



Norwegian Reading Centre

National Centre for Reading
Education and Research

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PERSPECTIVES ON READING IN A DIGITIZED WORLD

Dimensionen des Lesens

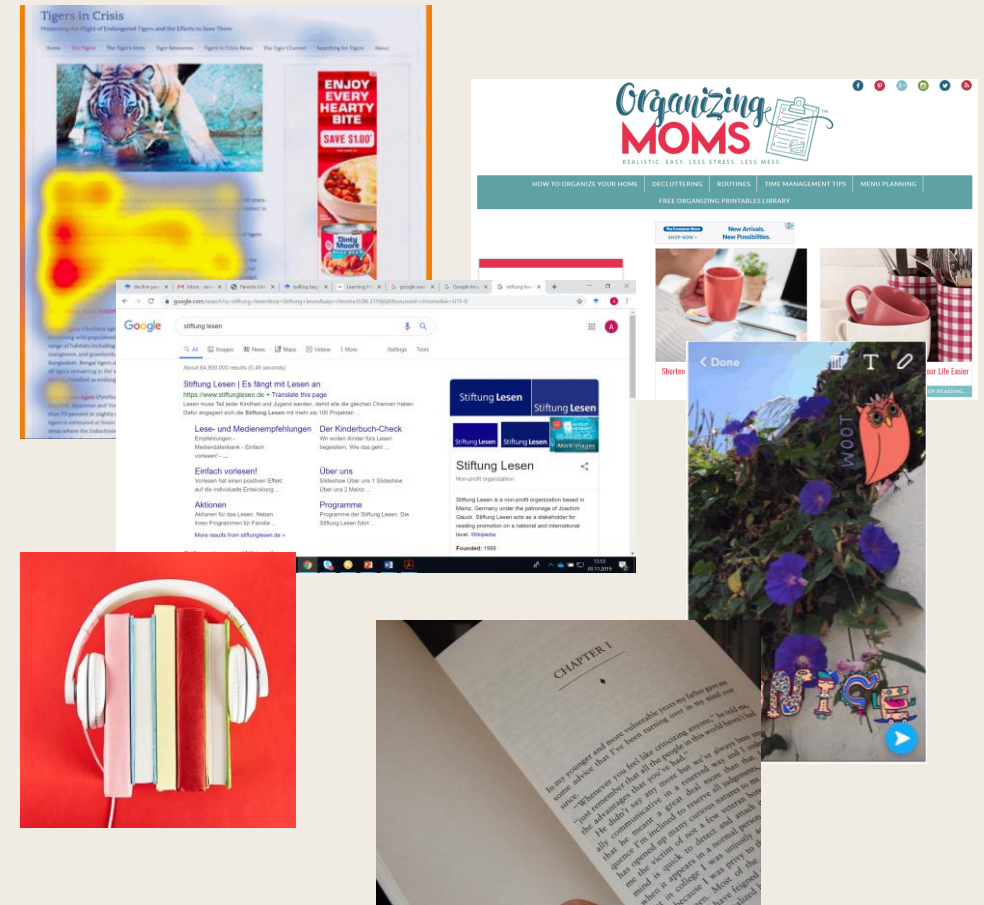
Hannover, 6.11. 2019

Agenda

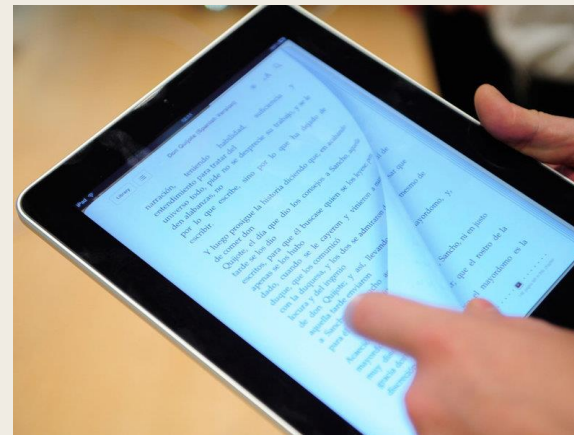
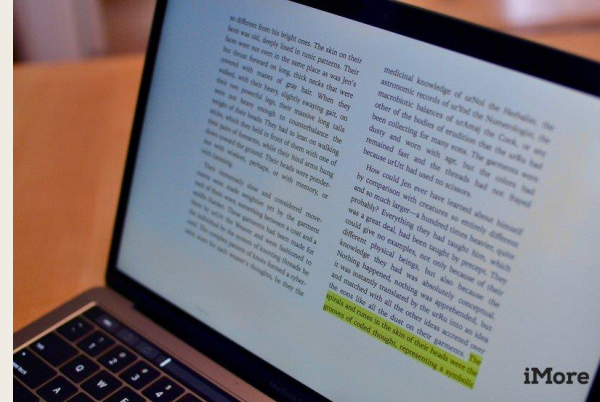
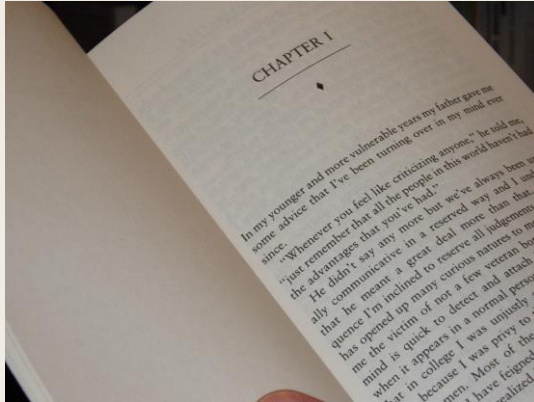
- Reading and digitisation – what do we know?
 - Continuous reading of linear text – the role of medium for reading comprehension
 - Meta-analyses and single studies
- Contemplating reading now and in the future
 - The role of long-form reading
 - Reading redefined?

Reading and digitisation

- An extremely multi-faceted area of research...
 - From “digital reading” – hypertexts, hypermedia, interactivity; internet navigation and search skills, etc. in which texts may be one part
 - - to the reading of single texts on the substrate of paper vs the substrate of screens (computers, laptops, tablets, e-readers, smart phones...)



Continuous reading of linear text – on paper and on various screens



Comprehension of linear texts on paper and on screens

■ Three recent meta-analyses

Journal of Research in Reading UKLA
The United Kingdom Literacy Association
Journal of Research in Reading, ISSN 0141-0423
Volume 42, Issue 2, 2019, pp 288–325 DOI:10.1111/1467-9817.12269

Reading from paper compared to screens: A systematic review and meta-analysis

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Background: Given the increasing popularity of reading from screens, it is not surprising that numerous studies have been conducted comparing reading from paper and electronic sources. The purpose of this systematic review and meta-analysis is to **consolidate the findings on reading performance, reading times and calibration of performance (metacognition) between reading text from paper compared to screens.**

Methods: A systematic literature search of reports of studies comparing reading from paper and screens was conducted in seven databases. Additional studies were identified by contacting researchers who have published on the topic, by a backwards search of the references of found reports and by a snowball search of reports citing what was initially found. Only studies that were experiments with random assignment and with participants who had fundamental reading skills and disseminated between 2008 and 2018 were included. Twenty-nine reports with 33 identified studies met inclusion criteria.

