CHAPTER 7

Digital Literacy ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●

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Technology has always had a strong influence on teaching and learning, as it has influenced all other aspects of our lives and world. The technology of graphite pencils, the printing press, the mimeograph machine, and the overhead projector all changed the way we approached literacy teaching and learning. After all, each of these is an example of technology at work—and, in its time, each was a new technology at that. Today, the new technologies most strongly influencing teaching and learning are the Internet and related information and communication technologies (ICTs), including weblogs (or blogs), wikis, podcasts, discussion boards, and streaming video. However, Leu and his colleagues contend that today's new technologies are very different from those of the past. They are so different that they are changing the very nature of what it means to be literate and, by extension, the very nature of what it means to be a literacy teacher (Leu, Kinzer, Coiro, & Cammack, 2004). According to Coiro, Knobel, Lanskhear, and Leu (2008a):

> The Internet . . . has brought unprecedented dimensions to both the speed and the scale of change in the technologies for literacy, forcing us to directly confront the issue of new literacies. No previous technology for literacy has been adopted by so many, in so many different places, in such a short period, and with such profound consequences. (p. 3)

In this chapter, we address digital learning as it relates to the skills and strategies associated with traditional print text as well as newer digital texts. Learning in the digital realm can support the development of skills and strategies we are already teaching; equally important, however, are the ways in which digital learning requires us to teach new skills and strategies. In this chapter, we look at digital learning from both of these perspectives.

OVERVIEW OF RESEARCH

The impact of the digital age on literacy learning is the subject of an ever-growing body of research, much of which is reported in the *Handbook of Research on New Literacies* (Coiro, Knobel, Lankshear, & Leu, 2008b), a volume over 1,300 pages in length. The editors of this handbook argue that literacy as we have known it for the past 500 years has changed significantly, and they identify the following as central characteristics of digital technologies:

- They are critical to full participation in our 21st-century world.
- They are *deictic*, meaning that they are rapidly and continuously changing.
- They are multiple, multimodal, and multifaceted, and therefore require not literacy as a singular entity, but *multiple literacies*.
- For effective use, they require new and different skills, strategies, and dispositions, which are termed *new literacies*.

Anstey and Bull (2006) suggest that a literate person in the 21st century

- Is able to read both traditional texts and new digital texts, and to use these to communicate.
- Has at his or her disposal a large repertoire of literacy skills and strategies.
- Is flexible enough to respond to the ever-changing landscape of new literacies.

In this section, we present an overview of research related to the prevalence of digital technologies, the nature of digital texts and digital literacies, teacher practice with respect to digital technologies, and implications of digital learning for central constructs addressed in this book.

The Prevalence of Digital Technologies in Today's World

We teach in a world very different from the one we grew up in, and this is especially true for those of us over the age of 30. Tools such as cell phones, laptop computers, MP3 players, and iPads; social networking sites such as Facebook and Twitter; and video-sharing sites such as YouTube are not only "firmly embedded in youth culture," as Merchant (2010) remarks, but in adult culture as well. It has been reported that the average student ages 8–18 spends over 7 hours a day participating in various technologies (Rideout, Foehr, & Roberts, 2010). In a study of U.S. children ages 6 and under, Vandewater and her colleagues (2007) found that on a typical day when they used technology, such as video games and computers, they did so for an average of 50–55 minutes. In a study of 37 children in grades K–2, Dodge, Husain, and Duke (2011) found that 84% reported using the Internet outside of school. These figures align with those showing a fast-paced increase in Internet use among students ages 12–17, 93% of whom reported using the Internet in 2008 (Pew Internet Group, 2009).

