

C O M M E N T A R Y

## The New Literacies of Online Reading Comprehension: Expanding the Literacy and Learning Curriculum

Donald J. Leu | J. Gregory McVerry | W. Ian O'Byrne | Carita Kiili | Lisa Zawilinski  
Heidi Everett-Cacopardo | Clint Kennedy | Elena Forzani

The Internet is the defining technology for literacy and learning in the 21st century. Approximately two billion individuals use the Internet (Internet World Stats, 2010). At the current rate of growth, more than one-half of the world's population will be online in five to seven years and most of the world will be online in 10 to 15 years. Never in the history of civilization have we seen a new technology adopted by so many, in so many different places, in such a short period of time.

While there are many explanations for the rapid growth in Internet usage, a primary impetus has been the economy and the workplace (Rouet, 2006; Smith, Mikulecky, Kibby, Dreher, & Dole, 2000; Organisation for Economic Co-operation and Development & the Centre for Educational Research and Innovation, 2010). Workplace settings are increasingly characterized by the effective use of information to solve important problems within a global economy (Friedman, 2006; Matteucci, O'Mahony, Robinson, & Zwick, 2005). Moreover, the efficient use of information skills in workplace contexts has become even more important as networked, digital technologies have provided greater access to larger amounts of information (Kirsch, Braun, Yamamoto, & Sum, 2007).

This analysis suggests that skill with the new literacies of the Internet and other Information and Communication Technologies (ICTs) will become an important determinant of an engaged life in an online age (International Reading Association, 2009; National Council of Teachers of English, 2008). This is true because the Internet and other ICTs are increasingly an important source of information and require new literacies to effectively exploit their information potential (Coiro, Knobel, Lankshear, & Leu, 2008). Individuals, groups, and societies who can identify the most important problems, locate useful information the fastest, critically evaluate information most effectively, synthesize information most appropriately to develop the best solutions, and then communicate these solutions to others most clearly will succeed in the challenging times that await us.

**The meaning of literacy rapidly and continuously changes as new technologies for information and communication continuously appear online and new social practices of literacy quickly emerge.**

How should we understand these changes, especially for education? Commentators from outside the research community and the popular press have presented us with unscientific, untested, and often misleading constructs such as Web 2.0 (O'Reilly, 2005) or notions of digital natives and digital immigrants (Prensky, 2001). Educational and literacy researchers have begun to develop more rigorous and systematic approaches to the study of these issues in mobile technologies (Facer et al., 2008), texting (Thurlow & Poff, 2009), gaming (Squire, 2005), multimodal

communication (Hull & Katz, 2006), online reading comprehension (Castek, 2008; Coiro & Dobler, 2007; Henry, 2007), and other areas. We believe that three issues have become especially important and have been largely ignored in public policies as we consider the Internet and other ICTs for educational use:

1. Literacy is now deictic; its nature and meaning continuously changes.
2. Effective online information use requires additional online reading comprehension practices, skills, and dispositions.
3. Misalignments in public policy, assessment, and instruction impede our ability to prepare students for the effective use of online information and communication.

## Literacy Is Now Deictic

Deixis is a construct developed by linguists to describe words whose meanings rapidly change when their context changes (Fillmore, 1966; Traut & Kerstin, 1996). "Here," for example, becomes "there" when I move just a few feet in any direction and "today" becomes "yesterday" every 24 hours, or by merely crossing the International Date Line. Each is a deictic concept.

With the Internet, literacy has become deictic (Leu, 2000); the meaning of literacy rapidly and continuously changes as new technologies for information and communication continuously appear online

and new social practices of literacy quickly emerge. Historically, literacy has always changed (Manguel, 1996), but over substantial periods of time. Today, however, the emergence of the Internet has brought about a period of rapid, continuous technological change and, as a result, rapid, continuous change in the nature of literacy.

The Internet is the most efficient system in the history of civilization for delivering new technologies that require new skills to read, write, and communicate effectively. It is also an amazingly efficient system for rapidly disseminating new social practices for the use of these technologies (Lankshear & Knobel, 2006). As a result, new technologies and new social practices rapidly and repeatedly redefine what it once meant, in a simpler world, to be able to read, write, and communicate effectively.

To be literate today often means being able to use some combination of blogs, wikis, texting, search engines, Facebook, foursquare, Google Docs, Skype, Chrome, iMovie, Contribute, Basecamp, or many other relatively new technologies, including thousands of mobile applications, or "apps." To be literate tomorrow will be defined by even newer technologies that have yet to appear and even newer social practices that we will create to meet unanticipated needs. Thus, the very nature of literacy continuously changes; literacy is deictic. It is becoming increasingly clear that the deictic nature of literacy will require us to continuously rethink traditional notions of literacy.

