Individual differences in learning from digital texts: What do we know and where do we go from here?

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Commentary on papers in Special Issue "Digital reading and what makes it hard for whom:

Individual differences in learning from digital texts "

Abstract

Digital reading has become integral in our education, recreational reading, and professional

lives. The papers in this special issue explore individual differences in how readers

understand, process, and learn from digital texts across different age groups and tasks. This

commentary summarises study findings about the similarities in processing information

presented on paper and on screen, and the unique challenges that arise through the

content and activities that are a focus of digital reading, such as internet-based search and

learning. I conclude with recommendations for future research to elucidate how reader

characteristics and experience interact with digital reading tasks and texts to influence

comprehension and learning.

Key words: Digital reading, Reading medium, Text comprehension, Learning

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1. Introduction

Digital reading is now ubiquitous in our education, leisure time, and professional lives. The majority of adults (87%) report using the internet on a daily basis (OECD, 2024a) and it is estimated that 90% of jobs in Europe require digital literacy skills (Mancino, 2023).

According to recent international surveys, 56% of 15-year-olds spend more than one hour per day on learning activities at school (OECD, 2024b), up to 90% of 15-year-olds browse the internet and social media for fun (OECD, 2024b), and approximately 70% of 10-year-olds own a smartphone (OECD, 2025). Against this backdrop, the papers in this special issue provide new insights into how different aspects of reader, task, and text interact to influence comprehension of and learning from digital texts, and indicate future research directions that will guide us to better understand and support digital reading proficiency.

2. What do we mean by digital reading?

Digital reading means different things to different people; as noted by Skovdahl et al. (2025) in this special issue, 'there is still no clear consensus regarding its definition' (p. 2). Digital reading can involve a range of delivery devices: smartphones, tablets, laptops, as well as ereaders, and the devices, formats, and interactional opportunities change and develop at pace. A particular focus of digital reading noted by the editors is the *range* of literacy practices involved, which include comprehension and learning "by navigating, integrating, and evaluating a series of digital texts..[that] vary according to their structures and modalities, sources and qualities, and perspectives and positions" (Segers et al., 2025). This range of perspectives is reflected in the papers in this special issue. They include comparison of comprehension and learning from single texts displayed on paper and screen; analysis of

the reader characteristics and experiences that influence internet navigation skills, evaluations of source and content credibility, and integration of information across multiple texts; and examination of how training and instruction can support better processing of and learning from digital texts.

2.1 Paper-based vs screen reading: the foundation

The skills, knowledge, and processes that we use when reading single texts for meaning on paper are the same as those used for reading on screen. Regardless of presentation modality, readers need to access word meanings accurately and efficiently, construct sentence meanings, and build an integrated and coherent model of the text's meaning (as noted by several authors in this issue). Two studies contrasted undergraduate students' comprehension of paper-based reading and paginated screen presentation, and each replicated the 'screen inferiority' effect; lower comprehension scores when reading on screen (Romero et al., 2025; Singer Trakhman et al., 2025). Romero et al. (2025) observed poorer comprehension of texts read on screen after controlling for individual differences in memory, sustained attention, prior knowledge and reading comprehension. Singer Trakhman et al. (2025) also found poorer comprehension for screen relative to paper reading, but observed the same types of text processing behaviours in the two presentation conditions. In contrast, the grade 7 readers in Ronconi et al.'s (2025) study did not differ significantly in their comprehension on paper and on screen. Other differences between media were evident, however; when reading digital texts, readers benefitted less from highlighting, a strategy considered to support self-regulation of learning (Ronconi et al., 2025).

These print vs screen contrasts are useful; they enable us to determine whether specific reader characteristics have a differential effect on reading by modality. These

papers, like others, confirm broad similarities when reading single texts on paper and on screen. Each paper also highlights additional factors related to our digital experiences and the processing of digital text that may have an important influence on digital learning, and which will be discussed in subsequent sections.

3. Reading and learning on the internet: challenges that arise from text, task, and reader While the basic reading and cognitive skills that influence paper-based reading and learning also support digital experiences, digital technologies provide greater opportunities and new experiences for leisure and learning. Successful digital readers need to be able to navigate the internet and to understand, evaluate, and integrate information across multiple websites that range in terms of credibility and quality (Coiro, 2021). The importance of these skills is recognized by their inclusion in national and international assessments (Mullis & Martin, 2019; NationalAssessmentofEducationProgress, 2025; OECD, 2019). What text, task, and reader characteristics influence how we navigate across this volume of information, identify relevant and credible sources, and then integrate that content into a coherent understanding of the topic?