Older students are producing more text than ever before in their out-of-school lives. Whether they are writing an e-mail, sending a text message, or updating their status on Facebook, today's students are constantly composing, and we have the recent advances in technology to thank (or, in some cases, blame) for these changes. In fact,

digital technologies have been shown to pique the interest of even reluctant writers (Quenneville, 2001). One reason for this is that digital technologies allow students to become producers of text rather than merely consumers (Dezuanni, 2010). Richardson (2010) reports that even elementary school children are creating content, producing information, and interacting with others via the Internet. Researchers have identified the following ways in which digital tools both motivate students and change the nature of written expression:

- *Freedom*. As producers of text outside of school, students are not restricted to guidelines set by a teacher, a district, or the state. Yet even without a rubric, they are successful in navigating within and among determined requirements.
- *Choice*. Students are drawn to the variety of technologies and the abundant choices available for all ages and achievement levels.
- *Accessibility*. The term *being mobile* has taken on new meanings. Even our youngest students are taking advantage of being able to be connected "on the go." Furthermore, keyboards, spelling assistance, and the availability of multiple media make text production, communication, and authorship possible even for students who experience difficulty with traditional print-based writing.
- *Identity and voice*. By expanding the range of what's possible in the arena of written expression, ICTs give students greater capacity for identity construction and personal voice. This comes through in rich connections with home culture and language (Witte, 2007).
- *Authenticity*. One of the most powerful dimensions of many digital tools is the capacity they provide for writing to real audiences, beyond the classroom. This source of motivation, along with the others above, holds great instructional potential (Warschauer & Ware, 2008).

The fact that daily literacy practices now include interactions with texts presented through multiple modes presents a challenge to traditional views of literacy and learning (Kress, 2000). Prensky (2001) refers to students growing up today as "digital natives," a term that highlights their frequent and natural interactions with digital technologies. As more and more students are "born digital" (Palfrey & Gasser, 2008), they will enter the classroom with new experiences, proficiencies, and needs.

Despite the prevalence of new digital technologies in the lives of our students, the digital divide still separates the "haves" from the "have-nots" both in home access and in access and appropriate use in school. In October 2005, reports from the U.S. Census Bureau indicated that over 85% of households with an annual income of $75,000 or more had a household computer with Internet access, compared to just 30% of households with an annual income below $25,000. This wide margin of difference in home access and use is compounded by differences in school access and use. Leu and colleagues (2009) highlight the fact that the poorest U.S. school districts are the least likely to integrate the Internet into the curriculum because they are the hardest pressed to raise students' scores on tests that do not include measures of new literacies. They make the strong statement that "Our failure to understand the Internet as a reading comprehension issue has produced policies that actually work to perpetuate the achievement gaps among poor and diverse students" (p. 173). Thus, adequate accessibility is not the only issue students and their teachers face. In order for low-income students to catch

up to their often more technologically advanced peers, opportunities to use computers strategically—that is, beyond basic skill practice—are necessary (Celano & Neuman, 2010). Therefore, providing opportunities for in-school assignments that utilize technology to its full potential will benefit all students and help bridge the gap between the "haves" and the "have-nots."

The Nature of Digital Texts

Differences between print and digital texts have important implications for reading and writing. Coiro and Dobler (2007) point to key features of digital text that require different types of comprehension than traditional print text: *nonlinear hypertext, inclusion of multiple media*, and *interactive design*. The hyperlinks embedded in most digital text allow the reader to move quickly, either from one part of the text to another or from one text to a related but entirely different text. Moreover, *text* includes a variety of media, such as symbols, animation, photographs, audio, and video. Several of these features are apparent on author/illustrator Eric Carle's rich and informative blog (which is one of several hyperlinks on the website *www.eric-carle.com*), including a short "Dear Friends" letter, hyperlinks to previous posts in a column to the right of the letter, artwork, photos of exhibitions and books signings, a hyperlink to video about a recent book, and a link to the *Eric Carle Museum of Picture Book Art* website, which itself includes possibilities for a virtual tour, news about traveling exhibits, and a link to the museum store. In addition to nonlinear hypertext and multimedia text, digital texts are often interactive. Visit the *United Nations Cyberschoolbus: Global Teaching and Learning Project* website (*http://cyberschoolbus.un.org*) to find interactive games focused on the availability of safe food and water worldwide, and on responses to natural disasters, for example. Other interactive sites offer opportunities for students to post responses to text using their own words, pictures, or art, in order to question, expand upon, engage in dialogue about, or offer an alternative perspective to the information presented. In addition, digital technologies offer opportunities to go public with writing in the form of personal webpages and digital storytelling, as well as to make connections with others worldwide, in the forms of pen-pal correspondence and online literature discussion groups (e.g., Castek, Bevans-Mangelson, & Goldstone, 2006; Grisham & Wolsey, 2006; Larson, 2009; Sylvester & Greenidge, 2009).

