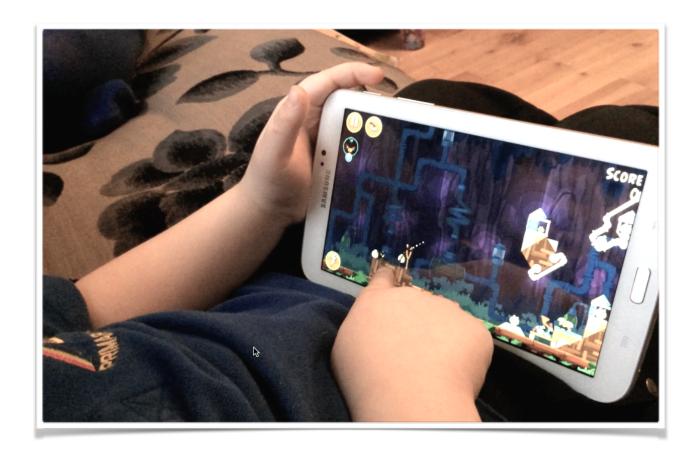# The Digital Literacy and Multimodal Practices of Young Children: Engaging with Emergent Research

Proceedings of the first Training School of COST Action IS1410, University of Minho, Braga, Portugal, 6th - 8th June, 2016

Edited by Íris Pereira, Altina Ramos and Jackie Marsh

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NOTA EDITORIAL/EDITORIAL NOTE
Este ebook resulta da 1.ª *Training School* da Ação COST IS1410 - *The Digital Literacy and Multimodal*

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Contents

Reading to learn on screens. Challenges for research[1]

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Abstract

Reading on screen is the subject matter at issue, focusing on online reading to build knowledge and learn. I begin by defining core features of digital reading, taking the essential characteristics of reading on paper as a reference point. I identify and discuss some of the potentialities and requirements established by digital reading at the meaning-making process level. Eventually, I examine the most relevant research questions that emerge from the discussion for DigiLitEY.

Key words: reading on screen, meaning making, multimodality, interconnectivity, interactivity

Introduction

Reading on screens is one of the objects of study established by the DigiLitEY project, aiming to research into literacy practices of young children (Sefton-Green, Marsh, Erstad & Flewitt, 2016). Digital reading carried out by these children unambiguously comes up as the result of a complex surge of social and technological developments which define the modern communicative context (Kress, 2010). The necessity to understand this facet of contemporary life, as assumed in DigiLitEY, is due, in the first instance, to the creation and sociocultural value of new means of communication and of dissemination of information. Knowing and examining young children's digital reading becomes an imperative to better promote the development of a required cultural competence for the future of these children.

At first glance, reading on screens is an easy and engaging activity (also) for small children. In fact, observing how children, literate or not, make sense of digital texts available on computers, tablets or mobile phones, makes one realize the ease of engagement and pleasure taken by youthful readers. Reading on screens seems, to that extent, to have advantages over reading

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'on paper', which is developed relatively late, and then often difficult and painful, particularly when one thinks of reading written texts to build knowledge and learn. However, digital reading is not free of danger and requirements (also) for small children. Actually, reading on screens can easily become closely related to 'random TV watching', a fragmented, casual, and careless meaning making process, and with the construction of potentially fragmented and transient learning.

Reading on screens to learn seems therefore to be a complex experience, and it is the matter for discussion in this paper. My goal is to further contribute to building an understanding of the subject at hand, considering the main challenges posed to the DigiLitEY project.

The perspective I share is indeed limited since I only have in mind the activity of reading digital texts available online, and being read on different media to build some type of knowledge, although some highlighted perspectives might probably be relevant to other forms of digital reading carried out in different digital media and configured (or not) in the context of Web 2.0. On the other hand, my discussion is conducted with close reference to a cognitivist perspective, which only accounts for one among distinct possible perspectives in the building of a full understanding concerning the matter at issue (cf. Coiro, 2015; Jewitt, 2008; cf. Cope & Kalantzis (2000) for New Literacies, Multiliteracies and associated concepts). Nevertheless, I do consider this perspective

to be of great interest in the understanding of the complexity of digital reading.

I begin by synthesizing some of the key notions about paper reading so that a basis for understanding can be built for the analysis of digital reading I do afterwards. Then, I identify and define three major features of digital texts and I discuss the main potential they show for reading to learn. Next, I discuss the risks the same features pose to digital reading, which impose great demands for digital readers. The discussion is concluded with some research questions, which I consider most important in the context of the DigiLitEY project.

