

The Evolution of Reading in the Age of Digitisation: An Integrative Framework for Reading Research

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Abstract

The spectrum of substrates for textual reading is being broadened as a result of digitisation to include a variety of screen-based technologies and reading devices, such as e-readers (e.g. kindle) and tablets (e.g. iPad). These technologies differ significantly from paper in terms of their capabilities. Given that textual reading is both likely to remain important as a cultural practice and is undergoing massive change as digital screens supplement paper – with the potential to replace it as the dominant substrate – there is an urgent need to investigate the effects of this change on the reading of various types of texts for various purposes. The necessity for an integrated, transdisciplinary paradigm of embodied, textual reading that takes into consideration its psychological, ergonomic, technical, social, cultural, and evolutionary components is discussed in this essay. The suggested model aims to be somewhat explanatory in the sense that it connects and integrates the available data. It is also partially exploratory in the sense that it highlights knowledge gaps that require further research. As a result, the model will be utilized to direct the planning of future research as well as to increase the compatibility and applicability of research.

Keywords: Texts, literacies, digitisation and (deep) reading.

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1. INTRODUCTION

The idea that reading and literacy in education and learning are being revolutionized by digital technologies has lost all credibility. Reading's natural place among modalities and media has changed as a result of digitization. Multimodal, dynamic, and interactive representations are now used to augment the static, linear nature of textual content (including the book). A surge in interest in reading and literacy studies has been sparked by significant changes in reading habits over the past few decades. This interest spans numerous philosophical schools as well as cutting-edge theoretical and methodological ideas. If there is any written language in digital representations, it plays a variety of meaning-making roles.

'Traditional' print-based notions seem inadequate when it comes to investigating emergent literacy practices like the use of Flickr, blogs, and Twitter. Text, reading, and literacy have all undergone significant definitional changes as a result of changes in

the media landscape. According to paradigms like New Literacies Studies, text is "a multimodal intentional representation with objectives and bounds recognized within a specific sociocultural domain." (O'Brien and Scharber, 2008, P. 66) Because of this, the concept of literacy is reconsidered and examined as a multiple construct.

The New London Group describes literacy as having many facets (Cope and Kalantzis, 2000). The following is a great definition of digital literacy: In their article, the authors define digital literacies as "socially situated behaviors supported by abilities, tactics, and positions that enable the representation and interpretation of ideas using a variety of modalities offered by digital instruments." O'Brien and Scharber (2008: 67).

These theoretical frameworks and schools of literacy research tackle significant digital issues, namely how readers interpret multimodal representations (e.g. Jewitt, 2006; Jewitt *et al.*, 2009). In

comparison to reading print, what (new) literacy skills are necessary for successful online navigation (e.g., Coiro, 2003; Coiro and Dobler, 2007; Coiro and Dobler, 2014)? In order to bridge the gap between so-called "schooled" and frequently print-based literacy practices and the more popular and frequently digital "out-of-school" literacy practices (for a study of this potential tension, see here), educators and literacy researchers must understand the expectations, needs, and expertise of digital natives or dissonance (see Dowdall, 2006, for example)?

These and other new paradigms for reading and literacy research have been a necessary and welcome response to the transformative nature of recent technological advancements. On the other hand, the variety of opinions and positions poses a threat to obscure the immense potential for communication and collaboration across disciplines and paradigms. As Barton (2001) notes, literacy - and New Literacy - studies are already well-established as a potent research paradigm. Through literacy research initiatives, we have gained insights into the potential uses of digital technology in a variety of literacy practices as well as insights into the complex relationships between peers engaged in meaning production from different media and modalities. However welcome this addition to the more limited scope of more traditional reading and literacy studies is, the effects of digitisation on the process of encoding and decoding meaning from verbal, written text—that is, 'text' narrowly defined—remain largely unaddressed. This is due to the descriptive ethnographic bent of the sociocultural approach.

In order to fill in these and related gaps, maximize the potential for interdisciplinarity, and take into account the diachronic effects of digitisation on reading, this article makes an attempt to propose an integrated paradigm for reading research. This framework suggests that to improve current research paradigms across substrates and their affordances, an empirical theoretical-methodological approach should be used. By defining reading and literacy as (i) human-technology interaction and (ii) embodied processes, the paradigm aims to promote multidisciplinary, empirical research into elements and dimensions of reading, some of which have been largely ignored. It provides a closer examination of the connections between ergonomics (sensorimotor, haptic/tactile feedback), attention, perception, cognitive and emotional processing at different levels, as well as the subjective experience characteristics of reading different types of texts for various purposes. Such cross-validated measurements of the effects of digitization will be made possible by such multidisciplinary empirical research, particularly in educational settings where reading is still a significant component.