The Nature of Digital Literacies

As stated earlier, digital technologies have generated the need for new types of literacy or new literacies. As we consider the role of the literacy teacher with respect to digital learning, it is helpful to consider several informed perspectives. First, we find the following definition of new literacies associated with the Internet and other digital technologies helpful.

> The new literacies of the Internet include the skills, strategies, and dispositions necessary to successfully use and adapt to rapidly changing information and communication technologies and contexts that continuously emerge in our world and influence all areas of our personal and professional lives. These new literacies allow us to use the Internet and other ICTs to identify important questions, navigate to locate information,

critically evaluate the usefulness of that information, synthesize information to solve problems, and communicate the solutions to others. (Leu, Leu, & Coiro, 2004, p. 421)

Second, we consider the International Society of Technology in Education (ISTE, 2007) National Educational Technology Standards for Students, which include the following:

- Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. (*Creativity and Innovation*)
- Students apply digital tools to gather, evaluate, and use information. (*Research and Information Fluency*)
- Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. (*Critical Thinking, Problem Solving, and Decision Making*)

Third, the International Reading Association's (2009) position statement *New Literacies and 21st-Century Technologies* states that students have the right to many things, among them:

- Teachers who use ICTs skillfully for teaching and learning effectively.
- A literacy curriculum that offers opportunities to read, share, and create content collaboratively with peers from around the world.
- Literacy instruction that embeds critical and culturally sensitive thinking into print and digital literacy practices.
- State reading and writing standards that include new literacies.
- Equal access to ICTs for all classrooms and all students.

Fourth, digital literacies are embedded in the Common Core State Standards for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects (CCSS; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). As early as grade 2, the CCSS reference digital text within the Reading and Writing Standards. By grade 5, students are expected to do the following:

- Analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text (e.g., graphic novel, multimedia presentation of fiction, folktale, myth, poem). (Reading Standards, p. 12)
- Use technology, including the Internet [with support from adults], to produce and publish writing as well as to interact and collaborate with others. (Writing Standards, p. 21)
- Include multimedia components and visual displays (e.g., graphics, sound) in presentations when appropriate to enhance the development of main ideas or themes. (Speaking and Listening Standards, p. 24)

As indicated in the introduction to the CCSS, preparation for life in the 21st century requires the ability to "analyze and create a high volume and extensive range of print and nonprint texts in media forms old and new" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 4).

Finally, much has been written about the importance of connecting in-school experiences to students' out-of-school experiences (Tatum, 2011). Today, such connections necessarily include digital connections aligned with characteristics of the 21st-century learner. Students bring new expectations into the classrooms that connect to their personal, out-of-school experiences with digital learning and literacy. Table 7.1 highlights the unique experiences and expectations of many 21st-century learners, along with the instructional needs of all such learners.

Teacher Practice with Respect to Digital Technologies

Just as the ISTE has issued national standards for students (see above), it has issued standards for teachers. The National Educational Technology Standards for Teachers (ISTE, 2008) highlight the importance of designing technology-rich learning environments that include authentic instructional and assessment experiences, coupled with teaching and modeling of the knowledge and work processes required in a global and digital society. However, the road toward achieving these standards has been difficult for teachers.