Educational Research Review 25 (2018) 23–38

Contents lists available at ScienceDirect

Educational Research Review

journal homepage: www.elsevier.com/locate/edurev

Don't throw away your printed books: A meta-analysis on the effects of reading media on reading comprehension

Ilencia, Spain

Computers & Education 123 (2018) 138–149

Contents lists available at ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Comparison of reading performance on screen and on paper: A meta-analysis

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ABSTRACT

This meta-analysis looked at 17 studies which focused on the comparison of reading on screen and reading on paper in terms of reading comprehension and reading speed. The robust variance estimation (RVE)-based meta-analysis models were employed, followed by four different RVE meta-regression models to examine the potential effects of some of the covariates (moderators) on the mean differences in comprehension and reading speed between reading on screen and reading on paper. The RVE meta-analysis showed that reading on paper was better than reading on screen in terms of reading comprehension, and there were no significant differences between

Delgado et al. (2018)

- 54 experiments
- 76 comparisons between paper-based and screen-based reading comprehension (of single text reading, no hyperlinks or interactivity)
- Both between- and within-subjects designs
- > 170 000 participants
- 19 countries
- Publication year 2000 - 2017

Description of the studies

- Text length:
 - (a) short (less than 1,000 words) - (b) long (1,000 words or more)
- Reading time allowed for reading:
 - (a) free (self-paced by participants)
 - (b) constrained (set by experimental instructions)
- Type of digital device:
 - (a) computer (desktop or laptop)
 - (b) hand-held (tablet, e-reader or smartphone)
- Text genre:
 - (a) informational (non-fiction: textbooks, newspapers, science magazines)
 - (b) narrative (fiction stories: novels, short fiction stories)
 - (c) mix (when both genre categories were used in the same task)