## The New Literacies of Online Reading Comprehension

Reading comprehension is one aspect of literacy where change is taking place. Online reading comprehension is not isomorphic with offline reading comprehension; additional practices, skills, and strategies appear to be required (Coiro & Dobler, 2007; Leu, Zawilinski, et al., 2007).

When we first think of online reading comprehension, many of us consider this to be the reading of a single webpage. It is not. Reading a single webpage is little different from offline reading comprehension; it represents reading a fixed and limited text, with little or no social interaction, no connection to other texts, no searching for information, and little if any

control by the reader about what to read. Few, if any, reading skills and strategies beyond those required for offline reading comprehension are required to read a single webpage.

Online reading comprehension, on the other hand, consists of a process of problem-based inquiry across many different online information sources, requiring several recursive reading practices: (a) reading online to identify important questions (b) reading online to locate information, (c) reading online to critically evaluate information, (d) reading online to synthesize information, (e) and reading online to communicate information. During these elements, new online and traditional offline reading comprehension skills are both required, often in complex and interrelated ways.

### ***Reading Online to Identify Important Questions***

We read on the Internet to solve problems and answer questions. How a problem is framed or how a question is understood is a central aspect of online reading comprehension. Recent work by Taboada and Guthrie (2006) within traditional texts suggested that reading initiated by a question differs in important ways from reading that does not.

### ***Reading Online to Locate Information***

A critical component of successful Internet reading is the ability to read and locate information that meets one's needs (Eagleton, Guinee, & Langlais, 2003; Guinee, Eagleton, & Hall, 2003). The reading ability required to search for and locate information on the Internet may very well serve as a gatekeeper skill, because you will be unable to solve the problem if you cannot locate information.

New online reading skills and strategies may be required, for example, to generate effective keyword search strategies (Bilal, 2000; Kuiper & Volman, 2008), to read and infer which link may be most useful within a set of search engine results (Henry, 2006), and to efficiently scan for relevant information within websites (McDonald & Stevenson, 1996; Rouet, 2006). Findings across several studies clearly indicate that many middle school students are not skilled at efficiently using the Internet to locate information that meets their needs (Bilal, 2000; Eagleton et al.,

2003; Sutherland-Smith, 2002; Wallace, Kupperman, Krajcik, & Soloway, 2000).

### ***Reading Online to Critically Evaluate Information***

A third component of successful Internet use is the ability to critically evaluate online information (Graesser et al., 2007; Sanchez, Wiley, & Goldman, 2006). Critically evaluating online information involves the ability to read and evaluate the information's level of accuracy, reliability, and bias. Critical evaluation on the Internet presents challenges quite different from traditional print and media sources because the content of online information is even more diverse and commercially biased (Fabos, 2008) than that of print sources.

### ***Reading Online to Synthesize Online Information***

Successful Internet use also requires the ability to read and synthesize information from multiple online sources (Jenkins, 2006). The Internet introduces additional challenges to coordinate and synthesize vast amounts of information presented in multiple media formats, from a nearly unlimited and disparate set of sources (Jenkins, 2006; Rouet, 2006).

### ***Reading Online to Communicate Online Information***

A fifth component of successful Internet use is the ability to communicate via the Internet to seek information, think together about information, or share what you have learned (Britt & Gabrys, 2001; Kiili, Laurinen, Marttunen, & Leu, 2011). Online reading comprehension, by necessity, includes communication. Online reading, writing, and discussion are so closely connected during the problem-based inquiry process that it is not possible to separate them (McVerry, 2007; Zawilinski, 2009). Thus, online reading comprehension includes the online reading and communication skills required in discussion, texting, blogs, wikis, video, shared writing spaces (such as Google Docs), and social networks such as Ning (Boyd & Ellison, 2008; Forte & Bruckman, 2006; Lewis & Fabos, 2005).

## **Additional Differences**

In addition to the distinctive nature of online reading comprehension as a process of problem-based inquiry

**Online reading comprehension is not isomorphic with offline reading comprehension; additional practices, skills, and strategies appear to be required.**

with several recursive reading practices, three other differences exist between online and offline reading comprehension. First, online reading is a self-directed, text-construction process; readers choose the online texts that they read through the links that they follow as they gather information to solve a problem. Thus, in addition to constructing meaning, readers also physically construct the texts they read online. Central to online reading is the self-

directed construction of texts and intertextual reading. While this is also possible during offline reading, it always takes place during online reading.