3.1 Finding information: Factors that influence internet search and navigation

Search terms on the internet will generate many hits, some more relevant than others. Two papers examined the factors associated with successful search and navigation in adolescent readers. Norberg et al. (2025) found that adolescents' ability to generate topic-specific search terms was a key predictor of their learning and comprehension, even when students who used different search terms identified the same sites. This finding was more pronounced for less able readers. The authors suggest that search term specificity may have supported more directed processing of the information and compensated those with lower academic proficiency. The generation of more topic-aligned search terms was

also associated with readers' metacognitive awareness of their own performance. In a secondary data analysis of 15-year-olds' performance on the Programme for International Student Assessment (PISA) survey, Naumann et al. (2025) found that students with better (independently assessed) reading comprehension scores were more precise in navigation, being better able to differentiate relevant from irrelevant web pages. They were also more adaptive in their processing, spending more time on relevant pages for more difficult test items. These effects were also influenced by performance on a (nonverbal) problem-solving task; students with both weak reading comprehension and weak problem solving demonstrated the poorest navigation skills.

These studies illustrate interactions between reader resources (academic achievement, metacognitive skills and problem solving) and task features (search and navigation skills). Effective instruction might benefit digital learning for those with lower academic proficiency or weaker cognitive processing in particular. Studies designed to determine the critical components of effective instruction would also help to determine the direction of any causal relations between internet search, navigation, time devoted to processing content, and text comprehension.

3.2 Evaluating and using information: Factors that influence credibility judgements

Readers differ in their ability to differentiate relevant from irrelevant websites (Naumann et al., 2025). However, sites that are relevant to a specific and well targeted search may differ in the credibility of source and content. Evaluating the source and reliability of content is not a new skill; most of us are aware of the particular political biases and editorial standards of different print newspapers and magazines, as well as radio and televised media channels. However, credibility judgements are becoming increasingly important in the digital age, given the sheer amount of information that is available, and the

lack of regulation and editorial oversight for content, which results in ready access to misinformation and disinformation, as well as a range of reliable, trustworthy, and well-evidenced content. Several papers investigated the relations between reader skills and credibility judgements across multiple texts.

McGrath et al. (2025) found that undergraduate students with stronger reading comprehension skills (measured independently) had better evaluation skills. They were more likely to view unreliable information as less useful and also less trustworthy, and also to provide clear criteria for their evaluation. The findings also indicated that strong reading comprehension skills mitigated for weak prior knowledge when evaluating content. The authors speculate that those with stronger reading comprehension skills may have greater cognitive resources to apply to critical evaluation. Svedholm-Häkkinen et al. (2025) found that 15- to 19-year-olds were sensitive to the trustworthiness of an (experimentally controlled) internet source and could successfully differentiate between four articles written by experts and non-experts, as well as the quality of evidence. Older students and those who reported being more open to different viewpoints, assessed with an analytic thinking disposition task, were better at evaluation. Finally, Marten et al. (2025) found positive effects for an intervention designed to teach students in grades 7 and 8 how to use source information to evaluate the credibility of information, and how to corroborate its claims. The training benefited those with stronger reading proficiency, in particular.

These studies show that individual differences in reading comprehension skill and analytic thinking are related to the evaluation of information. Instruction in what counts as a credible source and high-quality evidence, together with scaffolded opportunities for reevaluation (Svedholm-Häkkinen et al., 2025), appears to be a promising way to support those with weaker reading skills in general. Future research to identify the key elements of

that support, and whether and why it differs by age or ability group, is needed to support all digital readers to successfully differentiate reliable and unreliable information.

3.3 Constructing meaning across multiple texts: metacognitive awareness, attention, and digital reading

Metacognitive awareness of one's understanding when reading is a strong predictor of reading comprehension and its development in young readers (Oakhill & Cain, 2012). A reader's awareness that they have difficulty in understanding a text, or low or insecure knowledge about a topic, is a critical first step in self-regulating reading behaviours that can enhance comprehension such as developing reliable and navigation strategies, and applying appropriate standards for evaluation. There is evidence for reader-task interactions in two papers in this special issue. Norberg et al. (2025) found that awareness of one's own topic knowledge was associated with more targeted internet search terms that supported better learning. Singer Trakhman et al. (2025) found that topic knowledge and the accuracy of comprehension judgements were related. However, their intervention targeting metacognitive skills benefitted text processing behaviours and comprehension, but not calibration accuracy.

In addition to metacognitive skills, attention has been identified as a factor of special interest for digital reading (Segers et al., 2025). Sustained attention was assessed by Troncosco-Ruiz et al. (2025) in their study of undergraduate students' comprehension of multiple texts. Readers with better sustained attention obtained higher comprehension scores for individual texts and also for an essay that required them to integrate information across these multiple texts. Specifically, students with higher sustained attention scores were more likely to select arguments from reliable sources, a critical skill when assimilating information across multiple texts that may differ in terms of credibility. Romero et al. (2025)

controlled for individual differences in sustained attention and found that the tendency to multitask predicted additional variance in reading comprehension scores. The relation between reading comprehension and attention in itself is not a new or controversial finding (Follmer, 2017; Peng et al., 2018). Of specific to multiple text comprehension are the findings that sustained attention interacts with the credibility of information when learning across multiple texts, and that multitasking, which involves divided attention and task switching, are partially separable influences on learning.