Findings

- Significant overall reading medium effect indicating better reading outcomes for paper-based reading (effect size Hedge's $g = -.21$, $dc = -.21$.)
- The advantage for print is larger under time constraints than under self-paced reading
- Scrolling results in a significant digital disadvantage
- The advantage of paper *increased* over the years since 2000 (as seen in the effect sizes in the studies, in light of their publication year)

Conclusions

- “Digital natives” do not get better at reading on screens
- Digital environments seem less conducive to fostering deep comprehension
- Paper-based reading yields a larger advantage in situations demanding increased mental effort
 - Reading under time pressure
 - Reading more complex informational texts

Delgado et al., 2018

WHY?

- The *Shallowing* Hypothesis
 - The more we read on screen, the more skimming, scanning
- The *Metacognitive Deficit* Hypothesis
 - We are less in touch with our reading on screen
 - We tend to overestimate our comprehension on screen

Children's metacognition on paper and screen

- A recent study (Halamish & Elbaz, 2019) assessed the comprehension and metacomprehension of fifth grade children (N = 38)
- Reading time was the same, but comprehension was better on paper than on screen
- Children's metacomprehension judgments were insensitive to the effect of medium
- Children are unaware of the detrimental effect that screen reading has on their comprehension, and they are likely to make ineffective medium choices for their reading tasks

Long-form reading in print and on Kindle – an experiment

Reading a longer narrative text in print vs on a Kindle

- E-ink display technology:
 - developed for sustained (e.g., novels)
 - shown to be as good (Benedetto et al., 2013) or better (Siegenthaler et al., 2012) than paper for perceptibility, legibility and visual discrimination
- Reading a long (28 pages) text, in a real book vs as a real e-book



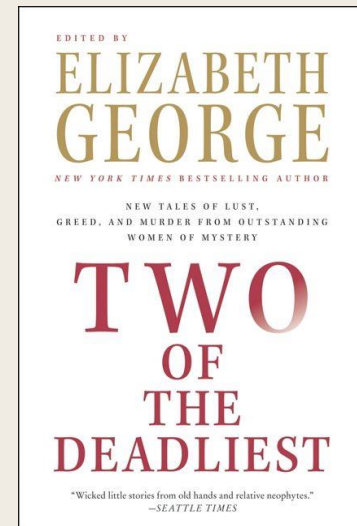
Collaborators: J.-L. Velay (CNRS/Aix-Marseille Univ.) & G. Olivier (Nice-Sophia Antipolis Univ.)