Reading on paper

Cognitive views of reading "on paper" tend to converge on the definition of reading as a meaning-making interactive process, which takes place between a *reader* and a *text* in a given *context* (Irwin, 2007). Taking this into account, and in general terms, the *context* creates the conditions of reading, making it necessary, hence bringing about aims and objectives that are crucial in the reader's motivation and engagement; the written *text* is the object of the reader's meaning-making activity; *the reader is the meaning-making agent* who mobilizes not only his language knowledge, and his emotional and background knowledge, but also, and essentially, *a set of specific mental processes* to construct a mental representation (that is, his understanding) of a text. The activated processes entail:

. Comprehending written representation

These are basic operations in the meaning-making of the written text: identifying written words, parsing (that is, grouping sequences of words into meaningful syntagmatic units) and sentence understanding; establishing meaningful relationships between sentences and inferring meanings; understanding the meaning of the text as a whole, including the identification of the issue, main ideas, the text structure, and the costruction of a synthesis of textual information. These processes are closely dependent upon the linearity and unidirectionality of the written language as well as upon the delimitation of written texts and text genres.

. Elaborating on personal meaning

In understanding the written text, the reader actually goes beyond the text itself, elaborating unforeseen and unpredictable meanings, which are only attributed to one's own individuality. Text reading involves, for instance, the reader's previous knowledge and experiences, the reader's emotions, the ability to visualize and to anticipate as well the critical positioning to the text. This latter process is called up when the reader, for example, questions the source of the text and the author's purpose, so as to avoid ideological bias, and /or prevent inaccuracy and partiality of accessed information. Meanings thus construed are also part of the mental representation every reader builds of the text being read.

A cognitivist understanding of reading assumes that these two types of making meaning processes are inextricably called up to the reader's mind, making the reading of any text into a literal, inferred, organized, synthesized, and personally elaborated set of meanings. However, this process of making meaning to oneself may also activate a different type of mental processes related to metacognition.

• Monitoring the process of making meaning

These processes are triggered in the reader's mind whenever he/she needs to control the meaning – making process. Contrariwise to the previous ones, these are conscious processes involving the reader's attention and thinking over the reading activity. Such a control is due to different reasons. One of the most common processes of reading control is related to solving comprehension problems. It has to do with processes that are mobilized to find out the unknown meaning of words, for example, or to overcome incorrect processes of sentence parsing and word chunking. Besides, another further set of processes is also called up, allowing the reader to control the reading process and be able to learn from it. In this case, the reader focuses his attention and thinking on the reading process so that he may identify, select, (re)organize, and synthesize relevant information regarding his reading purposes, which he/she consciously integrates in his/

her previous knowledge to build more meaningful knowledge and therefore learn (Irwin, 2007).

Reading on screen

This more or less consensual model of reading "on paper" is currently unable to fully explain digital reading, particularly the kind of digital reading related to learning. It is clear to me that there are similarities between print reading and on screen reading. In fact, the act of reading does not seem radically different for both types of communication contexts (on paper and digital), since reading is in each case synonymous with *making meaning of the available information*. Moreover, I have no reason to think that the *kinds of meanings* constructed is not similar for the two types of communication contexts, as they are *thought and created by the same mind in both contexts*.

However, the dissimilarities between paper-based reading and digital reading are indisputable, and from my point of view these are mostly based on the fact that, in the context of digital communication, a new textual unit is implied: *the digital text*. As I see it, the understanding of digital reading may therefore consider *cognitivist tenets* but needs crucially to take a close consideration of this new object of meaning making. The digital text displays different characteristics from text on paper, featuring significant impact on the meaning-making processes required for the reader to build

the represented meanings, especially when learning is the purpose of reading. In the following section I identify three detached characteristics of the digital text, examining, in each case, their implications in supporting the meaning-making processes activated by the digital reader. This is followed by the discussion on what may be considered procedural requirements triggered by those characteristics.

Digital text: features and gains in the meaning-making process

Multimodality, interconnectedness and interactivity are the most prominent features of digital text. Together, they significantly alter the construction of the meaning-making process involved in reading texts 'on paper', offering auspicious possibilities for meaning making.