Second, no two readers read the same text to solve the same problem. Each reader typically follows a unique informational trace, selecting a unique sequence of links to information and sampling unique segments of information from each location. This, too, is also possible in offline reading; it always takes place during online reading.

Finally, online reading comprehension is not simply an individual process but rather a collaborative and social practice. Recent work suggests that the potential of the social and collaborative nature of online reading extends far beyond simply communicating a solution to a problem. Work by Kiili et al. (2011), exploring collaborative online reading to construct meaning and knowledge, suggested that collaborative reading of online information about a controversial issue, within an argumentative discussion framework, can lead to important learning gains. Comparing individual (Kiili, Laurinen, & Marttunen, 2009) with collaborative online reading (Kiili, Laurinen, Marttunen, & Leu, 2011), it was found that individual readers concentrated on gathering facts, whereas the collaborative reading context offered additional opportunities for deeper exploration of ideas and different perspectives.

Related work by Everett-Cacopardo (2011), Zawilinski (2011), and O'Byrne (2011) supports the importance of framing online reading comprehension as a collaborative, social practice. Everett-Cacopardo (2011) discovered that a number of

teachers find it highly effective to have their students engage in collaborative, online projects with students in other nations. Zawilinski (2011) found that collaborative blogging in social studies between students in first and fifth grades led to important gains in understanding and communication. O'Byrne (2011) found that collaborative development of "spoof" sites led to greater skill in students' critical evaluation of information they focused on in the creation of their webpages. Thus, we need to begin to consider more fully the important social dimensions of online reading, both during the offline, verbal discussions that can be used in thoughtfully constructed lessons as well as during online communication and collaborative problem solving.

## **Misalignments in Public Policy, Assessment, and Instruction**

Unfortunately, compared with established information on online reading comprehension, initial attempts at public policies in a world of online information and learning have created a number of misalignments in assessment and instruction. Perhaps it is because we are caught in a period of transition between reading on the page and reading on the screen that these misalignments are especially salient. Regardless, the misalignments appear to have serious consequences for our youth.

Consider, for example, that adolescents use various aspects of the Internet with increasing frequency, especially social networking, texting, and video (Pew Research Center, 2010). Evidence also indicates that our youth are online daily at a far greater rate than other segments of the world's population (Lenhart, Madden, & Hitlin, 2005), a rate that is increasing from 27 minutes per day in 1999, to 62 minutes in 2004, to 89 minutes in 2009 (Rideout, Foehr, & Roberts, 2010).

Unfortunately, however, there is increasing evidence that online reading by adolescents is not very skilled (Bennett, Maton, & Kervin, 2008; Leu, Reinking, et al., 2007), especially their ability to locate (Bilal, 2000; Eagleton et al., 2003; Wallace, Kupperman, Krajcik, & Soloway, 2000) and critically evaluate the information they encounter online (Kiili, Laurinen, & Marttunen, 2008; Walraven,

Brand-Gruwel, & Boshuizen, 2009). How are nations responding to this and other issues associated with online reading? Some do better than others, it seems.

### ***The Case of the United States***

Consider, for example, that no state in the United States currently assesses any element that is essential for online reading comprehension in their state reading assessment (Leu et al., 2009). These elements include items such as the reading of search engine results, the reading of a wiki or e-mail message, or the critical evaluation of the source of information at a webpage.

In addition, no state measures students' ability to communicate effectively with any of the online communication tools commonly available: wikis, blogs, e-mail, text messaging, or others. More troubling, perhaps, no state permits any student to take a state writing assessment with a word processor, should he or she choose to do so. This still is true today, despite evidence from a series of studies, over 10 years old, estimating that 19% of fourth graders who were classified as "Needs Improvement" in writing and could type 20 words per minute would move up to the "Proficient" performance level (Russell & Plati, 2000; Russell & Plati, 2001) if permitted to use a word processor. Current state assessments have been constructed around state standards from another era, none of which include any elements specific to online reading comprehension, such as locating online information, evaluating online information, synthesizing online information, or communicating with any of the digital communication tools now available.