Research questions

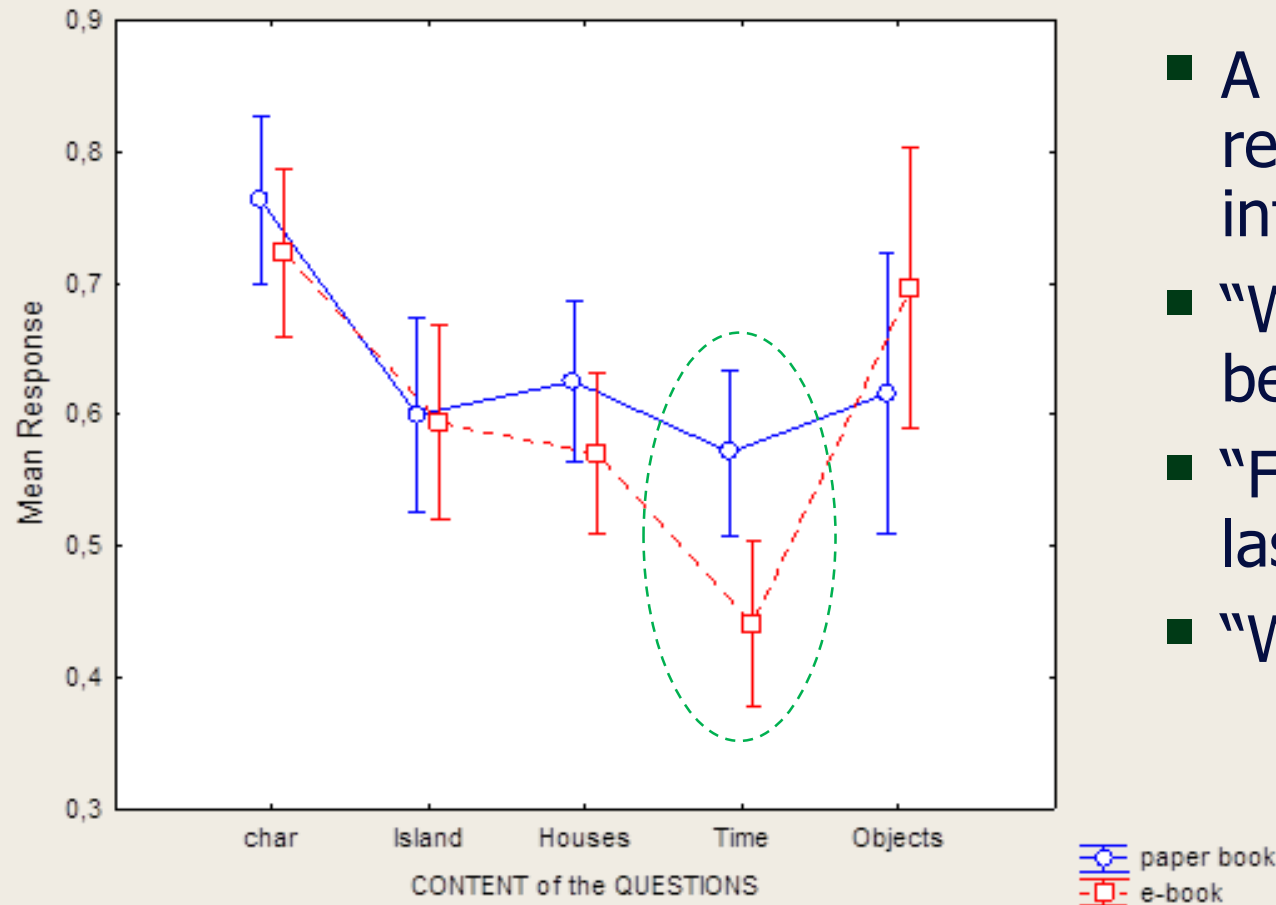
- Do haptic/tactile affordances of a Kindle affect readers'
 - immersion and emotional engagement
 - short-term factual recall
 - aspects of comprehension
 - ability to place events in correct text segments/parts ("where-in-the-text")
 - ability to reconstruct the plot



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- Participants (n = 50) read "Jenny Mon Amour" (from *Two of the Deadliest* [2009]) in print or on a Kindle
 - The text was 28 pages long



