From Print-based Texts to Reading Online: An Exploration of the Theories and Research Examining the Impact

Erin Mills

The increasing prevalence of online reading prompted this review of the literature. Firstly, it sets out to determine what the research has revealed about reading comprehension as a print-based endeavor. Reader, text, and activity are identified as integral elements to the reading process and make up the developmental heuristic of the RAND reading study group for organizing research on reading. These elements also take place within a sociocultural context and affect the meaning that is made. Using the RAND reading study group heuristic, the literature review then explores the theories and findings that have emerged to explain the impact of the internet on reading and thus contribute to understandings of literacy in digital contexts to inform pedagogical practice. Ultimately, the literature shows that reading online is qualitatively different from reading print-based texts: texts are multimodal, and readers are more agentic as they have more ways to enter the text, act as coauthors and "exert" their agency on technology, and shape it for their own practices.

In a 2018 survey, the PEW research center found that 45% of youth (ages 13-17) are online "on a near-constant basis" (Anderson, 2018, para. 3). Anderson (2018) reports that this statistic is almost double what it was four years prior, and that smart phone access is nearly "ubiquitous", 95% of teens have access to one. A separate survey by the PEW research center elaborated on the phone use, noting that 83% use it to "learn new things" (Schaeffer, 2019). Considering these studies, students come to classrooms with substantial experience in reading on the internet.

The increasing prevalence of online reading amongst adolescents prompted this review of the literature. It therefore investigates what is known about reading for meaning with print-based texts. In particular, the literature review examines what the research says about the process of reading comprehension. The review then examines the theories that have emerged to explain the impact of the internet on the reading process while also investigating what scholars have found on the pedagogical implications of online reading.

Definitions

In the literature on reading print-based texts and reading online, several terms emerge that need clarification:

Literacy – According to Kress (2003) "the term which refers to (the knowledge of) the use of the resource of writing" (p18).

Digital literacy – Knobel and Lankshear (2006) reviewed the literature on the definitions of digital literacy and found that the "mainstream" definitions often define the term in the following ways: first as an "It", something to be acquired that will enable students to face the challenges of the twenty-first century; second, as something associated with "epistemic engagement" with the information so that students who learn digital literacy will be equipped with the skills to interact with the information and

determine what is credible. However, Street (1984) claims that viewing digital literacy as a skill is equivalent to the "autonomous model" and in contrast with what sociocultural theorists see literacy as, a social practice. Knobel and Lankshear (2006) stress that viewing digital literacy as a social practice does not mean rejecting the idea that skills play a role, only "that these 'skills' and 'techniques' take on very different forms when embedded in different social practices involving different purposes and where different kinds of meaning are at stake" (p.16). For Knobel and Lankshear (2006), reading involves decoding but decoding alone does not make meaning, "reading and writing are always reading and writing with meaning" (p.16). Hence, Knobel and Lankshear conclude that as far as the term digital literacy, "we should think of 'digital literacy' as shorthand for the myriad social practices and conceptions of engaging in meaning making mediated by texts that are produced, received, distributed, exchanged etc., via digital codification. Digital literacy is really digital literacies" (p.17).

Literacies – In their research, Kalantzis et al. (2016) have found that the contemporary communication environment necessitates students learn more than "alphabetical communication", that they instead learn literacies, or the many forms of literacy "not only knowledge of formal conventions across a range of modes, but also effective communication in diverse settings and the use of tools of text design that are multimodal, rather than a reliance on the written mode alone" (p.5). Street (2016) conceptualized literacy as a social practice, not as a skill, and therefore, Street noted that a range of different literacies can be observed, "religious literacies, many different occupational literacies, family/domestic literacies, bureaucratic literacies, academic literacies, etc." (p.339)

Modes – In their theory of multimodality, Kalantzis et al. (2016) identify the following modes of meaning: "written, visual spatial, tactile, gestural, audio and oral" (p.229). Kress (2010) adds color and layout to this list of modes, emphasizing that layout communicates to the reader where to focus their attention, in other words, it engages the reader's attention and can even encourage a particular path of reading. Kress's (2003) social semiotic theory of multimodality understands reading as a process of interpreting modes, or communicative signs. Thus, in Kress's words, "Equally, in reading, we need now to gather meaning from all the modes which are co-present in a text" (p.27).

Interpretation – "The sense one person makes of a message communicated by another person" (Kalantzis et al., 2016, p.215). Kress (2003), in his theory of social semiotics explains interpretation in reading as "the making of a new sign from the sign that I have received as a signifier. I fill that signifier with my meaning" (p.29).