Given the importance of metacognitive awareness and attention for reading comprehension in general, a future research focus should be to determine precisely how they influence a range of specific digital reading behaviours and tasks, across readers. The extent to which either metacognitive awareness or sustained attention is malleable, and generalisable across tasks, is an empirical question. But a better understanding of how each interacts with a readers' academic proficiency will inform instruction to mitigate negative impacts on digital reading.

3.4 Constructing meaning across multiple texts: prior knowledge and learning

All of the studies in this special issue examined digital reading and learning from information texts. Many controlled for prior knowledge or beliefs, due to their established influence on comprehension and learning, and some also examined relations with independent measures of reading comprehension. As expected, knowledge and (paper-based) reading comprehension were associated with digital text comprehension of single and multiple texts, across studies. There was evidence that strong reading comprehension skills might compensate for weaker prior knowledge when evaluating the credibility of information (McGrath et al., 2025). Of particular interest is the paper by Lyu and McCrudden (2025) that examined the influence of different types of knowledge on undergraduates'

comprehension and learning. Students' topic-general and topic-specific prior knowledge were each assessed, as well as learning from a base text that introduced general principles of a topic (in this case natural selection), and the application of that knowledge to a second text that focused on a specific exemplar. Topic-general knowledge influenced comprehension of the base text, but the ability to apply this knowledge to new exemplars mediated the influence of topic-specific knowledge on learning from the second topic-specific text. This paper indicates the need for future research to consider the impact of different dimensions of knowledge (McCarthy & McNamara, 2021) on learning, and how to mitigate for individual differences in prior knowledge.

4. Digital reading: (how) does reader experience interact with task and text?

There is a well-established beneficial relationship between paper-based reading experience and reading comprehension. The general thesis is that reading experience is associated with better proficiency and knowledge, because reading affords opportunities to practice skills and access a greater variety of knowledge than everyday conversation (Cunningham & Stanovich, 1998). In contrast, a negative relationship between digital experience and digital comprehension and learning has been proposed, driven by findings such as the screen inferiority effect. The thesis shared across the variants of this proposal is that our digital experiences have a negative impact on skills critical for digital (and perhaps also paper-based) reading and learning.

According to the 'shallowing hypothesis', adults who engage in greater use of social media and texting are less likely to engage in regular reflective thought (Annisette & Lafreniere, 2017). When related to digital reading, this hypothesis translates to a relation between time spent using digital devices or on social media and poorer digital comprehension due to more shallow processing of digital text. The relation between

frequency of digital device use and digital reading comprehension was examined in Skovdahl et al.'s (2025) analysis of the Progress in International Reading Literacy Study (PIRLS) study. They found a negative association between 10-year-olds' digital reading comprehension and digital device use in school. Of note, the negative effects of digital device use were apparent only for students with poor print reading skills. Their findings broadly align with other analyses of PIRLS data that show a positive relation between moderate digital device use and habits and math performance, and a negative relation for students who made greater use of digital devices (OECD, 2024b).

A related view is that the superficial nature of our engagement with digital, such as online browsing and checking of social media posts and texting, might result in weaker sustained attention (Wolf, 2018) or greater distractibility or mind wandering (Delgado & Salmerón, 2021). On this topic, Troncosco-Ruiz et al. (2025) found only a negligible relationship between sustained attention and social media use. However, Romero et al. (2025) found that reader reports of multi-tasking were related to both paper and screen reading performance. The 'metacognitive deficit hypothesis' seeks to explain the screen inferiority effect in relation to less effective monitoring of performance when reading on screen relative to paper (Lauterman & Ackerman, 2014); readers are overconfident in their comprehension ability when reading from a screen and are therefore less accurate in regulating their learning for on screen tasks. Several papers in this issue found a relation between calibration skills and processing and learning from text (Norberg et al., 2025; Romero et al., 2025; Singer Trakhman et al., 2025).

Each proposal has some support through established associations between digital experience, cognitive, and text comprehension skills, including the papers in this special issue. But the underlying reasons for these relations and direction of causality is not known.

Take the example of the PIRLS data: the relation might have arisen because digital device use in schools was greatest for weaker students who were using educational apps for intensive instruction in phonics and basic skills or due to displacement, perhaps computer use (inadvertently) resulted in less opportunity for interactive and discursive text comprehension instruction (Skovdahl et al., 2025). Other pertinent causal questions that arise from papers in this special issue include: Does multitasking result in greater distractibility and, through that, poorer comprehension, or are those with weaker comprehension skill more likely to develop these habits and be more prone to distractibility (Romero et al., 2025)? What aspects of digital use might benefit skills important for (digital) text processing (Troncoso-Ruiz et al., 2025)? Understanding how environmental factors and experience shape the development and application of skills that support digital reading and learning will provide essential information about digital text comprehension, and how best to support it.