Multimodality

Modes comprise the material resources for making meaning in texts, stemming from cultural development, and made available in a given social context (Kress, 2003, 2010; Bezemer & Kress, 2016). There are several meaning-making modes: written language, spoken language, still image (illustration, photography), moving picture (video), colour, layout (arrangement of data in a given space), sound, music, touch….

Though not exclusive to them, multimodality is a fundamental characteristic of digital

texts. According to Kress (2003, 2010), the simultaneous availability of this type of resources, made possible by digital media, was responsible for catapulting a multimodal trend that has been observed for decades in the communication field.

In digital text, the various modes are 'meaningful', being used to represent meaning. However, one of the great principles of multimodal text composition concerns the partiality and interdependence of the modes that are used: all modes are partial and all of them are complementary in the process of making meaning:

> Different modes offer different potentials for making meaning. These differing potentials have a fundamental effect on the choice(s) of mode in specific instances of communication. (Kress, 2010:79). "No one mode stands alone in the process of making meaning; rather, each plays a discrete role in the whole" (Jewitt, 2008: 247).

This means that each mode is used according to its specific potential for making meaning, not aiming at duplicating, illustrating or embellishing meanings represented by other modes (Bezemer & Kress, 2016; Jewitt, 2005, 2008; Kress, 2003, 2010). In general terms, speech and writing, associated to the power of authority, are mainly used to name; images and photographs (still images) to display/show not only entities and facts, but also processes in a static way (for example in graphics), allowing for the illustration of information of a more abstract nature (e.g., concepts); filsm, videos, animations (moving image) is used to display/show dynamic processes throughout time and space, and the actors involved; layout is used to distribute and arrange the elements on the screen, thus conveying meaning (e.g., centrality or marginality), as well as the meaning of relations between the elements that are simultaneously and discontinuously represented on the screen (see Kress, 2010:92).

Among the numerous modes used in the construction of digital texts, the screen openly favours the exploration of those associated with image: still image, moving image, and layout. In fact, it is acknowledged that, in digital contexts, the hegemony of the written language is set away in favour of visual modes, becoming one among the many modes in the construction of meaning, and even being subdued by the prevalence of the latter modes (Kress, 2003, 2010; Jewitt, 2005, 2008).

This reveals how multimodality redefines the text in the digital context, which is now represented as *a multimodal symbol-saturated environment* (Jewitt, 2008: 259). Digital texts are *multimodal ensembles* (sets of modes), orchestrated in the construction of a meaningful set:

> Ensemble, in this context, names an emphasis on *modal multiplicity* of the text, while *orchestration* names an emphasis on the *aptness* of the selection, the mutual interdependence and the 'semiotic harmony' of such elements (Kress, 2010:157, original italics).

Furthermore, the multimodality of digital texts radically alters the linearity and the unidirectionality of the organization of information represented in the conventional written text, setting up a novel, discontinuous, and multidirectional text:

> In *image*, meaning is made by the positioning of elements in that space; but also by size, colour, line and shape. Image does not 'have' words; it uses 'depictions'. (…) Meaning relations are established by the spatial arrangement of entities in a framed space and the kinds of relation between the depicted entities" (Kress, 2010:82, original italics).
> "*Writing* is newly organized by the demands of the spatial logic of the visual mode which dominates the 'screen'" (idem: 170). "The visual character of writing comes to the fore on screen to function as objects of literacy in fundamentally different ways than it does on page (Jewitt, 2008: 257).

The multimodality of digital texts brings with it a transformation reading processes. Research has been showing that multimodality has a potentially positive effect on the mental process of making meaning. Such effect is credited to the fact that additional sensory modes are activated in the comprehension of multimodal texts (Mayer, 2001; Moreno & Mayer, 2007), especially visual and auditory modes, which seem to recover basic pathways of input in the reader's brain, biologically operational long before the cultural development of written language. The advantages that the simultaneous activation of these sensory modes offer to the reader in his/her efforts to make meaning are likely to be the reason behind its popularity.

Interconnectivity

Interconnectivity is comprised in the potentially infinite set of textual interfaces associated with the digital text, as it is virtually connected to other texts via the hypertext. This broadness of digital texts, established by interconnectivity, amplifies the flexibility and fluidity of texts allowed by multimodality, as opposed to texts on paper, which are self-contained, closed, and static within their limits. Additionally, the immediate link to other digital texts, with which the reader can immediately engage, makes reading a deeply social act, thereby permanently renewing the typical individual reading process that is strictly maintained between the reader and the paper-based text (Salmerón & García, 2011).