Print-based Texts

Gough and Tunmer (1986) developed the Simple View of Reading theory which posits there are two key elements that lead to successful reading comprehension: decoding and linguistic comprehension. Gough and Tunmer support this assertion with evidence from their empirical formula, R=D x C, where R refers to reading, C refers to linguistic comprehension, and D refers to decoding. Gough and Tunmer (1986) applied their formula to known reading disabilities to demonstrate its function in predicting reading ability. Nation (2019) who set out to analyze the strengths and weaknesses of the simple view of reading theory using longitudinal data from over two hundred five-year-olds starting primary school, clarifies linguistic comprehension as referring to one's ability to recognize language structures. Nation's data attests the strength of the theory in understanding that the two elements, decoding and linguistic comprehension, are necessary and interact when comprehension takes place. Chiu (2018) found the simple view of reading theory correctly predicted the reading outcomes for third grade reading comprehension. Lonigan et al. (2018) expanded these findings to fifth grade. Additionally, the findings of Catts et al. (2006) indicated the applicability of the simple view of reading theory for identifying dyslexia in children.
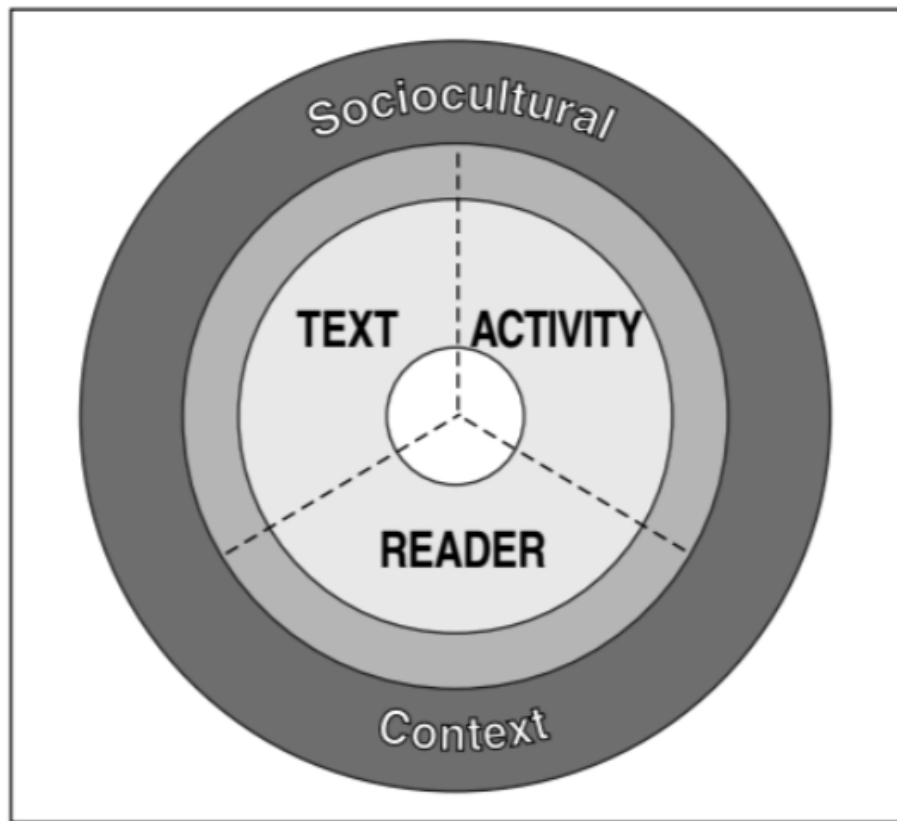
Catts (2018), however, makes two important claims about the limitations of the simple view of reading theory based on the existing literature. The first claim Catts makes is that linguistic comprehension does not address "the problems (that) go beyond oral language and include difficulties in working memory, inference, and world knowledge" (p. 318). The second claim Catts makes is that research in the simple view of reading theory often presents decoding and comprehension in "comparable manners" (p. 319). Catts argues that such a comparison is misleading, as it leads to viewing comprehension as a "single thing" to be tested for rather than addressing the "multi-dimensional nature of comprehension" (p. 321). Francis et al. (2018) conducted a longitudinal study on reading comprehension with middle school students that included variation across texts and within readers. Their findings led them to expand the simple view of reading theory to what they call the Complete View of Reading theory, asserting that their model "illustrates that readers develop differently and approach the reading task differently, showing differential impact of text features on their fluency. To be complete, a model of reading must be able to reflect this heterogeneity at the person and passage level" (p.274). However, Snow (2018), having reviewed the comprehension outcomes of the study by Chiu (2018) under the simple view of reading theory, as well as the study by Francis et al. (2018) under the complete view of reading theory, cites limitations. Snow found that both the simple view of reading theory and the complete view of reading theory are successful at determining interventions for emergent or struggling readers on simple comprehension tasks, but not for the kinds of reading expected in the upper grades.

In earlier work, Snow (2010) also highlights that the simple view of reading theory "underemphasizes the role of background knowledge and motivation" (p.416). Anderson and Pearson's (1984) theory of schemata, "knowledge already stored in memory" (p.255) attempts to explain the importance of background knowledge in text comprehension, particularly the aspect of comprehension that involves interpreting and learning. According to Anderson and Pearson's theory, the reader activates schemata as concepts emerge in the text. The researchers in turn posit that these schemata then help the reader make inferences or predictions. Pressley and Afflerbach (1995) whose extensive review of the literature using student think-alouds, consistently showed that schema theory indeed was activated often. More recently, An (2013) reviewed the different theories of schema theory and concluded its importance in understanding comprehension as an interactive process between reader and text stating, "Schema theory guides readers as they make sense of new experiences and also enables them to make predictions about what they might expect to experience in a given context" (p. 134). Schema theory has been used to analyze the teaching of reading to English as a foreign language and English as a second language students (Carrell & Eisterhold, 1983). Additionally, Shen (2008) explored how it can help create deeper understandings in second language reading and Ahmed (2017) looked at how it can help explain the ways students interpret texts across cultural and temporal spaces. Guthrie et al. (2004) detected increased engagement when working with the strategy of increasing background knowledge of students in grades three and five.

Working with middle school students in grade seven, Guthrie and Klauda (2014) explored the role of engagement and motivation in comprehension. The study used standardized tests to measure comprehension as well as experimenter designed comprehension. Engagement was defined as "active text interaction in which students are seeking conceptual understanding of complex topics" and motivation as "intrinsic motivation, value, and perceived competence" (p. 388). Their study concluded that engagement and motivation impacted comprehension positively and it extended the findings of authors such as Chapman and Tunmer (1995) who found that self-efficacy played a role in comprehension of primary students.

The RAND reading study group (2002), an organization given the task of creating a framework for literacy research to address current issues, developed a heuristic for organizing reading research around elements of the reading process (Figure 1).

Figure 1. *Heuristic of the Elements of the Reading Process.*

RAND reading study group, 2002

The reader and text are addressed in the aforementioned models of comprehension, as they are in the work of Anderson et al. (1985) in the National Report on Reading which surveyed, interpreted and synthesized the published research on reading at the time. However, in terms of the heuristic of the RAND reading study group (2002), Snow (2018) argues that, at least within the research of the simple and the complete view of reading, the activity "continues to be ignored" (p. 314). The activity is defined as the "purpose" and "outcome" (RAND reading study group). Snow reminds readers that the activity changes from primary to upper grades stating,

> Older students and adults are expected to read critically—sifting plausible from outlandish claims, recognizing the difference between factual reports and parodies or satires, and using information about author and source as well as information internal to the text in deciding what to learn and whether to modify preexistent knowledge stores. Older readers are thus expected to make inferences, not just about the text, but also about the author's point of view, and to use those inferences as input to their comprehension processing (p.215).

Thus, Snow insists that research in reading comprehension in secondary contexts needs to account for the more complex nature of the reading outcome.