In 2009, only 40% of teachers reported that they or their students *often* used computers in the classroom during instructional time (U.S. Department of Education, National Center for Educational Statistics, 2010). With respect to quality of use, Cuban, Kirkpatrick, and Peck (2001) found that even when teachers had access to exceptional technology, they used it infrequently, and that when they did, it was to sustain current

TABLE 7.1. Digital Learning Experiences, Expectations, and Needs of 21st-Century Learners

Experiences	Expectations	Needs
• Active participation in out-of-school digital literacy practices (e.g., blogs, video games) • Familiarity with a variety of text formats (e.g., traditional print, online, images, videos, audio) • Participation in multimodal text production (e.g., drawing software, narrated video) • Ability to learn features of new technologies quickly through exploration and experimentation	• High-interest academic materials • Hands-on learning experiences • Multifaceted, collaborative learning experiences • Freedom for exploration and individual choice	• Focus on higher-order critical thinking skills • Understanding that students are often unaware of the quality of information online and often assign greater value to this information than to information from traditional print-based texts (e.g., Schacter, Chung, & Dorr, 1998) • Explicit instruction aimed at improving students' website evaluation skills (Zhang & Duke, 2011) • Opportunities for creative thinking and innovation • Proficient movement between and among multiple modalities • Explicit instruction, demonstration, and guided practice in attainment of 21st-century skills and strategies

instructional practices (e.g., reviewing homework) rather than to create new learning experiences. The lack of sustained professional development opportunities, and the focus on traditional reading and writing in most statewide tests, are contributing factors. Other issues—such as feeling overwhelmed with trying to learn and keep up with new technologies, frustration when technology fails, and fear of the unknown—have been discussed as reasons why teachers are hesitant to incorporate technology into their classrooms (Hayes, 2007).

There is a direct correlation between effective classroom implementation of new technologies and teachers' personal beliefs about and use of these technologies. Teachers who are frequent users of new technologies often have higher comfort levels with them and are more likely to create successful opportunities for integration (Mueller, Wood, Willoughby, Ross, & Specht, 2008). In addition, teachers' interaction with their students during technology engagement has lead to more constructive academic experiences and opportunities for active learning (Hsu, 2011). An overall increase in technology use, by both teachers and students, has had a positive influence on how technology is viewed for instructional purposes (Baylor & Richie, 2002) and is a constant reminder of how changes in society affect and drive learning experiences. Reports of teacher engagement in digital teaching and learning indicate great variation, and almost all teacher self-reports refer to the process as an ever-unfolding journey (Karchmer, Mallette, Kara-Soteriou, & Leu, 2005) in which the teachers are perpetual learners. This disposition may feel uncomfortable for teachers who associate effective practice with the mastery of instructional tools, and it is also a challenge for teachers who are uncomfortable with the idea that they are co-learners with their students, as opposed to "the experts." Finally, with the preponderance of options available, it is important for teachers to engage students in "meaningful, purpose-driven literacy technology integration" (Watts-Taffe & Gwinn, 2007, p. 31), rather than the use of digital tools for their own sake. Just as students can be attracted to the newest, flashiest tools, teachers too can be tempted to incorporate tools without a firm grasp on the ways in which their use is aligned with appropriate instructional goals and objectives. Although we believe that literacy learning in the 21st century requires an expansion of traditional competencies, effective instruction is determined not by whether traditional materials/methods or methods/materials associated with new technologies are used. Effective instruction is determined by the degree to which the selected methods/materials reflect the current strengths and limitations each student brings to the wide array of literacy learning goals encountered in school.

Up to this point, we have emphasized that new technologies have implications for instruction that promotes independence, critical thinking, and collaboration. Here we want to make four points clear. First, it is possible to integrate new technologies into literacy instruction without fundamentally altering approaches to instruction or goals for literacy learning. For example, many teachers make effective use of software to build traditional literacy competencies such as phonological awareness, fluency, vocabulary, and comprehension. Second, the use of new technologies does not ensure the implementation of best practices with respect to literacy teaching. It is up to each teacher to incorporate new technologies in ways that reflect research-based characteristics of effective instruction. Too often, "new" digital tools coexist with outdated instructional practices, serving as nothing more than electronic worksheets or flashcards, where the goal is rote memorization rather than in-depth understanding and independent application.