The interconnectivity of digital texts provides the reader with access to a wide range of potentially enriching information concerning the quality of meanings it enables to build (Coiro, 2011). Contrariwise, when reading 'on paper', this possibility is completely dependent on the reader's current knowledge (Eco, 1987), while being much slower (and sometimes remote). The availability of other sources of information in digital text interfaces allows readers to draw inferences (through the access to essential information, previously unknown to the reader), as well as integrate and elaborate

on information (Coiro, 2011; Salmerón & García, 2011).

Interactivity

Digital texts incorporate the possibility of *intervening* upon texts, more specifically of *acting in the inside and towards the outside of texts.* Thus, the multimodal, interconnected digital text promotes a kind of understanding by doing (cf. Learn by doing, Moreno & Mayer, 2007). This *understand-by-doing* allows readers to find their own reading path (as well as their own pace) within the text. Readers choose that path among multiple portals (Jewitt, 2008) opened by the multimodal discontinuity on the screen, they themselves determining the order in which to proceed. As referred by Kress,

> Placement of the elements does not determine the order of 'reading-as-engagement'. 'Reading' is now a matter of the design of the 'page' or the 'screen' by the reader" (2010: 175.16); "The ensemble offers a choice of routes for making meaning in interpretation" (Kress, 2010: 165)).

In addition, readers can expand *this path* by following the multiple 'outside doors' provided by the interconnected text, seeking information, selecting and controlling their reading pace on the available textual interfaces (Jewitt, 2008; Moreno & Mayer, 2007; Kress, 2010). Research has revealed a potential powerful connection between being able to 'navigate' proficiently using the navigation map found in the hypertext and readers'

ability to integrate the information distributed across different texts (Salmerón & García, 2016). Such results seem to be in line with findings regarding a well-established relationship between navigation and performance in online tasks coming from international student assessments such as PISA:

> There is clear evidence that students' navigation, as indicated by their traces in log files, play a major role in online question-answering tasks (Organization of Economic Co-Operation and Development [OECD], 2011). Specifically, a large scale study involving the adolescents participating in the OECD Programme for International Student Assessment (PISA) 2009 electronic reading assessment revealed that students who displayed a more task-oriented navigation behaviour, as indicated by more visits to task-relevant pages, correctly responded to a higher number of questions (Naumann & Salmerón, 2016: 43).

As such, *interactivity* makes of the reader the actual composer of the digital text. Besides, the interactivity of the digital text is also materialized in its own effects upon the reader. The digital text is able to "supervise" the activity of the readers by *supporting/guiding/providing feedback* on the decisions and responses of readers (Moreno & Meyer, 2007).

Together, the whole template of possible actions provided to readers as well as all the feedback configure a sort of *scaffolding* to the meaning-making process that takes place on screen. The dynamism thus set in the process of digital reading is non-existent

in paper-based reading, thus completely transforming the conventional process of interaction between readers and printed texts.

Digital text: requirements for meaning-making processes

The same features that are responsible for the meaning-making potential of digital texts pose a very significant set of requirements to digital readers. These consist of *new* and *renewed* procedural requirements when compared to the requirements placed by printed reading. Besides, should the required processes not be activated, the digital text meaning-making potential can eventually incur in "losses" respecting the meaning-making process associated with reading on paper (Kress, 2003, 2010).

New processes

Digital text readers need to know how to deal with the abounding multimodal meanings available on screen. According to Jewitt, "When using learning resources that demand the interpretation of movement, image, and colour, students are engaged in a complex process of sense making" (2008: 258). This means that readers need to resort to processes such as:

. Understanding multimodal representations

Digital text readers must understand multimodal representations, "a broad range of multimodal systems and their design" (Jewitt, 2008: 261). This requirement involves the need to make use of semiotic codes associated with colours, sounds, music, screen layout ... to make meaning out of them. In digital text reading, the reader must therefore know the multimodal codes and conventions of meaning-making in order to be able to make literal meanings from such codes, as well as infer, relate and integrate the represented meanings into a coherent and organized (mental) whole (Kress, 2010; The New London Group, 2000).

