where they were in the book – they could “see” and “feel” where they were in the text.

Print is easier on the eyes. H. Moon, CC BY-NC-ND

Print was also judged to be easier on the eyes and less likely to encourage multitasking. Almost half the participants complained about eyestrain from reading digitally (“my eyes burn”), and 67 percent indicated they were likely to multitask while reading digitally (compared with 41 percent when reading print).

At the same time, respondents praised digital reading on a number of counts, including the ability to read in the dark, ease of finding material (“plenty of quick information”), saving paper and even the fact they could multitask while reading.

Measuring learning

But the bigger question is whether students are learning as much when they read onscreen.

A number of researchers have sought to measure learning by asking people to read a passage of text, either in print or on a digital device, and then testing for comprehension.

Most studies have found that participants scored about the same when reading in each medium, though a few have indicated that students performed better on tests when they read in print.

The problem, however, with learning-measurement studies is that their notion of “learning” has tended to be simplistic. Reading passages and answering questions afterwards may be a familiar tool in standardized testing, but tells us little about any deeper level of understanding.

Some researchers are beginning to pose more nuanced questions, including one scholar who has considered what happens when people read a story in print or on a digital device and are then asked to reconstruct the plot sequence. The answer: Print yielded better results.

Another aspect of learning is to see how outcomes differ when students are doing their reading in less prescriptive experimental conditions. One study let students choose how much time to spend when reading on each platform. The researchers found that participants devoted less time to reading the passage onscreen – and performed less well on the subsequent comprehension test.

This finding is hardly surprising, given the tendency so many of us have to skim and search when going online, rather than reading slowly and carefully. In my study, one student commented,

> *"It takes more time to read the same number of pages in print comparing to digital."*

Another complained,

> *"It takes me longer because I read more carefully."*

Critical thinking and reading

How does the learning question relate to educational goals? There is much buzz today about wanting students to be good at critical thinking. Definitions of that goal are elusive, but it's pretty clear they involve being able to understand complex ideas, evaluate evidence, weigh alternative perspectives and construct justifiable arguments.

To become proficient in critical thinking – at least in a literate society – students need to be able to handle text. The text may be long, complex or both. To make sense of it, students cannot skim, rush ahead or continually get distracted.

So, does reading in print versus onscreen build critical thinking skills?

Reading helps develop critical thinking skills. mrskradz, CC BY-ND

The comprehension studies we talked about earlier tell us little about the kind of reading we recognize as necessary for serious contemplation or analysis. An alternative approach, at least for starters, is asking students about their digital and paper-based reading patterns – much as physicians ask for histories (along with physicals and lab tests) to figure out what ails their patients.

While my own study didn't directly measure learning, it did query students about their reading patterns and preferences. The responses to some of my questions were particularly revealing.

When asked on which medium they felt they concentrated best, 92 percent replied "print." For long academic readings, 86 percent favored print. Participants also reported being more likely to reread academic materials if they were in print.

What's more, a number of students indicated they believed print was a better medium for learning. One said,

> *"It's easier to focus."*

Others stated,

> *"[I] feel like the content sticks in the head more easily" and*
>
> *"I feel like I understand it more."*

By contrast, in talking about digital screens, students noted “danger of distraction” and “no concentration.”

Obviously, student perceptions are not the same thing as measurable learning outcomes. And my research didn’t probe connections between reading platforms and critical thinking.

However, a pattern did emerge: Print stood out as the medium for doing serious work.

Digital is convenient and cheaper

At the same time, we cannot ignore other factors impacting students’ decisions about what reading platform to chose for school work.

Convenience is one big consideration: More than 40 percent of participants in my study mentioned convenience (including easy access to materials) as what they liked most about reading onscreen.

Money is another variable. Students were highly conscious about differential prices for print and digital versions of reading materials, with cost often driving choice. As one student put it,

> *“Cost rules everything around me.”*

Many students revealed a mismatch between finances and learning. When queried about which reading platform they would choose if cost were the same, 87 percent said “print” for academic work.

Adapting to digital learning

We also need to keep in mind the growing trend for universities to adapt their curricula to fit the proverbial “procrustean” bed of a digital world – a world tailor-made for skimming, scanning and using the “find” function rather than reading slowly and thoughtfully.

How can digital be adapted? ITU Pictures, CC BY

Professors now toy with ditching long or complex reading assignments in favor of short (or more straightforward) ones, moving closer to digital reading patterns in the nonacademic world. This world hypes condensed versions of texts and shorter reading material that is bite-sized to begin with.

The question then is how can universities help students read text thoughtfully, reflectively, and without distraction on digital devices?

One key could be adaptation. Research suggests students may be overconfident about what they are understanding when they read digitally. Teaching them to be mindful in their digital reading (for instance, by writing down key words from the reading) may help in learning.

Another form of adaptation is happening in the realm of digital hardware and software. Modern screens cause less eyestrain, and annotation programs continue to improve. Some digital reading devices now come with tools enabling them to digitally approximate physical page flipping and multiple place-marking.

However, in my view, while short-and-to-the-point may be a good fit for digital consumption, it's not the sort of reading likely to nurture the critical thinking we still talk about as a hallmark of university education.

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