As seen in Figure 1, the RAND reading study group (2002) also posits that the three elements take place within a sociocultural context and can affect the meaning that is made. Citing Vygotsky's (1978) sociocultural theory, the RAND reading study group explains differences in meaning as attributable to the

ways in which literacy is learned. "According to Vygotsky (1978), with the guidance and support of an expert, children are able to perform tasks that are slightly beyond their own independent knowledge and capability" (p. 16), and that "differences among readers can, to some extent be traced to the varying sociocultural environments in which children live and learn to read" (xvi). Variation in meaning was demonstrated by Pressley and Afflerbach's (1995) report on the literature of think-alouds which showed different interpretations of texts. Working within a sociocultural lens, Reynolds and Goodwin (2016) examined the interactions of adolescent students working with texts above their grade level reading comprehension. They found that scaffolding interactions between the teacher and the student were effective for struggling readers comprehending more complex texts that were seen as beyond their capability independently.

Street and Besnier (1994) critically examine the thinking on the ability to read and write, or what they term "literacy", and form the conclusion that it is a "construct" of the socio-cultural and claim it cannot be divorced from the "social, political and historical forces which shape it" (p. 533). As evidence, the researchers cite the Vai of Liberia who learn different types of literacies: Vai, Koranic and English. Street and Besnier compare all three and demonstrate that the way the literacies are taught and used "shape the individual's cognitive makeup" (p. 56), so that those Vai who learn Koranic literacy for example, do well on recall comprehension tests which Street and Bresnier argue "is a reflection of the importance of memory work in Koranic schools" (p. 56). Whereas the Vai who are literate in English, and also attend schools modeled after the West, the researchers observe, "do well on tests that resemble school activities, like syllogisms" (p. 56). Understanding literacy as a construct of the socio-cultural is what Street (1984) calls an ideological model of literacy, it views the ability to read and write as a social practice and is based on findings from extensive ethnographic work in Iran which revealed that literacy had different uses and meanings. Knobel and Lankshear (2006) point out that this view of literacy frames literacy not as "a function of" (p.16) comprehension, but rather as "a function of social practice, social context, and discourse" (p.16). Street's (2016) investigations of the ethnographic literature on reading support this view of literacy. In fact, the investigations led Street to identifying "literacy families" that manifest the "many and varied users and contexts of literacy" (p. 336). Street observes that these literacy families can be "religious literacies, many different occupational literacies, family/domestic literacies, bureaucratic literacies, academic literacies, etc." (p. 339). Street also cites pedagogical implications of these findings: there often exists a gap between the academic literacies of school and the "everyday" literacies.

Using sociocultural theories to guide their work, Arya and Maul (2021) investigated the role of science discovery narratives in increasing engagement in reading comprehension. Arya and Maul hypothesized that scientific narratives that demonstrate the situated nature of knowledge would increase middle school reading engagement. Their qualitative field work proved their hypothesis correct and demonstrated the necessity of incorporating sociocultural perspectives into the curriculum. Frankel et al. (2021) also grounded their research in sociocultural theories. They performed a meta-analysis of the qualitative work done in secondary reading intervention classes. Their work found that "[y]outh revealed multifaceted and dynamic literacy identities, histories, and abilities, and a keen understanding of the kinds of instruction that they valued" (p. 49), and that these then mediated the students' experiences in the classes.

Snow (2010) analyzes the RAND reading study group's (2002) elements of the reading process: text, reader, activity to reveal the complexities of defining what constitutes reading comprehension. Below is an excerpt from the analysis,
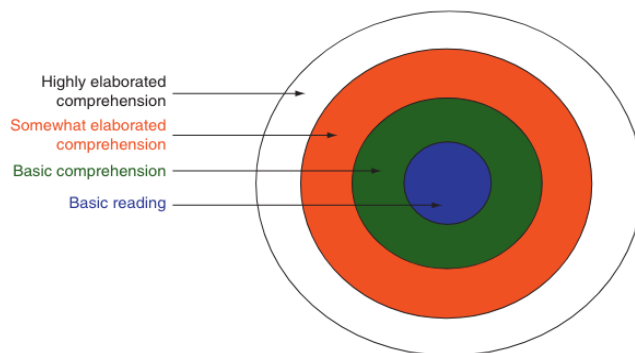
Consider a candidate text that might be found in a first-grade reader:

Alex and Ali ran to the swings and jumped on.

What constitutes comprehension for this text? At a minimum, a mental representation of two individuals moving quickly toward and using some playground equipment should be conjured up, but is the inference that Alex and Ali are probably children part of the comprehension process or does that go beyond basic comprehension? Is it required that the comprehender assign genders to Alex and Ali or that gender assignment be postponed, recognizing that Alex could be short for either Alexandra or Alexander" (p. 413).

Snow's analysis leads her to extend the work of the RAND reading study group (2002) and develop a graphic of concentric circles to visualize how reading comprehension might be explained (Figure 2).

Figure 2. *Comprehension Process*

Highly elaborated comprehension
Somewhat elaborated comprehension
Basic comprehension
Basic reading

Snow, 2010, p. 416

Snow (2010) states, "Reading comprehension might be thought of, then, as located on the radius of a set of concentric circles" (p. 415). At the center is what Snow terms basic reading comprehension, which involves "accurate word recognition, fluent access to word meaning, recognition of syntactic cues to sentence meaning, and short-term phonological memory" (p.415). This is followed by basic comprehension, which she defines as "the ability to construct a mental representation of the ideas presented textually" and it involves "text memory, making text-based inferences…and making text-world links" (p. 415). As the concentric circles progress outward, deeper comprehension processes are involved. Snow believes that these processes do not have to occur in order and offers evidence in the example of children who are not yet able to decode words but can still make inferences about what's happening in the story.

The literature reviewed thus far examined print-based, written language texts, where written language, according to Cope and Kalantzis (2009), is used to refer to the mode of words on the printed page or the screen. What follows is an examination of the literature that explores how the elements of reading for meaning: text, reader and activity are impacted by reading on the internet.