1.2 Textual Reading's Shifting Nature and Conditions

Recent decades have seen significant changes to reading in the narrow sense, or reading linear, written texts. Today, reading is increasingly done on digital screen technologies like computers, smart phones, tablets (like the iPad), and e-readers. Digitization is having an impact on reading and literacy activities in preschools, kindergartens, elementary schools, and higher education as screens replace paper as the primary reading medium. Rethinking a number of empirical concerns is necessary in light of the current shift from paper to screen substrates, including the following:

What sets (textual) reading apart from the processing of other modalities, such as (still or moving) visuals or spoken words, in multimodal texts? Is there a relationship between the substrate (paper and screens) and cognitive outcomes like memory and comprehension? Is there a difference in our reading experience depending on the genre (a novel or a poetry, for example) or the medium (print or a Kindle screen)? How does literacy evolve when the reading medium changes, for example, from knowing how to traverse paper-based texts to knowing how to manage the ever-changing hardware and software configurations needed in screen-based reading? How does the growing digital infrastructure change the social position of books and other texts and that of reading in general?

There is currently a great deal of concern about the speed and transformativity of changes in reading practice associated with the switch from paper to digital substrates, especially given the significant implications for education, and results from empirical research are, thus far, inconsistent. New reading practices have proliferated in recent decades. This modification has sparked heated discussions about the alleged general decline in reading and literacy abilities, which may have been exacerbated or caused by digitisation. The argument is not so much that people are reading less (in fact, it's likely that the opposite is true), but rather that they are reading in such radically new ways. After centuries of book culture, we have developed deep reading habits that we now take for granted (Van der Weel, 2011). However, shallower reading habits are now taking their place (see also Baron, 2015; Carr, 2010).

One outcome that has already been seen is a shift in both individual and societal attitudes toward reading (and writing). For leisure reading, screens are replacing books (as well as for entertainment at large) 1; it is claimed occasionally that digital learning environments should take the role of textbooks in education, even to the point where entire iPad schools

have been established in various countries, thanks to the ubiquity of keyboards, children do not need to learn how to write by hand anymore (Francis, 2008); and parents' examples increasingly display screen-based behavior both at home and in public (including the mediatization of much of their social life).

Children are consequently less socialized than they once were in a book-based reading culture. The competition for the consumer's attention, which encompasses the complete spectrum of modalities converging on the screen, may make this situation worse. Textual reading may be perceived as being inherently less immersive and needing a more deliberate effort to focus than gaming, listening, or viewing in this rivalry. Even though this type of competition is nothing new in and of itself, the fact that it takes place on a single playing field—the digital screen—gives this perception new significance. Reading research on vocal texts assumes a new urgency in these situations. First of all, little is known about how the current digital advances will affect society. There are empirical studies (particularly in cognitive and educational psychology and cognitive neuroscience), but it is challenging to compare and synthesize results due to differences in the textual material, instruments, measures, and definitions of key constructs. Finding out what is changing in reading practice is not just not very difficult, but also not very difficult to prove that changes are occurring. The adoption of digital technology may have caused these changes, but it is less clear if and how they are causally related. More importantly, it is unclear what the longer-term sociocultural and cognitive effects of the changes in reading practice may be.

Meanwhile, the advent of the digital age has raised awareness of the nature and importance of textuality as well as the degree to which human communication has been mediatized in general. Textuality has so far continued to take center stage in the mix of modalities, especially in an educational setting. Although the form of our reading habits is changing, textual reading will likely continue to be a significant cultural activity for the foreseeable future.

Text stands apart from many other forms of communication thanks to several peculiar advantages. For instance, language, both spoken and written, enables communication among various mental faculties; it could be referred to as the lingua franca of modalities. Reading and writing are still essential for both formal education in schools and the informal and practical sharing of knowledge. They are also essential for self-expression. But reading continues to be a valuable amusement tool. The ability to linguistically objectify language through writing and reading may be the most important benefit. Any changes brought about by the digitization of reading are likely to have significant

cognitive, cultural, and social repercussions given the significance of reading in the cultural evolution of human civilization.

At the same time, it's possible that the cultural and social importance of reading has never received enough attention. We reached the pinnacle of our reading culture around the start of the 20th century, when nearly universal literacy was attained in the West (Vincent, 1993), and literacy became the standard for successful social involvement. Following this, it has really tended to be assumed that modern human civilization is textual. Reading has certainly been recognized as being significant in that it enables participation in a literate society.

However, there is no doubt that the significance of reading to the makeup of modern society needs to be revisited. This calls for a deeper comprehension of what reading is and does, as well as the cognitive and emotional effects it has on each reader. It also calls for an understanding of how reading and changes in reading habits affect society as a whole. One sign that we have not been sufficiently aware of major changes as they have occurred is the fact that a comprehension of the significance of long-form reading is only now becoming apparent as it is no longer self-evidently the norm.