Third, in classrooms where very little technology is available, teachers can nonetheless address skills and strategies for new literacies. For example, using multiple print sources on the same topic, and teaching students how to synthesize information across these sources, are two of the most important comprehension strategies associated with the Internet. Finally, while digital technologies afford new opportunities for student choice, text accessibility, and personal connection in reading and writing, research indicates that students require teacher direction, scaffolding, and specific strategy instruction, just as they do when reading traditional print texts, in order to maximize these opportunities (Dalton & Proctor, 2008; McKenna, Labbo, Conradi, & Baxter, 2011).

The remainder of this chapter aims to illustrate some of the ways in which digital learning can be a daily part of literacy instruction, and to show how it can be used to further student success and achievement in meaningful, purpose-driven ways. Previous chapters of this book have addressed some central elements in literacy teaching and learning. In Table 7.2, we highlight the role of digital technologies with respect to these elements.

Meeting the Needs of All Learners

New technologies, coupled with the central instructional elements discussed above, greatly expand the range of possibilities for meeting the individual needs of all students. In addition to common features of digital learning environments, such as hyperlinks to word pronunciations, embedded spelling and word meaning resources, and visual displays of information, numerous software applications have been designed specifically to increase the literacy development of struggling readers and writers. For example, the software program Thinking Reader has been used successfully to promote comprehension (Dalton & Strangman, 2006). In addition, research highlights the promise of software programs for increasing reading comprehension and English language competency among English language learners (McKenna et al., 2011). Liaw (1997), for example, found that using computerized books increased verbal interaction between and among students and helped foster language development. Recent research focused on gifted learners points to the power of new technologies in providing access to above-grade-level text and content, as well as forums for learning and expressing knowledge in multiple ways and engaging in learning communities outside the classroom (Thomson, 2010). Finally, new technologies can support teachers through websites offering multiple and varied texts and text recommendations (e.g., *www.starfall.com, www.storylineonline.net, www.storycart.com*), language translation applications (*translate.google.com*), and communities of practice (e.g., *www.readwritethink.org; www.thinkfinity.org*).

SUMMARY OF BIG IDEAS FROM RESEARCH

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- Digital technology use outside of school is prevalent among school-age children, but the "digital divide" still exists and is too often perpetuated in classrooms.
- Differences between digital and print texts are significant enough to warrant instruction in the new literacies associated with digital texts and related technology.
- New technologies can be used to support learning of traditional literacy skills and strategies, as well as skills and strategies for new literacies.

TABLE 7.2. Impact and Implications of Digital Technologies on Central Instructional Elements