Reading on the Internet

Baker (2010) reviewed the literature on the impact of digital technologies on reading and writing and discovered many different theoretical frameworks. Leu et al. (2017) propose a "dual-level" theory approach to analyzing the many theoretical frameworks whereby at one level would be what they call the lowercase theories of new literacies which address and provide insight on a particular aspect of the impact of digital technologies on reading and writing, while the uppercase theory of New Literacies serves as the

umbrella framework. After a more recent review of work in new literacies, Leu et al. found that the lowercase theories have the following common elements that define the larger theory:

- "The Internet is this generation's defining technology for literacy and learning within our global community" (p. 5)
- "The Internet and related technologies require additional new literacies to fully access their potential" (p. 5).
- "New literacies are deictic" (p. 5).
- "New literacies are multiple, multimodal, and multifaceted" (p. 5).
- "Critical literacies are central to new literacies" (p. 5).
- "New forms of strategic knowledge are required with new literacies" (p. 5).
- "New social practices are a central element of New Literacies" (p. 5).
- "Teachers become more important, though their role changes, within new literacy classrooms" (p. 5).

Leu et al. (2017) insist that these findings call for a new way to think about literacy and support the argument of Kalantzis et al. (2016) that the ways in which we teach and think about reading for meaning must encapsulate the change brought on by the affordances of the communicational technologies.

New Texts

Hartman et al. (2010) argue that reading online is qualitatively different from reading print-based

texts. They justify this argument by highlighting the hypertextuality of reading online, stating that

To comprehend online is neither conceived of nor experienced as reading a unitary text, but instead as reading across an evolving range of texts to construct meaning...The online interaction frame, then, is populated by texts that are made of other texts and that in turn make up the network of other texts that readers comprehend (p. 140).

Sung et al. (2015), when examining the online reading behaviors of fifth graders in Taiwan through an eye tracking study and retrospective think-alouds, indicate that students had difficulties navigating the nonlinear quality of hypertexts. However, the researchers found that when these same students used a strategy of setting goals, they were more likely to pay attention to what they read online. Balcytiene (1999) who looked at university students in Finland also found that using strategies helped; in particular, activating prior knowledge and monitoring of comprehension helped students find the information they needed. The study by Balcytiene used English materials with Finnish students, adding to the literature on students whose primary language is not English. The strategies of activating prior knowledge and monitoring of comprehension are those Pressley and Afflerbach (1995) found successful readers do with print-based texts in their meta-analysis of think aloud protocols. Goodwin et al. (2020) adds an interpretation through a study with middle school students from the southeastern United States in which findings revealed that reading online tends to be more similar to print-based reading when there are no hyperlinks or other "dynamic features". Shang (2015), working through a sociocultural perspective, investigated the hypertext features of reading online and compared scaffolding of print-based texts by teachers with scaffolding using hypertext as reading intervention with non-traditional English as foreign language students. In this study, the hypertext intervention did not show improvement on comprehension scores but did positively affect the engagement of the students.

Countering the assertion of Hartman et al. (2010), that hypertexts are part of the "new" in "new literacies", Kalantzis and Cope (2021) make the case that hypertext is not so "new". After researching the origins of the logic underpinning hypertext, they contend that the feature of linking to other texts or outside of what is being read is something already found in print-based texts. Instead, they direct their

focus on other elements of the text that are new, such as the fluidity of the uses of different modes to communicate meaning afforded by digital technologies, what the literature reviewed refers to as "multimodal" ways of making meaning (Chandler-Olcott & Lewis, 2010; Gee, 2003; Guzetti, 2010; Kalantzis et al., 2016; Kress, 2003; New London Group, 1996). Kress (2010) clarifies that the notion of multimodality is not new to reading, observing that textbooks have long included images with words. Rather, what is "new," are the affordances provided by the internet and technology for making meaning.

Kress (2010) also argues that multimodality alone is not sufficient to explain how the differences in choice of mode create meaning. For that, he proposes a social semiotic theory of multimodality, whereby, the social accounts for the context within which the meaning-making happens as well as the purposes of the texts. In an interview with Berit Hendriksen, Gunter Kress examines a website as "text" and highlights the ways in which the modes displayed overlap to create meaning that is socially embedded:

> I have an interest to make a composition in which certain kinds of things (modes) come together in a particular way that best exemplifies, or communicates, what I want to mean. So, these modes are kind of arranged according to the interest I have as the person communicates, but also my sense of who you are, and what might be most interesting, most readily memorable, most pleasurable, most informative for you so these things are sort of set in the communicational frame… (Bezemer, 2012).

Kress (2010) theorizes that the aforementioned arrangement of modes is the design, and that this design will vary. That is because design, Kress (2003) explains, "[a]sks what is needed now, in this one situation, with this configuration of purposes, aims, audience, and with these resources, and given my interests in this situation" (p. 38). Through this theory, Kress (2003) sheds light on the sociocultural nature of the text. Kress's (2003) qualitative research with primary school students reveals that as the varying modes work together in different ways according to their design, it has implications for the reading path. The students in this study visited a museum and created stories of their visit. Kress (2003) observed how the mode of writing in the work of one of the six-year-olds indicates a clear reading path dominated by the structural elements of the sentences, whereas, the image they were told to draw to assist in telling the story does not. Kress (2003) offers the example that one could begin to read the image with whatever is central "taking spatial centrality to indicate centrality of meaning" (p. 130). Although Kress's qualitative research indicates that visual modes imply a change in reading paths, he stresses the importance of the sociocultural context on reading images, asserting that "individual readers do act in accordance with socially established practices of viewing" (p. 133). Supporting this line of argument, Ajayi (2011), working within the theoretical framework of a social semiotic theory of multimodality found in a study of third graders' analysis of a video that they used their "socio-historical experiences and multimodal resources to mediate interpretation and representation" (p. 60).

Probing multimodality in the classroom, El Refaie and Hörschelmann (2010) found that some students lack a range of skills to interpret the different modes. In particular, their qualitative study of youth, ages 16-19, in a multi-ethnic British city, revealed a lack of a range of skills required to interpret the mode of cartoons. Dallacqua and Sheahan (2020) turned their attention to the teaching of multimodal skills. They investigated the use of multimodal texts via graphic novels in a 10th grade classroom. After Dallacqua and Sheahan educated students in the reading of comics, looking at the ways that modes such as color, image and shading work to form meaning, they found that students were able to achieve more critical learning and explore multiple perspectives and voices. Also looking at instruction of multimodal reading skills, Kachorsky (2018) in a dissertation study looked at multimodality in a qualitative study on the use of comics in secondary classroom instruction. Using a theoretical framework of a social semiotic view of modality, Kachorsky found that in the classroom, there is a tendency to still view multimodal texts through traditional understandings of literacy, and that there was a disconnect between the instructional goals of the teacher and the actual literacy practices of the students. These findings are

consistent with the work of Kress et al. (2014) in the science classroom, who found that the image mode of diagrams was still viewed as supplementary to the information in the written mode, hence there was a reliance on more traditional notions of literacy where writing carries the weight of meaning.