This situation may be changing. In the United States, the Common Core State Standards Initiative (2010) has recently sought to establish more uniform standards across states to prepare students for college and careers in the 21st century. One of their key design considerations, research and media skills, is consistent with the perspective we have outlined here. It states,

To be ready for college, workforce training, and life in a technological society, students need the ability to *gather, comprehend, evaluate, synthesize, and report* (italics added) on information and ideas, to conduct original research *in order to answer questions or solve problems*, (italics added) and to analyze and create a high volume

and extensive range of print and nonprint texts in media forms old and new. The need to conduct research and to produce and consume media is embedded into every aspect of today's curriculum. (Common Core State Standards, n.d., p. 4)

Ironically, this design principle is more completely implemented in the Common Core State Standards for writing than for reading. It is included in 4 of the 10 anchor standards for writing (Anchor Standards 6–9):

6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
9. Draw evidence from literary or informational texts to support analysis, reflection, and research. (Common Core State Standards, n.d., p. 41)

It is only included in 1 of 10 anchor standards for reading (Anchor Standard 7) and then only marginally, where evaluation and synthesis are recognized without specific mention of the Internet:

7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. (Common Core State Standards, n.d., p. 10)

Indeed, nowhere in any of the reading standards do the terms *Internet* or *online* appear, though some grade levels do include searching for information, beginning with the grade three reading standards.

Thus, online reading comprehension skills appear more systematically in the Common Core State Standards for writing than they do for reading, an interesting development. Reading standards appear to have been constructed without much attention to a central design principle intended to inform their development.

With respect to assessments now being developed for the Common Core State Standards, it is unlikely that any online reading comprehension skills



will be included, because there is little, if any, attention to them in the reading standards themselves. Two multistate consortia were recently funded by the United States federal government to develop assessments aligned with the common core standards: the Partnership for Assessment of Readiness for College and Careers and the SMARTER Balanced Assessment Consortium. Neither is scheduled to be available for states until 2014–2015. In the meantime, current state assessments will be used in the United States, none of which include elements of online reading comprehension.

### ***The Case of Australia***

The Australia Curriculum, Assessment and Reporting Authority, or ACARA, (n.d.) has been developing the Australian Curriculum, a project somewhat similar to the Common Core State Standards Initiative in the United States. Several “general capabilities” are expected in the English curriculum including ICT competence:

ICT competence is an important component of the English curriculum. Students develop the skills and understanding required to use a range of contemporary technologies. In particular, they explicitly develop increasingly sophisticated word-processing skills to enhance text construction. Students also progressively develop skills in using information technology when conducting research, a range of digital technologies to create, publish and present their learning, and communication technologies to collaborate and communicate with others both within and beyond the classroom. (ACARA, n.d., General Capabilities, Information and Communication Technology Competence section, para. 2)

The English Curriculum integrates this capability into each year’s statement of the achievement standard and content descriptions. Each year’s achievement standard includes the term *multimodal texts*, which may include online information. The content standards for each year, examples of what should be taught, also include limited evidence that online comprehension skills should be developed, such as this one from Year 3 English (ACELA1790): “Identify the features of online texts that enhance navigation” (ACARA, n.d., Year 3, Text Structure and Organisation, para. 4). More specific evidence appears in the “Elaborations”

of the English Curriculum such as this one from Year 4 English (ELBE900): “Participating in online searches for information using navigation tools and discussing similarities and differences between print and digital information” (ACARA, n.d., Year 4, Text Structure and Organisation, para. 4).

While the informational inquiry practices of online reading comprehension do not appear in the English Curriculum as a complete unit, they do appear in science as an “Elaboration.” Examples in the Australian Curriculum (ACARA, n.d.) include the following:

- “Developing strategies and techniques for effective research using secondary sources, including use of the internet.” (Elaboration, Science, Years 7 and 8; Planning and Conducting section, para. 1)
- “Experiencing a range of ways of finding information and ideas, including internet research.” (Elaboration, Science, Years 5 and 6; Planning and Conducting section, para. 1)
- “Using internet research to identify problems that can be investigated.” (Elaboration, Science, Years 9 and 10; Questioning and Predicting section, para. 1)

### **Current Misalignments May Help the Rich Get Richer and the Poor Get Poorer**

The failure to tightly integrate the practices of online reading comprehension into national standards or curricula and into the assessments being developed to inform instruction has important consequences for those who are least advantaged in a society. Policy misalignments lead to a serious concern for any society based on egalitarian principles: They serve to increase achievement gaps, not close them.

How do current misalignments work against the literacy development of those who are least privileged? The United States example may be illustrative: Children in the poorest school districts in the United States have the least amount of Internet access at home (Cooper, 2004). Unfortunately, the poorest schools are also under the greatest pressure to raise scores on

state assessments that have nothing to do with online reading comprehension (Henry, 2007).

There is little incentive to teach the new literacies of online reading comprehension because they are not tested. Thus, students in the poorest schools become doubly disadvantaged: They have less access to the Internet at home, and, when they come to school, our schools do not always prepare them for the new literacies of online reading comprehension.