5. Conclusions: What do we know and where do we go from here?

The papers in this special issue demonstrate how the digital environment brings new challenges, but also opportunities, for reading and learning. Digital reading for learning presents new challenges due to ease of access to a volume of information. Our broader digital experience may also influence the quality of our learning and cognitive processing. And digital technologies afford new opportunities that we can and should exploit to enhance digital reading proficiency and learning. The model introduced in the introductory paper of this special issue outlined how reader, text, and task factors might interact to influence the cognitive processing of digital text, and their impact on comprehension and learning (Segers et al., 2025). Key themes that arise from the findings in this set of papers in relation to these interactions, and future research imperatives are reviewed below.

An increasing amount of our learning from multiple texts, whether for education or leisure-time pursuits, is facilitated by digital technologies. Papers in this special issue demonstrate that navigation and content evaluation skills are influenced by academic proficiency (Marten et al., 2025; McGrath et al., 2025; Naumann et al., 2025; Norberg et al., 2025; Svedholm-Häkkinen et al., 2025). Broader cognitive skills such as problem solving, cognitive flexibility, and analytical thinking make an additional impact (Naumann et al., 2025; Norberg et al., 2025; Svedholm-Häkkinen et al., 2025). These findings highlight a future work need to examine how to support these aspects of digital reading and learning to mitigate the potential for Matthew effects on skill and knowledge development (Stanovich, 1986). Papers here highlighted the critical role of cognitive factors in learning from multiple text. In addition, Marten et al. (2025) demonstrated the promise of training in epistemic strategies to enhance adolescents' ability to evaluate online information. Future studies should build on this (and other work, see, for example List & Alexander, 2017) to determine how epistemic beliefs, and other reader characteristics such as motivation and affective disposition, influence digital reading (see introduction for discussion of this point).

We must be mindful of our broader digital experiences. The papers in this special issue examined digital reading in readers from 10 years through to adults. Probably none of the participants in these studies could truly be called a 'digital reading native'; digital shared reading with preschoolers is still not the norm, although many will have used digital devices for games and movies from a young age. An important point, noted by Norberg et al. (2025), is that the digital ecology is evolving at pace. This may have positive, as well as negative, consequences. For example, since the data were collected for the navigation studies, internet users are now presented with Al generated summaries above search results that have the potential to influence navigation behaviours. These summaries might aid students

with weaker knowledge and learning skills, but instruction must include raising awareness of potential bias and how to critically evaluate (or even ignore!) them.

It is critical that future research examines reader, text, and task interactions in relation to the diverse and broad experience of participants. For example, digital environments are viewed as less cognitively challenging by younger readers (Ronconi et al., 2025), something that might be harnessed to encourage classroom learning. But we need to understand when and why frequency of classroom computer use is associated with poorer performance (Skovdahl et al., 2025). Such research will provide the knowledge to determine how to design digital interfaces to support those with skill or knowledge weaknesses. Digital scaffolds have the potential to provide critical knowledge, minimize distraction and focus attention. Papers in this issue showed how each contributes to quality of learning (Lyu & McCrudden, 2025; Romero et al., 2025; Troncoso-Ruiz et al., 2025), but did not address critical design issues. Key questions include how can we best equip users with the resources to manage distraction and does the impact of distraction or type of support differ for neurotypical and neurodiverse populations? A useful tool in such studies will be log-files, or process data, which can provide a more fine-grained understanding of how individual differences influence text processing and learning (Ma et al., 2024; Teig et al., 2024). Two papers demonstrated insights from the analysis of text-processing behaviours (Naumann et al., 2025; Singer Trakhman et al., 2025). Future work could leverage process data of studentcomputer interactions to further elucidate interactions between reader, text, and task.

Finally, the papers in this special issue were broadly correlational, examining associations between reader, text, and task variables at a single-point in time or the short-term impact of instruction. To elucidate any causal mechanisms between individual differences and digital texts and tasks we must conduct observational longitudinal and

controlled intervention studies that take into account the frequency, type, and quality of participants' exposure to digital at home, in education, and/or in work, and how these interact with the individual differences shown here (and elsewhere) to influence digital reading across a range of text types and tasks. This research will be critical for elucidating the mechanisms that result in positive and negative associations with digital learning. It will provide valuable information to understand better human information processing, in general. Specifically for digital reading, this knowledge is sorely needed to inform policy decisions about digital access and also to develop appropriate support for digital learning.

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