Instructional element	Impact and implications of digital technologies
Motivation and engagement	Through quick, easy connections to current information, presented in a variety of ways, students see relevance to their daily lives, in both *what* and *how* they are learning. Digital technologies can be used to heighten student interest, expand student choice, increase student collaboration, and broaden thematic connections in learning, all of which are linked to increased motivation (Guthrie, 2011).
Classroom environment	Digital technologies can change the ways students interact with classroom space, materials, ideas, and each other. Collaboration becomes more robust, and collaborators can include students and teachers in other schools, states, or countries. A print-rich environment includes words, as well as images and symbols, captured on bulletin boards, chart paper, easels, screens, journals, blogs, and slideshows (Barone & Wright, 2008). The teacher can be more of a facilitator than ever before; provision of explicit models is as vital as ever before; thematic instruction is more accessible than ever before; and the learning community can be more collaborative than ever before.
Balanced, differentiated instruction	Digital technologies offer new possibilities for the processes and products of teaching and learning. Teachers have more options for customizing instruction, both with respect to how students engage in learning and how they demonstrate what they have learned. Anderson-Inman and Horney (2007) suggest that technologies' malleability and their capacity to change and adapt texts bring direct advantages to readers, especially those with reading difficulties. For example, the text-to-speech feature of many digital texts and software programs can assist students who struggle to decode grade-level texts, while hyperlinks to word meanings, multimedia representations, and virtual tours can provide "just-in-time" support in building text-specific vocabulary and prior knowledge (Dalton & Proctor, 2008). Research also indicates that strong readers of traditional print text may struggle with the multimodal elements of digital text, whereas strong online navigational skills, ability to "control" the text, and the assistance of multimedia features may compensate for limitations, such as lack of prior knowledge, among other readers (Bilal, 2001; Castek, Zawilinski, McVerry, O'Byrne, & Leu, 2011; Coiro, 2011). Furthermore, various software programs and Web-based applications (e.g., TELE-Web) have effectively supported the writing performance of students with learning disabilities (Englert, Wu, & Zhao, 2005). Thus digital technologies can change the dynamics of difficulty.
Ongoing assessment and progress monitoring	Digital technologies offer tremendous possibilities for collecting, storing, analyzing, and sharing data related to student achievement and ongoing progress, such as audio recordings of oral reading and retellings, writing samples, and videos of response to various types of instruction. Such samples can be stored individually or collectively in electronic portfolios, and can be shared with colleagues, parents, and students themselves for purposes of collaborative decision making (Fahey, Lawrence, & Paratore, 2007). Teachers can also observe each other more readily by using video-sharing software and collaborative problem solving (Taylor, 2011). The other side is the need to assess reading and writing in multiple formats, especially those related to the Internet (Afflerbach, Kim, Crassas, & Cho, 2011).

TABLE 7.2. *(continued)*

Instructional element	Impact and implications of digital technologies
Culturally responsive instruction	Digital technologies offer students and teachers opportunities to "step outside of personal experience within a particular linguistic, ethnic, and cultural group to experience others," a fundamental component of the 2010 International Reading Association Standards for Reading Professionals as described by Tatum (2011, p. 437). Furthermore, culturally responsive instruction is supported by an expansion of what counts as reading and writing, greater diversity in texts and text types, the affordance of a wider array of learning response options (including those that integrate out-of-school literacies and popular culture with in-school literacies), and language translation capabilities (Alvermann, 2011; Morrell & Duncan-Andrade, 2002).

- Skills and strategies for new literacies include website navigation, critical evaluation of information, synthesis of information from multiple texts and across multiple text types, communication, and collaboration. Students require a great deal of teacher support and direction to develop these competencies.
- Effective use of new technologies in the classroom requires careful decision making on the part of teachers, as well as the ability to assume the role of facilitators and co-learners in the classroom.

    In the next section of this chapter, we discuss classroom applications of digital technologies and instruction in new literacies.