This ability is critical to prevent cognitive saturation, which occurs with the simultaneous convergence of excessive information in a single input pathway in the brain, as can happen when multiple modes associated with image are used in the text (Moreno & Mayer, 2007). From this point of view, making meaning from multimodality is a new ability in the context of cognitivist reading theories, although being already known in broader contexts, such as the ones associated to socio-semiotic theories of communication (Kress, 2010).

Renewed processes

In addition to the aforementioned 'new' capability, digital reading for learning brings about the need to activate *in a radically new robust manner* reading processes already

involved in paper-based reading. As Naumann & Salmerón point out,

> traditional or offline comprehension skills are needed to process the documents accessed through the navigation process (e.g., Salmerón & García, 2011). This means that in online learning scenarios as well, students need to decode words, parse the syntax of sentences, and execute local and global coherence processes to finally understand a document's contents (e.g., Kintsch, 1998) (Naumann & Salmerón, 2016: 43).

In this text, emphasis is however placed both on the activation of elaborating processes related to critical questioning of the made-available texts, and on metacognitive processes that sustain the conscious process of learning.

. Critical questioning of texts

The ease of production, availability and access to digital texts require that readers take on a very inquisitive attitude towards the quality of information and the author's purpose. The sheer amount of texts that readers have at their disposal may represent inaccurate or incomplete information, while the intentions of the author may not always be of "pure" sharing. Critical questioning ability is therefore essential for the readers to avoid assumptions associated to these limitations, or being subjugated to a potentially biased and 'dangerous' perspective (Coiro, 2015). The limitation and manipulation digital texts covertly enact upon digital readers can also be recognized

in their self-imposed limits, such as pre-set templates (Kress, 2010: 193). Although providing a kind of scaffolding to the reading process, as discussed above, these pre-set templates may also determine the limits of the knowledge *readers* can construct. It is therefore essential that digital readers authenticate and question by *omission* all the information available to them. Sourcing, analysing and evaluating digital texts thus become essential in order to circumvent acritical information consumption and transform digital reading into proficient meaning making (Coiro, 2015).

. Self-determination on the meaning-making process

By allowing the realization of multiple immediate reading actions, the reading of multimodal and interconnected texts promotes a sense of 'control' in readers: They themselves select the texts and determine both the reading path to follow and their reading pace. Yet, the array of offered possibilities frequently dazzles readers, transforming reading into a random, confusing, and unfocused activity, and resulting in an indiscriminate collection of huge amounts of information, and/or in an incoherent patchwork of excerpts. As referred by Moreno & Mayer (2007), "By virtue of their interactivity, [interactive multimodal mixed-modality learning environments] can create excessive extraneous load that disrupts deep learning" (p. 313), which can hardly be

integrated into the readers' mental structures to build meaningful learning. Despite the potential offered by digital reading, it can thus become a rather trivial and pointless endeavour. Therefore, digital reading requires readers to learn to "move beyond information consumption to knowledge generation" (Coiro, 2015:55) by becoming consciously responsible for their reading (Moreno & Mayer, 2007; Coiro, 2015). This means that digital readers crucially need to enact metacognitive reading processes during their meaning making (Coiro, 2015; Winnie & Hadwin, 2013).

On construction of such reading control, it seems paramount that digital readers learn to s*et clear and stimulating reading purposes* (Coiro, 2015). In my opinion, it is much more important for readers to define these *intentions* for themselves than to depend on those casually found and established by others in digital texts. *Intentions* established by the readers themselves are the most effective, governing their attention and thought, and therefore their reading activity. It is also imperative that readers learn meaning making strategies that are needed to achieve their goals and generate knowledge, that is, learn how to select the relevant available pages (or sections) to read, how to select relevant information, and relate the selected information into a coherent whole, and actively integrate it what they previously knew in order to build new knowledge, and revise and evaluate their achievements in light of their purposes

(Coiro, 2015; Jewitt, 2008; Kress, 2010; Naumann & Salmerón, 2016). Therefore, digital text readers crucially need to develop the ability of self-determination, this is, to learn how to (consciously) plan their digital reading, to stick to it throughout the construction of their reading path, monitoring the process and the knowledge they thereby construct. It seems to me also important to note the results, shown by recent research carried out by Naumann & Salmerón (2016), which shows the interplay between such online and other print-based comprehension processes. Their studies begin to reveal how the the performance of a self-regulated digital reader might be related to the reading ability that is independently developed offline, by learning to read texts in paper. By researching the connection between decisions concerning online page selection and task completion, their results show that

> relevant page selection on online comprehension is enhanced by offline comprehension skills, since without those appropriate skills, students displaying whatever navigation behaviour will not be able to completely understand a digital text (…). "They do also reveal that good offline comprehension skills are not sufficient in themselves to produce good digital reading performance. Rather, if students fail to comply with demands of relevant page selection, the otherwise strong and positive association of offline comprehension skill and digital reading performance is no longer significant (Naumann & Salmerón, 2016: 51-52).