Now, consider students in the most privileged schools: Cooper (2004) indicated that most children from advantaged communities have broadband Internet connections at home. As a result, teachers feel greater freedom to integrate the Internet into their curricula and support students in using it (Henry, 2007); it is easy to assign homework requiring Internet use when one knows that students have Internet access at home.

Lazarus, Wainer, and Lipper (2005), for example, found that 63% of children from households earning more than \$75,000 annually reported that they used the Internet at school, compared with only 36% of children from households earning less than \$15,000 annually. Thus students in richer districts become doubly privileged: They have greater access to the Internet at home and they use it more often at school.

It is the cruelest irony of our public policies that the students in the United States who most need to be prepared at school for an online age of information are precisely those who are being prepared the least. This public policy failure has important consequences for education because the Internet is now a central source of information, and learning is dependent on the ability to read and comprehend complex information at high levels (Alexander & Jetton, 2002; Bransford, Brown, & Cocking, 2000).

## Our Future?

It remains to be seen if our standards, curriculum, and assessments, and the instructional practices that are closely related to each, can keep up with the continuous changes taking place to literacy. Recent initiatives in both the United States and Australia illustrate a range of potential. The new literacies of online reading comprehension are recognized as a central design element of the Common Core State Standards for

the English language arts in the United States, but there is little evidence that this design principle was translated systematically into the reading standards. In Australia, there appears to be somewhat better movement in this direction, including integration into science.

Ironically, online reading and Internet use are positioned most visibly in the writing standards, not the reading standards, in the United States. The reason for this somewhat surprising development is not at all clear.

It remains to be seen if new assessments being considered will include the new reading skills required for successful online information use. Because this is not a central part of the reading standards in the United States there is little reason to expect that they will be a part of assessments for that nation.

Integrating basic aspects of online reading comprehension into the reading curriculum appears to be a slow, circuitous process; one that is sometimes met with resistance. Perhaps this resistance is prompted by a basic reluctance to venture beyond the touchstone of our field, the book. Or perhaps it is prompted because we do not all fully see the way forward. Or perhaps continuous change is simply too challenging to attempt to conceive in thoughtful ways. Whatever the source of this resistance, there clearly are two paths that diverge for each of us as Robert Frost (1920) so vividly described in his well-known poem, "The Road Not Taken." Down one, we allow others to define the future of reading in terms of our past. Down the other, we step forward and contribute to defining the future of reading for those who follow. The path we choose is important for all of us, but it is especially important for those who have the least access and opportunity to fully engage in the future of reading, online.

## Note

*Appreciation is expressed to Lisa Kervin, University of Wollongong, Jon Callow, University of Sydney, and Katina Zammit, University of Western Sydney, for their thoughtful comments to an earlier draft.*

**It is the cruelest irony of our public policies that the students in the United States who most need to be prepared at school for an online age of information are precisely those who are being prepared the least.**