New Readers

Coiro and Dobler (2007), reviewed the literature on comprehension of internet text compared to informational hypertext and observed the following difference, "internet texts are part of a complex open-ended information system that changes daily in structure, form and content" (p.220). This leads Coiro and Dobler to argue that readers have more ways to "enter" the text. Additionally, Coiro (2003) asserts that readers act as coauthors when reading online. Schilling's (2011) research exploring the reading strategies of sixth graders reading online strengthens Coiro's assertions. Schilling found that the sixth graders made decisions about what to read next. Kalantzis et al. (2016) refer to such an impact as a change in the "balance of agency", where agency refers to "a person's capacity to act; the degree of control they have over their own actions and of responsibility for their actions" (p. 56). Hawisher et al. (2004) used a theoretical lens of cultural ecology to examine case studies of literacy narratives. Hawisher et al.'s findings support the notion of an impact on the agency of individuals interacting with digital technologies such as the internet. Indeed, the researchers found from the literacy narratives of the coauthors of the study that "people manage to exert their own very real and potent agency in, around and through digital literacies, thus shaping the environment for their own literacies practices" (p. 666). Kalantzis et al. contend that such changes in the balance of agency create the potential for classrooms of greater equity if educators embody practices that reflect what is new in new literacies.

Work by Lee et al. (2019) provides qualitative evidence that use of digital tools in lessons can support the agency of students. In their in-depth examination of the classwork and final product of one student in a seventh grade classroom, the researchers argue the student was able to practice agentic action, because of the teachers' lesson design incorporating the affordances of technology. The researchers define agentic action as "an avenue for students to connect their identities and actions to make meaning with objects, language use, and interactions with other people" (p. 158). Lee at al. observed that the teacher created a "student-centered approach" and that the seventh grader could choose the topic that mattered to him with just two requirements: that the research be executed online and the product executed in PowerPoint form. Lee et al. found that the student's PowerPoint incorporated various modes to convey his message in ways that "offer a view into his personal life and the cultural milieu that influence his worldview" (p. 166), highlighting that the student used language that showed his "spoken and written language outside of school" (p. 166) and chose to use music by a local hip hop artist. However, in Burke's (2013) qualitative study of children's virtual play, where agency was clearly exhibited as students embodied roles and had control over where the experience went, Burke found that children exhibited a range of literacies skills but that these were not readily recognized by the teachers. Instead, the researchers observed that the teachers in the study found the virtual worlds exhibited such positive learning experiences such as citizenship and community, rather than complex literacies skills often associated with structured inquiry activities. This gap between teachers and students has been expressed by Hawisher et al. (2004), who account for it because of the gap in the different cultural ecologies within which teachers are raised versus students,

> Raised and educated in a culture that valued and continues to value, alphabetic and print literacies, many of these teachers remain unsure of how to value new-media literacies, unsure how to practice these new literacies themselves, and unprepared to integrate them at curricular and intellectual levels appropriate for this particular young people. (p. 671)

Hawisher et al. also assert that schools continue to be one of the major "gateways" for learning digital literacies skills. Their qualitative case study, that came from a database of 350 interviews and

technology questionnaires, revealed that the more gateways opened for individuals, the more they will "develop effective sets of digital literacy skills and to value these literacies of technology" (p. 670).

Valuing the literacies of students ties into the work of Forzani et al. (2020) who studied the effect of motivation on reading comprehension in online contexts. Motivation, Forzani et al. claim, is an under-investigated area of online reading. Hence, Forzani et al. developed a measurement to assess the impact of motivation on online reading comprehension in seventh grade students. The findings of the study show that self-efficacy affected online comprehension more than that of offline, print-based texts. Thus, self-efficacy plays a unique role in online contexts and motivation is also key to understanding online comprehension. Indeed, Forzani et al. assert that self-efficacy is perhaps the "strongest motivation predictor of online reading" (p. 776).

New Activities

According to Coiro (2003), reading online also has implications for the activity, which Coiro states "includes the purpose, process and consequences of an activity" (p. 460). Analyzing one activity, such as the inquiry project online known as a WebQuest, Coiro highlights how the purpose exhibits new literacies, "these Web-based inquiry projects demand fairly high levels of thinking and collaborative problem solving that may surprise readers used to more traditional reading tasks" (p.461). In addition to collaborative and higher-level thinking, Coiro notes that such activities also catapult the reader into new reading contexts which imply an urgency for curriculum that teaches more critical processes of reading. Citing the literature that has investigated the need for critically processing online text, Coiro asserts that new literacies online mean readers must engage in more critical processes or "risk being unknowingly tricked, persuaded or biased" (p. 461).

Castek et al. (2011) used a framework for reading comprehension online for a case study of seventh graders who struggled at reading print-based texts. Castek et al. explain that the framework is a lower-case new literacies theory that "views online reading as a process of problem-based inquiry involving the new skills, strategies, dispositions and social practices of the internet" (p. 94). They highlight the five "processing practices" outlined by the framework when reading online as:

- "(a) reading to construct useful questions;" (p. 94)
- " (b) reading to locate information;" (p. 94)
- "(c) reading to evaluate information critically;" (p. 94)
- " (d) reading to synthesize information" (p. 94)
- "and (e) reading and writing to communicate information" (p. 94).

The study by Castek et al. reveals that the distinctive purposes for reading online, as outlined by the aforementioned framework, meant that the struggling readers they observed often performed better when reading online. Their findings reveal that students' skills, developed by the new purposes such as reading to locate information, "were often developed during online reading experiences outside of school" (p. 105). They also point out that new purposes such as reading to communicate online possibly contributed to the participants using the well documented print-based text reading strategy of monitoring comprehension while reading.