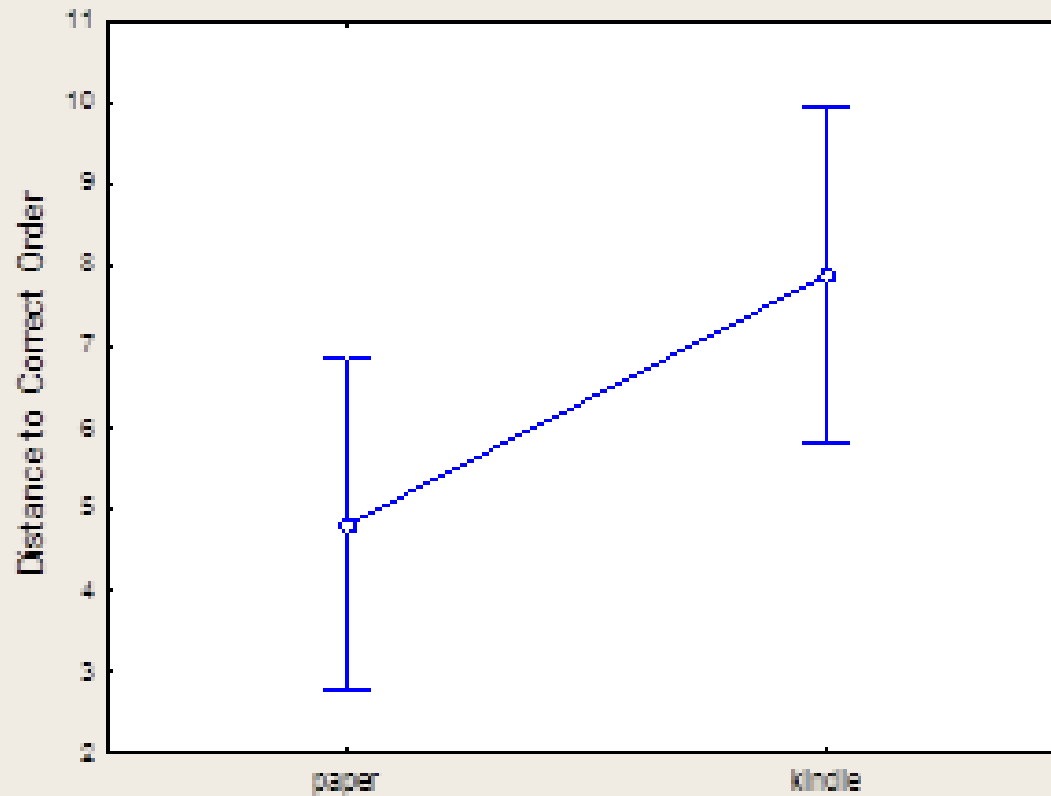
Time and temporality between events



- A significant 'category of response' by 'group' interaction
- "What is the time lapse between event X and Y?"
- "For how long did [event] last?"
- "When did [event] occur?"

Plot reconstruction task

- 14 key events to be sorted in the correct order



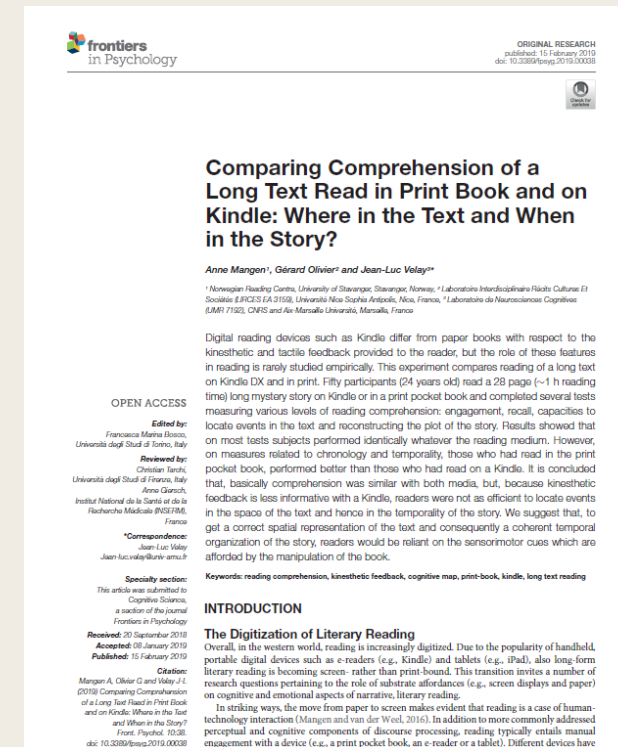
Mean distance from correct order

- paper: 4.8
- Kindle: 7.9

Correlation between 'where in the text' results and plot reconstruction performance

Conclusions, Kindle experiment

- On measures related to *chronology and temporality*, print readers performed better:
 - Better recall of temporal relations between events
 - More correct reconstruction of the plot
- Sensorimotor assessment of the substrate seems to be related to aspects of cognitive processing



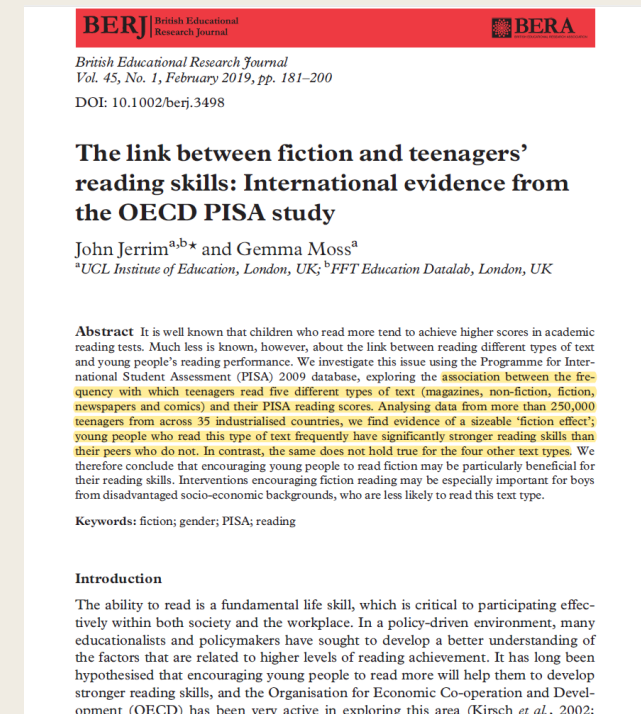
Mangen, Olivier & Velay, 2019

Some issues to ponder ...