1.3 The Need for Transdisciplinary, Integrated Framework

Reading research has recently received more attention, largely because of digitalization. To start, reading is studied from a variety of practical and disciplinary angles, such as reading as a historical practice (Cavallo and Chartier, 1999; Piper, 2012), reading as a sociocultural practice (Barton *et al.*, 2000; Street, 2005), reading as a phenomenological experience (Heap, 1977; Rose, 2011; Rowsell, 2014), reading as a cognitive process (Duffy and Israel, 2009; Kintsch, 1998; Tapiero (Dehaene, 2009; Wolf, 2007). Additionally, more studies are comparing textual reading in print and on screens, focusing on things like how display technologies affect visual ergonomics (Benedetto *et al.*, 2013; Siegenthaler *et al.*, 2011; Siegenthaler *et al.*, 2012), how the interface affects (meta)cognitive, (Ackerman and Goldsmith, 2011; Ackerman and Lauterman, 2012; Kretzschmar *et al.*, 2013; Mangen). Therefore, reading research is by its very nature multidisciplinary. The extensive multidisciplinary has, however, also had the unavoidable consequence of not promoting the best possible coherence.

There hasn't been a lot of cross-disciplinary communication and collaboration. Scientists conducting experiment-based research, such as psychology and neuroscience, tend to avoid primarily qualitative research domains, such as media/reading history,

pedagogy, literary studies, and sociology. Reading research in domains like cognitive and perceptual psychology continues to map the psychological landscape despite calls for more interdisciplinary research and multi-method approaches (particularly bridging the humanities - natural sciences divide). The majority of research in literacy studies today downplays lower-level psychological aspects of reading and literacy in favor of concentrating primarily on sociocultural aspects of these skills. Rarely are sociological and psychological (or neuroscientific) components of reading discussed together.

The current digitization heightens the importance of encouraging better coordination amongst research initiatives. The shift from reading on paper to reading on screens may make it possible to transform a dispersed multidisciplinary field where disciplinary and sub-disciplinary paradigms coexist into a truly transdisciplinary field where theoretical perspectives and models from various disciplines are applied, bottom-up, to shared research questions (Streng, 2009; Samuels, 2009). This perceived need for a more cogent approach to reading research inspired the creation of the E-READ (Evolution of Reading in the Age of Digitization) initiative, which was co-chaired and co-chaired by the authors of the current article and received a COST 2 network subsidy in 2014. E-READ's primary goal is to create vital synergies between actors, sectors, and stakeholders outside of academia and the fields of reading science and scholarship. A cutting-edge, transdisciplinary reading strategy that spans the scientific sciences, social sciences, arts, and humanities will make it possible to map the effects of digitisation from the bottom up using multimethod empirical research. We ensure that research projects are informed by both their requirements and their expertise by including educational practitioners (teachers and educators) as stakeholders in scientific growth.

Practitioners continuously contribute to the research agenda by identifying knowledge gaps in their field. For instance, urgent questions like whether it matters if students read different types of content in print or on computers or whether reading children's stories in print picture books or as iPad apps affects the engagement of young readers (Flewitt *et al.*, 2014; Kucirkova, 2014; Kucirkova) are examples of urgent questions. As the brains behind E-READ, we promote a more cogent approach to research and as such, suggest the necessity for a transdisciplinary reading paradigm. This model would act as a standard point of reference for both analyzing previously conducted research and beginning new study. It is designed to serve as an all-encompassing integrative framework that can include existing models that already successfully capture particular aspects of reading, rather than to replace existing models.

The framework must be culturally and technologically agnostic in that it should be able to account for various sociocultural contexts and technical advancements both synchronically and diachronically. Therefore, the framework can simultaneously abstract from and account for technological and cultural factors when posing the question of what reading essentially is.

Reading is a culturally and historically variable activity. The development of our current level of text literacy has taken many years. In other words, reading's social relevance depends on a person's culture. In fact, the advancements in digital technology are once again highlighting its cyclical character. Although deep reading has come to be seen as the implicit standard that education should strive for, it is becoming more and more obvious that this is not a natural, inherent standard: "My concern," says Baron, "is that fewer and fewer people are seeing deep reading and rereading, uninterrupted reading, and tackling longer texts as part of what it means to read." (Baron, 2015: 230–231).

To better comprehend the significance of the shift from paper to screen and the importance of reading in contemporary society, we need to understand how such norms develop. Even though reading is an ever-evolving, historically and culturally contingent activity, it's possible that some aspects of the reading style we have developed—which could be in danger of being lost in reading's further evolution—are valued.