Lawless and Schrader (2008) reviewed the research on navigation within digital environments and argue that the task or activity can impact student navigation online. The research involved a range of different settings and participants and the findings indicate that the more general a learning goal, the less efficiently students approached navigation. Taking a closer look at reading online versus reading print-based texts, Schmar-Dobler (2003) found that when reading online texts, adolescent students exhibited different strategies for successful comprehension than those argued by Pearson et al. (1992) as what distinguishes expert readers from novice readers. In terms of navigation strategies and activity, Schmar-Dobler points out that according to Pearson et al. when readers navigate print-based texts such as a book,

the "reader uses the feature of print text to search for information", however, the researchers found that in reading online, the reader "figures out features of the internet in order to search for information (e.g., pop-up ads, downloading)" (p. 84). Schmar-Dobler did find that other strategies for successful comprehension of print-based texts, such as drawing inferences, synthesizing, and activating prior knowledge were similar to what the adolescents used when reading on the internet. The findings of Zhang and Duke's (2008) qualitative study support and extend the work of Schmar-Dobler. They also found that good, adult readers while reading online use many strategies for successful comprehension that are associated with print-based texts, such as monitoring, evaluating, summarizing, making inferences and applying prior knowledge (Pressley and Afflerbach, 1995). However, contrary to Lawless and Schrader (2008), they found that sometimes strategies used by the good readers did not vary according to purpose.

Gaps in the Literature

The extent to which strategies overlap between offline texts and online texts supports the claim of Kalantzis et al. (2016) that traditional conceptions of how we read best are still important in the "new" literacies. Notwithstanding, the evidence in the literature on what is "new" in new literacies with reading online reveals that elements of the reading process: text, reader and activity are impacted significantly. Reading texts online is a multimodal endeavor in a hyperlinked environment; readers have more agency and online reading implies unique purposes and outcomes of reading. Understanding these changes as embedded in a sociocultural context is important for considering students' reading for meaning in the classroom.

Forzani et al. (2020) have found that despite the need to study online reading, it continues to be an understudied area. As was demonstrated in the literature review, often, this research specifically examines the skills and strategies proven offline to be effective in reading comprehension. Research in what has been established as the new skills in new literacies is limited. Specifically, online reading as a multimodal endeavor in education is limited, and, more often than not, the focus is on skills towards successful comprehension, rather than the current interpretive practices exhibited by students with multimodal reading online. The literature has also shown that understanding these practices is important to close the gap between what teachers recognize as literacies skills versus what students actually do, and how they actually think about the multimodal texts they encounter online.

Conclusion

The literature reviewed suggests that reading for meaning of print-based texts is an act of comprehension. This, to some extent, involves decoding. However, comprehension is a complex process involving multiple factors. Reader and text are identified as important elements to the reading process and the activity has been shown as necessary to include when examining upper grades where reading outcomes demand more complex comprehension. Sociocultural theories influence the work of authors attempting to explain and address the complexities of reading as embedded in, or a construct of, the socio-cultural factors. This view often frames reading for meaning not as a skill or outcome such as comprehension, but rather as a practice.

Analyzing the elements integral to the reading process: reader, text and activity through theories of new literacies shed light on how digital technologies, such as the internet, have impacted reading for meaning online. Studies of reading for meaning online that view it as a multimodal practice, situated in a sociocultural context, and carried out by readers with agency within new activities, can shed much needed understanding about reading on the internet. In doing so, schools, an important "gateway" to digital literacy (Hawisher et al., 2004) realize their potential for addressing the demands of these new literacies,

but also become sites of equitable teaching practices that incorporate the diverse literacies practices of youth. Knobel and Lankshear (2005) made the call for such research

> that provides rich accounts of new social practices mediated by technologies and multimodal texts can help inform teachers and others in education involved in education about what the world, beyond the school gates that is mediated by these technologies and texts is like; The more such knowledge and understanding educators have the better position they are in to judge how best to integrate (or not) new technologies into school work (p. 25).

Further research into the multimodal reading practices of students in situated contexts not only enriches the literature as Knobel and Lankshear (2005) state, but also can help close the gaps revealed by the literature between teachers' and students' conceptions about what literacy means today. It can also help shift the tendency for many to still view literacy as an alphabetic process, encourage more equitable classroom practices that take into account the sources of student knowledge, and reveal the ways in which students are critically thinking about what they read online.

References

Afflerbach, P., & Cho, B. (2009). Determining and describing reading strategies: internet and traditional forms of reading. In H. S. Waters & W. Schneider (Eds.) *Metacognition*, *strategy use*, *and instruction* (pp. 201–225). Guilford.

Ahmed, F. (2018). First love letter to conflicting marriages: Exploration of ethnically diverse students' developing understanding during their reading of Romeo and Juliet using schema theory. *English in Education, 52*(2), 105-119.

Ajayi, L. (2011). Video "Reading" and multimodality: A study of ESL/literacy pupils' interpretation of Cinderella from their socio-historical perspective. *The Urban Review*, *44*(1), 60–89. https://doi.org/10.1007/s11256-011-0175-0

An, S. (2013). Schema theory in reading. *Theory and Practice in Language Studies*, *3*(1), 130–134. https://doi.org/10.4304/tpls.3.1.130-134

Anderson, M. (2018, May, 31). Teens, social media and technology. Retrieved from https://www.pewresearch.org/internet/2018/05/31/teens-social-media-technology-2018/

Anderson, R.C., Hiebert, E.H., Scott, J.A. & Wilkinson, I.A.G. (1985). *Becoming a nation of readers: The report of the national commission reading.* National Academy of Education.

Anderson, R. C., & Pearson, P. D. (1984). A schema-theoretic view of basic processes in reading comprehension. In P. D. Pearson, R. Barr, M. L. Kamil, & P. Mosenthal (Eds.), *Handbook of reading research* (pp. 255-291). Longman, Inc.

Arya, D. J., & Maul, A. (2021). Why sociocultural context matters in the science of reading and the reading of science: Revisiting the science discovery narrative. *Reading Research Quarterly*, *56*(S1), S273–S286. https://doi.org/10.1002/rrq.393

Baker, E.A., Pearson, D., & Roze, M.S. (2010). Theoretical perspectives and literacy studies:

An exploration of roles and insights. In E. A. Baker (Ed.), *The new literacies: Multiple perspectives on research and practice* (pp. 1-22). The Guilford Press.