## References

- Alexander, P.A., & Jetton, T.L. (2002). Learning from text: A multidimensional and developmental perspective. In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 285–310). Mahwah, NJ: Lawrence Erlbaum Associates.
- Australian Curriculum Assessment and Reporting Authority. (n.d.). *The Australian Curriculum, v1.2*. Retrieved May 31, 2011, from [www.australiancurriculum.edu.au/Home](http://www.australiancurriculum.edu.au/Home)
- Bennett, S., Maton, K., & Kervin, L. (2008). The digital natives debate: A critical review of the evidence. *British Journal of Educational Technology*, 39(5), 775–786. doi:10.1111/j.1467-8535.2007.00793.x
- Bilal, D. (2000). Children's use of the Yahoo!igans! Web search engine: I. Cognitive, physical, and affective behaviors on fact-based search tasks. *Journal of the American Society for Information Science*, 51(7), 646–665.
- Boyd, D.M., & Ellison, N.B. (2008). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication*, 13(1), 210–230.
- Bransford, J.D., Brown, A.L., & Cocking, R.R. (Eds.). (2000). *How people learn: Brain, mind, experience, and school* (Expanded ed.). Washington, DC: National Academies Press.
- Britt, M.A., & Gabrys, G.L. (2001). Teaching advanced literacy skills for the World Wide Web. In C.R. Wolfe (Ed.), *Learning and teaching on the World Wide Web* (pp. 73–90). San Diego, CA: Academic Press.
- Castek, J. (2008). *How do 4th and 5th grade students acquire the new literacies of online reading comprehension? Exploring the contexts that facilitate learning*. Unpublished doctoral dissertation, University of Connecticut.
- 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.
- Coiro, J., Knobel, M., Lankshear, C., & Leu, D.J. (Eds.). (2008). *Handbook of research on new literacies*. New York: Lawrence Erlbaum Associates.
- Common Core State Standards Initiative. (2010). *Common Core State Standards Initiative: Preparing America's students for college and career*. Retrieved November 10, 2010, from [www.corestandards.org](http://www.corestandards.org)
- Cooper, M. (2004). *Expanding the digital divide and falling behind on broadband: Why a telecommunications policy of neglect is not benign*. Washington, DC: Consumer Federation of America. Retrieved April 17, 2007, from [www.consumerfed.org/pdfs/digitaldivide.pdf](http://www.consumerfed.org/pdfs/digitaldivide.pdf)
- Eagleton, M., Guinee, K., & Langlais, K. (2003). Teaching Internet literacy strategies: The hero inquiry project. *Voices from the Middle*, 10(3), 28–35.
- Everett-Cacopardo, H. (2011). *Classrooms without borders: How online collaboration can connect adolescents to literacy and learning around the world*. Manuscript submitted for publication.
- Fabos, B. (2008). The price of information: Critical literacy, education, and today's Internet. In J. Coiro, M. Knobel, C. Lankshear, & D.J. Leu (Eds.), *Handbook of research on new literacies* (pp. 839–870). Mahwah, NJ: Lawrence Erlbaum Associates.
- Facer, K., Joiner, R., Stanton, D., Reid, J., Hull, R., & Dirk, D. (2008). Savannah: Mobile gaming and learning. In J. Coiro, M. Knobel, C. Lankshear, & D.J. Leu (Eds.), *Handbook of research on new literacies* (pp. 1003–1020). Mahwah, NJ: Lawrence Erlbaum Associates.
- Fillmore, C. (1966). Deictic categories in the semantics of 'come'. *Foundations of Language*, 2(3), 219–227.
- Forte, A., & Bruckman, A. (2006). From Wikipedia to the classroom: Exploring online publication and learning. *Proceedings of the International Conference of the Learning Sciences, Vol. 1* (pp. 182–188). Bloomington, IN: Author.
- Friedman, T.L. (2006). *The world is flat*. New York: Farrar, Straus and Giroux.
- Frost, R. (1920). *Mountain interval*. New York: Henry Holt.
- Graesser, A.C., Wiley, J., Goldman, S.R., O'Reilly, T., Jeon, M., & McDaniel, B. (2007). SEEK Web tutor: Fostering a critical stance while exploring the causes of volcanic eruption. *Metacognition and Learning*, 2(2–3), 89–105. doi:10.1007/s11409-007-9013-x
- Guinee, K., Eagleton, M.B., & Hall, T.E. (2003). Adolescents' Internet search strategies: Drawing upon familiar cognitive paradigms when accessing electronic information sources. *Journal of Educational Computing Research*, 29(3), 363–374.
- Henry, L.A. (2006). SEARCHing for an answer: The critical role of new literacies while reading on the Internet. *The Reading Teacher*, 59(7), 614–627.
- Henry, L.A. (2007). *Exploring new literacies pedagogy and online reading comprehension among middle school students and teachers: Issues of social equity or social exclusion?* Unpublished doctoral dissertation, University of Connecticut, Storrs.
- Hull, G.A., & Katz, M.L. (2006). Crafting an agentive self: Case studies of digital storytelling. *Research in the Teaching of English*, 41(1), 43–81.
- International Reading Association. (2009). *New literacies and 21<sup>st</sup>-century technologies* (Position statement). Newark, DE: Author.
- Internet World Stats. (2010) *Usage and population statistics*. Retrieved July 1, 2010, from [www.internetworldstats.com/stats.htm](http://www.internetworldstats.com/stats.htm)
- Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. New York: New York University Press.
- Kiili, C., Laurinen, L., & Marttunen, M. (2008). Students evaluating Internet sources: From versatile evaluators to uncritical readers. *Journal of Educational Computing Research*, 39(1), 75–95.
- Kiili, C., Laurinen, L., & Marttunen, M. (2009). Skillful Internet reader is metacognitively competent. In L.T.W. Hin & R. Subramaniam (Eds.), *Handbook of research on new media literacy at the K–12 level: Issues and challenges* (pp. 654–668). Hershey, PA: IGI Global.
- Kiili, C., Laurinen, L., Marttunen, M., & Leu, D.J. (2011). *Working on understanding: Collaborative reading on the Web*. Manuscript under review.
- Kirsch, I., Braun, H., Yamamoto, K., & Sum, A. (2007). *America's perfect storm: Three forces changing our nation's future*. Princeton, NJ: Educational Testing Service. Retrieved May 31, 2011, from [www.ets.org/Media/Research/pdf/PICSTORM.pdf](http://www.ets.org/Media/Research/pdf/PICSTORM.pdf)
- Kuiper, E., & Volman, M. (2008). The Web as a source of information for students in K–12 education. In J. Coiro, M. Knobel, C. Lankshear, & D.J. Leu (Eds.), *Handbook of re-*