The proposed framework, which is given out below, is meant to serve as an integrative conceptual starting point for empirical study on the digitalisation of text reading. As a result, it ought to make it possible to create transdisciplinary paradigms that allow for the testing of hypotheses and the evaluation of the impacts of digitization on text reading. The framework would need to facilitate empirical research combining experimental paradigms from, for example, psychology and neuroscience with historically and socioculturally oriented approaches, which are currently more common in literacy studies. It was developed from the bottom up to view reading as a human-technology interaction. The framework should be flexible, allowing for iterative improvements based on empirical data.

Importantly, the framework is based on two theoretical presuppositions in addition to the understanding that reading is an essential sociocultural (and thus historically contingent) practice: Reading is interaction with technology or a device that has specific interface affordances because (a) cognition, including reading, is embodied and involves physical interaction with a device, particularly manual or haptic interaction. These presumptions give the framework's levels and dimension a theoretical foundation and serve as its lowest common denominator.

This guarantees a level of internally consistent and coherent epistemology based on empirically testable hypotheses and, in turn, makes it possible for coherent and cumulative scientific development based on research findings from empirical studies. The suggested framework ought to direct interdisciplinary empirical study in that direction and aid in the creation and continuous improvement of a variety of indicators to gauge the impact of digitization on reading. Thus, it aims to encourage and facilitate longitudinal and experimental research that allows for stronger causal inference, as well as correlational studies.

Reading is Human–Technology Interaction

By highlighting the technological basis of written language, historians like Goody and Watt (1963), Havelock (1981, 1986), and Ong (1982) have done us all a favor. The material and technological characteristics of the device or technology delivering or displaying the text are consequently included in the current conceptualization of "what we read," in addition to the text itself. Because different technologies are "materially configured in profoundly different ways," according to Haas (1996), the transition to new interfaces when new technologies emerge and start to replace older ones may make us aware of the specifics of the old ones. Screens differ from print on paper in terms of their inherent qualities and possibilities.

The transition from paper-based to screen-based reading involves, among other things, new multimodal capabilities, a loss of fixity and material integrity, and the substitution of various screen interfaces' ergonomic, audiovisual, and sensorimotor affordances for those of paper. Empirical questions are posed and taken into consideration by the current framework regarding how and to what extent such changes may affect reading (both for study and leisure).

1.4 Reading is Embodied

Reading is frequently seen as an act of consciousness, and McLaughlin notes in the aptly named book *Reading and the Body* that "literary theory has tacitly framed the act of reading within a simple body/mind dualism, ignoring the eyes and hands, the postures and habits of reading, and denying any connection between the transcendent life of the reading mind and the immanent life of the body." (2015) (McLaughlin, p. 1) Literacy academics have recognised the role of the body in literacy practices, in contrast to literary scholars who, with a few notable exceptions³, may have mainly neglected the embodied element of reading. Reading practices are "vernacular, networked, and embodied," according to the editors of the *Routledge Handbook of Literacy Studies* in their introduction (Rowse and Pahl, 2015a). Kress has called for increased awareness of the bodily nature of meaning making:

The material qualities of modes, their development over time in a society, and their subsequent interaction with the sensoriness, the sensuality, of our bodies are all inextricably linked to the forms of imagination. The long-standing division between the mind and body in Western thought is severely challenged when a concern with materiality and the senses is incorporated into representation. This in turn challenges the reification and subsequent separation of cognition, affect, and emotion (Kress, 2003; emphasis added, p. 171).

The extra emphasis is meant to emphasize how important it is to collaborate with psychologists and neuroscientists who are researching the close connections between human sensory modalities and the physical environment. Reading on screens instead of paper reveals the body's role in reading and literacy as a common research interest.

CONCLUSION

The transition from paper-based reading devices to screen-based ones creates a pressing need as well as an incredible opportunity to rethink reading from the ground up, taking into account the full spectrum of complexity in texts, substrates, technology, reading processes, and results. The implications of this rethinking for teachers and teacher educators are substantial. The integrative framework has a significant influence on their input, which takes the form of knowledge gaps and fresh research questions brought on by technological developments.

Research findings are made available to a variety of end users, including educational practitioners, as e- scientific READ develops thanks to ongoing reciprocal dialogue with all stakeholders. A radical form of transdisciplinarity is required due to the wide range of disciplinary contributions that are required, and this calls for increased theoretical-methodological cooperation between scientists conducting experiment-based research and academics from the arts and humanities in particular. It is advisable to use the multidimensional reading strategy given here. Encourage such interdisciplinary cooperation. Last but not least, we hope that the framework will encourage understanding of the value of reading as an activity that, to date, has remained exclusively human and has been more deeply ingrained in our culture than we typically recognize.

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