Balcytiene, A. (1999). Exploring individual processes of knowledge construction with

hypertext. *Instructional Science*, *27*(3), 303–328. https://doi.org/10.1007/BF00897324

Bezemer, Jeff. (2012, March 15). *What is multimodality?*—Video. YouTube.

https://www.youtube.com/watch?v=nt5wPIhhDDU

Burke, A. (2013). Children's construction of identity in virtual play worlds—a classroom

perspective. *Language and Literacy*, *15*(1), 58–73.

Carrell, P. L. & Eisterhold, J. C. (1983). Schema theory and ESL reading pedagogy.

TESOL Quarterly, *17*(4), 553–573. https://doi.org/10.2307/3586613

Castek, J., Zawilinski, L., McVerry, J. G., O'Byrne, W. I., & Leu, D. J. (2011). The new

literacies of online reading comprehension: New opportunities and challenges for students with learning difficulties. In C. Wyatt-Smith, J. Elkins, & S. Gunn (Eds.), *Multiple Perspectives on Difficulties in Learning Literacy and Numeracy* (pp. 91–110). Springer Netherlands. https://doi.org/10.1007/978-1-4020-8864-3_4

Catts, H., Adolf, S., and Weismer, S. (2006). Language deficits in poor comprehenders: A

case for the simple view of reading. *Journal of Speech, Language, and Hearing Research, 49,* 278–293.

Catts, H. W. (2018). The Simple View of Reading: Advancements and False Impressions.

Remedial and Special Education, *39*(5), 317–323. https://doi.org/10.1177/0741932518767563

Chandler-Olcott, K. & Lewis, E. (2010). Screens and scrapbooking: Sociocultural perspectives

on new literacies. In E. A. Baker (Ed.), *The new literacies: Multiple perspectives on*

research and practice (pp. 242-264). The Guilford Press.

Chapman, J. W. & Tunmer, W. E. (1995). Development of young children's reading selfconcepts:

An examination of emerging subcomponents and their relationship with reading achievement. J*ournal of Educational Psychology, 87*(1), 154-167.

Chiu, Y. D. (2018). The simple view of reading across development: Prediction of grade 3

reading comprehension from prekindergarten skills. *Remedial and Special Education*, *39*(5), 289–303.

Coiro, J. (2003). Reading comprehension on the internet: Expanding our understanding of

reading comprehension to encompass new literacies. *The Reading Teacher 56*(6), 458-464.

Coiro, J., & Dobler, E. (2007). Exploring the online reading comprehension strategies used by

sixth-grade skilled readers to search for and locate information on the internet. *Reading Research Quarterly*, *42*(2), 214–257.

Cope, B. & Kalantzis, M. (2009). "Multiliteracies": New literacies, new learning.

    Pedagogies: An International Journal, *4*(3)*,* 164–195.
    https://doi.org/10.1080/15544800903076044

Dallacqua, A. K., & Sheahan, A. (2020). Making space: Complicating a canonical text

    through critical, multimodal work in a secondary language arts classroom. *Journal of Adolescent & Adult Literacy*, *64*(1), 67–77. https://doi.org/10.1002/jaal.1063

El Refaie, E., & Hörschelmann, K. (2010). Young people's readings of a political cartoon and

    the concept of multimodal literacy. *Discourse: Studies in the Cultural Politics of*

    Education, *31*(2), 195–207. https://doi.org/10.1080/01596301003679719

Ferguson, S., & Hebels, R. (2003). CHAPTER 1—The Internet and the web. In S. Ferguson &

    R. Hebels (Eds.), *Computers for Librarians* (3rd ed., pp. 1–40). Chandos

    Publishing. https://doi.org/10.1016/B978-1-876938-60-4.50007-0

Forzani, E., Leu, D. J., Yujia Li, E., Rhoads, C., Guthrie, J. T., & McCoach, B. (2020).

    Characteristics and validity of an instrument for assessing motivations for online

    reading to learn. *Reading Research Quarterly*, *56*(4), 761–780. https://doi.org/10.1002/rrq.337

Francis, D. J., Kulesz, P. A., & Benoit, J. S. (2018). Extending the simple view of reading to

    account for variation within readers and across texts: The complete view of reading (CVRi). *Remedial and Special Education*, *39*(5), 274–288. https://doi.org/10.1177/0741932518772904

Frankel, K. K., Deanna Brooks, M., & Learned, J. E. (2021). A meta-synthesis of qualitative

    research on reading intervention classes in secondary schools. *Teachers College Record: The Voice of Scholarship in Education*, *123*(8), 31–58.

Gee, J. P. (2003). *What video games have to teach us about learning and literacy*.

    Macmillan.

Goodwin, A. P., Cho, S.-J., Reynolds, D., Brady, K., & Salas, J. (2020). Digital versus paper

    reading processes and links to comprehension for middle school students. *American Educational Research Journal*, *57*(4), 1837–1867. https://doi.org/10.3102/0002831219890300

Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and*

    Special Education, 7(1), 6–10. https://doi.org/10.1177/074193258600700104

Guthrie, J. T., & Klauda, S. L. (2014). Effects of classroom practices on reading

    comprehension, engagement, and motivations for adolescents. *Reading Research Quarterly*, *49*(4), 387–416. https://doi.org/10.1002/rrq.81

Guthrie, J. T., Wigfield, A., Barbosa, P., Perencevich, K. C., Taboada, A., Davis, M. H., Scafiddi,

    N. T., & Tonks, S. (2004). Increasing reading comprehension and engagement through

concept-oriented reading instruction. *Journal of Educational Psychology, 96*(3), 403–423. https://doi.org/10.1037/0022-0663.96.3.403

Hartman, D., Morsink, P.M., & Zheng, J. (2010). From print to pixels: The evolution of cognitive conceptions of reading comprehension. In E. A. Baker (Ed.), *The new literacies: Multiple perspectives on research and practice.* (pp. 131-164). The Guilford Press.