- search on new literacies (pp. 241–266). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lankshear, C., & Knobel, M. (2006). *New literacies* (2nd ed.). Maidenhead, England: Open University Press.
- Lazarus, W., Wainer, A., & Lipper, L. (2005). *Measuring digital opportunity for America's children: Where we stand and where we go from here*. Santa Monica, CA: The Children's Partnership. Retrieved March 5, 2009, from [www.contentbank.org/DOMS](http://www.contentbank.org/DOMS)
- Lenhart, A., Madden, M. & Hitlin, P. (2005). *Teens and technology: Youth are leading the transition to a fully wired and mobile nation*. Washington, DC: Pew Internet & American Life Project.
- Leu, D.J. (2000). Literacy and technology: Deictic consequences for literacy education in an information age. In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 743–770). Mahwah, NJ: Lawrence Erlbaum Associates.
- Leu, D.J., McVerry, J.G., O'Byrne, W.I., Zawilinski, L., Castek, J., & Hartman, D.K. (2009). The new literacies of online reading comprehension and the irony of No Child Left Behind: Students who require our assistance the most, actually receive it the least. In L.M. Morrow, R. Rueda, & D. Lapp (Eds.), *Handbook of research on literacy instruction: Issues of diversity, policy, and equity* (pp. 173–194). New York: Guilford.
- Leu, D.J., Reinking, D., Carter, A., Castek, J., Coiro, J., Henry, L., et al. (April 11, 2007). *Defining online reading comprehension: Using think aloud verbal protocols to refine a preliminary model of Internet reading comprehension processes*. Paper presented at The American Educational Research Association. Chicago, IL. Retrieved May 31, 2011, from [docs.google.com/Doc?id=dcbjhrtq\\_10djqrhz](http://docs.google.com/Doc?id=dcbjhrtq_10djqrhz)
- Leu, D.J., Zawilinski, L., Castek, J., Banerjee, M., Housand, B., & Liu, Y. (2007). What is new about the new literacies of online reading comprehension? In L. Rush, J. Eakle, & A. Berger (Eds.), *Secondary school literacy: What research reveals for classroom practices* (pp. 37–68). Urbana, IL: National Council of Teachers of English.
- Lewis, C., & Fabos, B. (2005). Instant messaging, literacies, and social identities. *Reading Research Quarterly*, 40(4), 470–501.
- Manguel, A. (1996). *A history of reading*. New York: Viking Penguin.
- Matteucci, N., O'Mahony, M., Robinson, C., & Zwick, T. (2005). Productivity, workplace performance and ICT: Industry and firm-level evidence for Europe and the U.S. *Scottish Journal of Political Economy*, 52(3), 359–386.
- McDonald, S., & Stevenson, R.J. (1996). Disorientation in hypertext: The effects of three text structures on navigation performance. *Applied Ergonomics*, 27(1), 61–68. doi:10.1016/0003-6870(95)00073-9
- McVerry, J.G. (2007). Forums and functions of threaded discussions. *New England Reading Association Journal*, 43(1), 79–85.
- National Council of Teachers of English. (2008). *Position statement: 21st century curriculum and assessment framework*. Retrieved May 31, 2011, from [www.ncte.org/positions/statements/21stcentframework](http://www.ncte.org/positions/statements/21stcentframework)
- O'Byrne, W.I. (2011). *Facilitating critical evaluation skills through content creation: Empowering adolescents as readers and writers of online information*. Unpublished doctoral dissertation, University of Connecticut, Storrs.
- O'Reilly, T. (2005). *What is Web 2.0?* O'Reilly Network. Retrieved on August 6, 2006, from [oreilly.com/web2/archive/what-is-web-20.html](http://oreilly.com/web2/archive/what-is-web-20.html)
- Organisation for Economic Co-operation and Development & the Centre for Educational Research and Innovation. (2010). *Trends shaping education 2010*. Paris: OECD Publishing.
- Pew Research Center. (2010). *Millennials: A portrait of generation next*. Retrieved March 1, 2010, from [pewresearch.org/millennials](http://pewresearch.org/millennials)
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1–6.
- Rideout, V., Foehr, U., & Roberts, D. (2010). *Generation M2: Media in the lives of 8- to 18-year-olds*. Retrieved February 1, 2010, from [www.kff.org/entmedia/mh012010pkg.cfm](http://www.kff.org/entmedia/mh012010pkg.cfm)
- Rouet, J.F. (2006). *The skills of document use: From text comprehension to Web-based learning*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Russell, M., & Plati, T. (2000). *Mode of administration effects on MCAS composition performance for grades four, eight and ten*. A report of findings submitted to the Massachusetts Department of Education by the National Board on Educational Testing and Public Policy.
- Russell, M., & Plati, T. (2001). Effects of computer versus paper administration of a state mandated writing assessment. *Teachers College Record*. Retrieved November 30, 2006, from [escholarship.bc.edu/cgi/viewcontent.cgi?article=1012&context=intasc](http://escholarship.bc.edu/cgi/viewcontent.cgi?article=1012&context=intasc)
- Sanchez, C.A., Wiley, J., & Goldman, S.R. (2006). Teaching students to evaluate source reliability during Internet research tasks. In S.A. Barab, K.E. Hay, & D.T. Hickey (Eds.), *Proceedings of the seventh international conference on the learning sciences* (pp. 662–666). Mahwah, NJ: Lawrence Erlbaum Associates.
- Smith, M.C., Mikulecky, L., Kibby, M.W., Dreher, M.J., & Dole, J.A. (2000). What will be the demands of literacy in the workplace in the next millennium? *Reading Research Quarterly*, 35(3), 378–383.
- Squire, K. (2005). Changing the game: What happens when video games enter the classroom? *Innovate*, 1(6). Retrieved June 6, 2011, from [www.innovateonline.info/pdf/vol1\\_issue6/Changing\\_the\\_Game\\_-\\_What\\_Happens\\_When\\_Video\\_Games\\_Enter\\_the\\_Classroom\\_.pdf](http://www.innovateonline.info/pdf/vol1_issue6/Changing_the_Game_-_What_Happens_When_Video_Games_Enter_the_Classroom_.pdf)
- Sutherland-Smith, W. (2002). Weaving the literacy Web: Changes in reading from page to screen. *The Reading Teacher*, 55(7), 662–669.
- Taboada, A., & Guthrie, J. (2006). Contributions of student questioning and prior knowledge to construction of knowledge from reading information text. *Journal of Literacy Research*, 38(1), 1–35.
- Thurlow, C., & Poff, M. (in press). The language of text messaging. In S.C. Herring, D. Stein, & T. Virtanen (Eds.), *Handbook of the pragmatics of CMC*. Berlin, New York: Mouton de Gruyter.
- Traut, G., & Kerstin, K. (1996). *Dictionary of language and linguistics*. London, New York: Routledge.
- Wallace, R.M., Kupperman, J., Krajcik, J., & Soloway, E. (2000). Science on the Web: Students online in a sixth-grade classroom. *Journal of the Learning Sciences*, 9(1), 75–104.