On the whole, the requirements posed by digital texts that have been discussed here point towards the activation of reading processes which allow readers to "impose"

themselves upon the chaos of alluring and overflowing information and bring out of it the coherence that best suits their interests. As Kress puts it, such meaning-making capacity comprises a "disposition towards 'architecture' and 'building' rather than one of mere navigation and selection among given options" (idem: 197). Contrariwise to what would appear to be, such a disposition does not embody a restriction to the freedom and power allowed by the digital text, instead representing *a condition for the achievement of that freedom and power of the reader* (cf. Kress, 2010).

Concluding remarks: envisaging reading research in the early years

On account of multimodality, interconnectivity and interactivity of digital texts, agency comes up as one of the major attributes (if not the main) of digital readers (Kress, 2010; Jewitt, 2008). Although being much discussed as far as paper reading is concerned (Eco, 1987), readers' *agency* gains a new breath in digital reading contexts (cf. Bezemer & Kress, 2016; Kress, 2010). Actually, both the possibilities granted and the meaning-making demands posed by digital texts make digital reading (in particular the one done to build knowledge and learn) a complex task, which includes integrated understanding of multimodality, understanding of the multiple texts that interface with the original digital text, critical and deep questioning of these texts, careful planning of the meaning-

making process, clear definition of objectives and strategies, monitoring the implementation of the plan. In this context, the proficient digital reader is the user of different conventions with potential for meaning, a questioner, and an autonomous meaning-maker. He is, to that extent, an *agentive reader*.

In my opinion, agency is a particularly interesting open door to the studies, which, under the DigiLitEY project, aim to know and theorize about the practices of onscreen reading of zero to eight-year-old children (Sefton-Green, Marsh, Erstad & Flewitt, 2016). I believe this is due to three reasons. First, these children have a powerful social experience of digital reading before school, in which they actually make meanings from the information that is displayed on screen, under which they do certainly set the basis for their own agency, in the same way that they can build other knowledge and social interaction skills. Second, if these children learn at school the needed agency to 'read on paper', they can also learn at school the required agency to read on screens, creating a possible symbiosis between both learnings. Third, from the moment they build this learning at school, these children can enhance and transform their personal agency in their digital reading experiences outside of school.

I believe that undertaking research on the agency of zero-to-eight-year-old digital readers, their characteristics and development, is one of the main challenges

under the DigiLitEY project. Taking into account the discussion of this text, it seems possible to assume that such challenge may be faced by finding the answers to the following research questions (and sub-questions):

- What is digital readers' agency like before coming to school?

Which digital reading practices do children do before coming to school? Which texts do they read? Which kinds of meanings do they make (what do they learn)? Which meaning-making processes do they activate to make meaning? Which are the most striking features of digital texts that children make use of in their meaning-making processes? What do they learn about digital reading in their attempts to build meaning from digital texts?

- What is digital readers' agency like throughout the early years of schooling?

Which pedagogical principles undergird the teaching and learning of the agentive digital reader at school? Which specific processes do they explicitly learn as regards digital reading at school? How is learning of digital reading articulated with learning of paper-based reading? How do students apply their learning about print and digital reading in school practices? Which digital reading practices do children make at school? What kind of digital texts do they read? Which kinds of meanings do they make? Which

meaning-making processes do they activate to make meaning? Which are the most striking features of digital texts that children make use of in their meaning-making processes? Which are the most difficult characteristics of digital texts for them?

- What is those readers' agency like out of school?

Which practices of digital reading are informally done by school children out of school? Which texts do they read? What do they learn from such reading? Which meaning-making processes do they activate to make such meanings? Which are the most striking features of digital texts in their meaning-making process? How is out-of-school reading articulated with its learning at school?

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