The importance of *fiction book* reading

- “The fiction effect”:
 - Time spent *reading fiction books* is associated with higher PISA reading scores
 - Association only for fiction book reading, not for non-fiction books, magazines, news, or comics
 - Found across almost all OECD countries (> 295 000 teenagers)

Jerrim & Moss, 2019



A longitudinal study from Finland

- «Leisure reading (but not any kind) and reading comprehension support each other – a longitudinal study across grades 1 and 9»
- Studied >2500 children from age 7 to 16, focusing on their development of reading skills (fluency and comprehension) and frequency of reading various types of texts (magazines, news, fiction books and digital reading)
- “Digital reading” = social media, blogs, web pages, wikis etc. (i.e., typically *shorter* texts, read for socializing)

Torppa et al., 2019

Torppa et al. (2019) findings

- Those who were most frequent readers of *fiction books*, had better reading comprehension
- There was a negative association between reading digital texts, and reading skills



Reading is *increasingly diverse*



Consider medium (incl paper) in light of

- The *content*
 - Short or lengthy? Simple or complex? Verbal text or multimodal?
- The *purpose*
 - Gist or deep comprehension? Skim for main points or scrutinize for analysis/critical reflection? Study or leisure?
- The *context*
 - Intermittent or sustained reading? Time constraints?
- The *reader*
 - Novice or expert? Reluctant or motivated?

Important questions concerning the future of reading

- What are the perceptual and cognitive mechanisms behind the screen disadvantage when reading linear texts?
- To what extent are current findings of screen inferiority related to experience & expertise (with medium, and with reading)?
- How to facilitate deep engagement with (complex; long) texts on screens?
- How to motivate children and adolescents to (continue to) read long(er), fictional texts – in whatever medium?



COST E-READ Stavanger Declaration
Concerning the Future of Reading



We live in an era of ever more swift and pervasive digitisation. Digital technologies offer tremendous opportunities with respect to the production, access, storage and transmission of information, at the same time as they challenge a number of long-established reading practices. Over the last four years a group of almost 200 scholars and scientists of reading, publishing, and literacy from across Europe, have been researching the impact of digitisation on reading practices.

Paper and screens each afford their own types of processing. In today's hybrid reading environment of paper and screens, we will need to find the best ways to utilize the advantages of both paper and digital technologies across age groups and purposes.

Research shows that paper remains the preferred reading medium for longer single texts, especially when reading for deeper comprehension and retention, and that paper best supports long-form reading of informational texts. Reading long-form texts is invaluable for a number of cognitive achievements, such as concentration, vocabulary building and memory. Thus, it is important that we preserve and foster long-form reading as one of a number of reading modes. In addition, as screen use continues to grow, it will be one of the urgent challenges to discover ways in which to facilitate deep reading of long-form texts in a screen environment.

Key findings:

- Individual differences in skills, abilities, and predispositions form distinct learning profiles that affect children's ability to use and learn from digital versus print sources;
- Digital text offers excellent opportunities to tailor text presentation to an individual's preferences and needs. Benefits for comprehension and motivation have been demonstrated where the digital reading environment was carefully designed with the reader in mind;

<http://ereadcost.eu/stavanger-declaration/>



E-READ Stavanger Declaration on the Future of Reading



KEY FINDINGS

- Individual differences in skills, abilities, and predispositions form distinct learning profiles that affect children's ability to use and learn from digital vs print sources;
- Readers are more likely to be *overconfident* about their comprehension when reading digitally than when reading print;
- Screen inferiority effects have *increased* rather than decreased over time, regardless of age group and of prior experience with digital environments;
- Our *embodied cognition* may contribute to differences between reading on paper and on screens;



E-READ Stavanger Declaration on the Future of Reading



RECOMMENDATIONS

- Students should be taught strategies to master *deep reading* on digital devices. Schools and school libraries must continue to motivate students to read paper books, and to set time apart for it in the curriculum;
- Replacing paper with digital technologies in primary education is *not neutral*. Unless accompanied by carefully developed digital learning tools and strategies, they may cause a *setback* in the development of children's reading comprehension and emerging critical thinking skills;
- Educators, reading experts, psychologists, and technologists should partner to develop digital tools that incorporate insights from research about the processing of digital and printed formats for reading practices

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**Thank you for
your attention**

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