Hawisher, G. E., Selfe, C.L., Moraski, B., & Pearson, M. (2004). Becoming literate in the information age: Cultural ecologies and the literacies of technology. *College Composition and Communication*, *55*(4), 642–692. https://doi.org/10.2307/4140666

Kachorsky, D. (2018). I am not Prometheus: *Traditional literacy and multimodal texts in secondary classrooms* [Unpublished doctoral dissertation]. Arizona State University.

Kalantzis, M., Cope, B., Chan, E., & Dalley-Trim, L. (2016). Literacies. (2nd ed.). [ebook edition]. Cambridge University Press.

Kalantzis, M. & Cope, B. (2021). *Literacies.* Works and Days. https://newlearningonline.com/literacies/chapter-2/kalantzis-and-cope-on-new-media-literacies

Knobel, M. and Lankshear, C. (2005). "New literacies": Research and social practice. 54th Yearbook of the National Reading Conference.

Knobel, M., & Lankshear, C. (2006). Digital literacy and digital literacies: Policy, pedagogy and research considerations for education. *Nordic Journal of Digital Literacy*, *1*(1), 12–24. https://doi.org/10.18261/ISSN1891-943X-2006-01-03

Kress, G. R. (2003). *Literacy in the new media age*. Routledge.

Kress, G. R. (2010). *Multimodality: A social semiotic approach to contemporary communication.* Routledge.

Kress, G., Jewitt, C., Ogborn, J., & Charalampos, T. (2014). *Multimodal teaching and learning: The rhetorics of the science classroom*. [ebook edition]. Bloomsbury Academic.

Lankshear C. & Knobel, M. (2006). *New literacies: Everyday practices and classroom learning.* Open University Press.

Lawless , K.A., & Schrader, P.G. (2008). Where do we go now? Understanding research on navigation in complex digital environments. In J. Coiro, M. Knobel, C. Lankshear, & D.J. Leu (Eds.), *Handbook of research on new literacies* (pp. 267 – 296). Erlbaum.

Lee, V. J., Meloche, A., Grant, A., Neuman, D., & Tecce DeCarlo, M. J. (2019). "My thoughts

on gun violence": An urban adolescent's display of agency and multimodal literacies. *Journal of Adolescent & Adult Literacy*, *63*(2), 157–168. https://doi.org/10.1002/jaal.944

Leu, D. J., Kinzer, C.K., Coiro, J., Castek, J. and Henry, L. A. (2017). New literacies: A

dual-level theory of the changing nature of literacy, instruction, and assessment. *The Journal of Education, 197*(2). 1-18.

Leu, D.J., Zawilinski, L., Forzani, E., & Timbrell, N. (2019). Best practices in teaching the new

literacies of online research and comprehension. In M. Morrow & L. Gambrell (Eds.), *Best practices in literacy instruction* (6th ed., pp. 343-365). The Guilford Press.

Lonigan, C.J., Burgess, S.R., & Schatschneider, C. (2018). Examining the simple view of reading

with elementary school children: Still simple after all these years. *Remedial and Special Education, 39*(5), 260-273.

New London Group. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard*

Educational Review, 66, 60–92.

Nation, K. (2019). Children's reading difficulties, language, and reflections on the simple view

of reading. *Australian Journal of Learning Difficulties*, *24*(1), 47–73. https://doi.org/10.1080/19404158.2019.1609272

Pearson, P.D., Roehler, L.R., Dole, J.A. & Duffy, G.G. (1992). Developing expertise in reading

comprehension instruction. In S. J. Samuels & A. E. Farstrup (Eds.), *What research has to*

say about reading instruction. (2nd ed., pp. 145-199). International Reading Association.

Pressley, M., & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively*

responsive reading. Lawrence Erlbaum.

RAND Reading Study Group. (2002). Reading for understanding: Toward an R&D program in

reading comprehension. RAND.

Reynolds, D. & Goodwin, A. (2016). Supporting students reading complex texts: Evidence for

Motivational Scaffolding. *AERA Open*, *2*(4).

Schaeffer, K. (2019, August 23). *Most U.S. teens who use cellphones do it to pass time, connect*

with others, learn new things. Retrieved from https://www.pewresearch.org/fact-tank/2019/08/23/most-u-s-teens-who-use-cellphones-do-it-to-pass-time-connect-with-others-learn-new-things/

Schilling, H. A. (2011). *An exploration of the reading strategies used by sixth grade students of*

varying reading abilities when reading internet sources to answer questions. [Doctoral dissertation, Ball State University]. ProQuest Dissertations Publishing.

Schmar-Dobler, E. (2003). Reading on the internet: The link between literacy and technology.

Journal of Adolescent and Adult Literacy. 47(1), 80-85

Shang, H.-F. (2015). An investigation of scaffolded reading on EFL hypertext comprehension. *Australian Journal of Educational Technology*, *31*(3), 293–312.

Shen, Y. (2008). An exploration of schema theory in intensive reading. *English Language Teaching*, *1*(2), 104. https://doi.org/10.5539/elt.v1n2p104

Sung, Y.-T., Wu, M.-D., Chen, C.-K., & Chang, K.-E. (2015). Examining the online reading behavior and performance of fifth-graders: Evidence from eye-movement data. *Frontiers in Psychology*, *0*. https://doi.org/10.3389/fpsyg.2015.00665

Snow, C. E. (2010). Reading comprehension: Reading for learning. *International Encyclopedia of Education, 3,* 413-418. https://doi.org/10.1016/B978-0-08-044894-7.00511-X

Snow, C. E. (2018). Simple and not-so-simple views of reading. *Remedial and Special Education*, *39*(5), 313–316. https://doi.org/10.1177/0741932518770288

Street, B. (1984). *Literacy in theory and in practice*. Cambridge University Press.

Street, B. (2016). Learning to read from a social practice view: Ethnography, schooling and adult learning. *PROSPECTS*, *46*(3), 335–344. https://doi.org/10.1007/s11125-017-9411-z

Street, B. & Besnier, N. (1994). Aspects of literacy. In T. Ingold (Ed.), *Companion encyclopedia of anthropology.* (pp. 527-562). Routledge.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Harvard University Press.

Zhang, S., & Duke, N. K. (2008). Strategies for internet reading with different reading purposes: A descriptive study of twelve good internet readers. *Journal of Literacy Research, 40*(1), 128–162. https://doi.org/10.1080/10862960802070491