- Walraven, A., Brand-Gruwel, S., & Boshuizen, H.P.A. (2009). How students evaluate information and sources when searching the World Wide Web for information. *Computers & Education*, 52(1), 234–246.
- Zawilinski, L. (2009). HOT blogging: A framework for blogging to promote higher order thinking. *The Reading Teacher*, 62(8), 650–661.
- Zawilinski, L. (2011). *An exploration of a collaborative blogging approach to literacy and learning: A mixed method study*. Unpublished doctoral dissertation, University of Connecticut, Storrs.

Leu is Professor and Neag Endowed Chair of Literacy and Technology in the Neag School of Education at the University of Connecticut, Storrs, USA; e-mail donald.leu@uconn.edu.

McVerry is an assistant professor at Southern Connecticut State University, New Haven, USA; e-mail jgregmccverry@gmail.com.

O'Byrne is an assistant professor at the University of New Haven, New Haven, USA; e-mail wiobyne@gmail.com.

Kiili is an advanced doctoral student at the University of Jyväskylä, Finland; e-mail carita.kiili@jyu.fi.

Zawilinski is an assistant professor at the University of Hartford, Connecticut, USA; e-mail lzread98@gmail.com.

Everett-Cacopardo, Kennedy, and Forzani are doctoral students in the Neag School of Education at the University of Connecticut, Storrs, USA; e-mail everettcacopardo@gmail.com, ctkennedy@gmail.com, and elenaforzani@gmail.com.