## EXAMPLES OF EFFECTIVE PRACTICES

Focus on Word Recognition and Vocabulary

Digital Language Experience Approach

Kevin Ray (all names in this section are pseudonyms) has incorporated the *digital language experience approach* (D-LEA; Labbo, Eakle, & Montero, 2002) into the weekly routine of his first-grade class at Franklin Elementary School. Using the school's digital camera, each Monday he photographs an event or events related to the life of his classroom. He then loads the digital photos onto the classroom computer for collaborative writing the next day. On Tuesday, he projects the photos onto a whiteboard and engages his students in conversation about each photo. He then assigns each photo to a pair or triad who come up with a sentence to describe what is depicted in the photo. As these sentences are dictated, Kevin types them as photo captions (see Figure 7.1). After he types each caption, the class reads it aloud. These photos and captions become repeated reading experiences for the remainder of the week and are routinely used to highlight a word recognition or spelling strategy Kevin wants to introduce or review. Saving these texts in digital format allows for multiple review opportunities. He can load them onto individual computers for students to return to them independently or to incorporate them into center activities; he can also save them in a folder on the desktop to
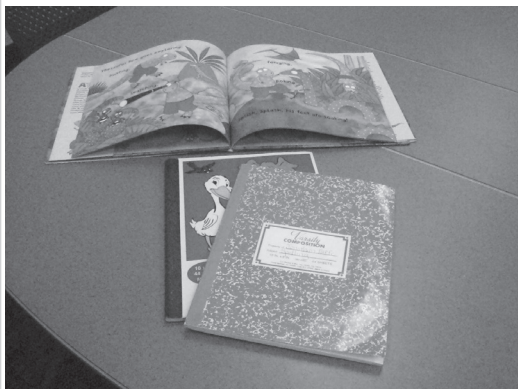
This is the Writing Center.
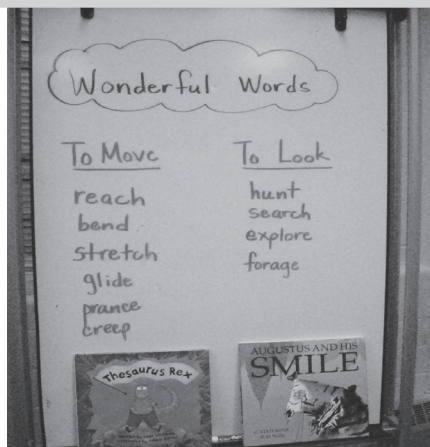
We can look at books we've read to get ideas for words to use when we write.

FIGURE 7.1. Two photographs in first-grade digital story, with captions dictated by the class.

return to them over time as an illustration of his class's growth in the conventions of text (sequence of events, main idea and details, etc.). In addition, they become a model for storytelling his students will do in small groups as the year unfolds, using presentation software such as KidPix.

At the beginning of the year, Kevin uses these photos to tie his students' language to the articulation and understanding of classroom routines—the order in which things happen, as well as various classroom procedures (e.g., getting lunch in the cafeteria, selecting a book at the library, and using the computer stations). As new routines are introduced, such as writing workshop, he uses this to reinforce them and encourage his students to use their growing academic vocabularies to describe them. He also photographs events related to topics of study, such as safety, communities, and habitats. The language experience approach (Stauffer, 1970), on which the D-LEA is based, is an established means of reinforcing the connection between oral and written language; it also provides students with easier access to word recognition and the act of reading, via familiar, self-generated text.

Kevin has extended this approach to focus on his students' use of academic language and appropriation of conventional text grammars, as well as exploration into the new text grammars of the digital world. He also considers this an ideal time to be intentional in his own vocabulary choices—explaining what he's doing by using the vocabulary of digital texts, such as *digital photos, desktop, folder, save, caption*, and *move the captions into a word-processing document*. Furthermore, he has found the D-LEA to support differentiation of instruction. While all of his students benefit from the production of meaningful text within mutually understood contexts and supported by photo images, collaboration with peers, and reinforcement and practice over the week, he has seen tremendous benefit for his students with special educational needs related to

language processing. (For more about teaching word recognition, see Johnson & Kuhn, Chapter 8, this volume.)

Vocabulary Images

Susanna Montero and her third graders use images in the public domain—for example, ones found in Google Images and Flickr (*www.flikr.com*)—to learn new vocabulary. In her school, the majority of students are English language learners; vocabulary has been identified as a buildingwide focus, and all teachers are encouraged to devote in-depth instruction to new vocabulary found in read-alouds and reading selections used for instruction. Digital images allow Susanna's students to "see" the meanings of words such as *persistent, gnarled*, and *canopy*. She transports these images to PowerPoint slides that can be shown on "the big screen" during whole-class lessons, viewed on "the small screen" during independent work, and printed as handouts to take home. She also gives her students chances to locate their own images from a set Susanna has compiled, and to create individual slides to pair with written definitions and to practice throughout the week. (For more about vocabulary instruction, see Kucan, Chapter 11, this volume.)

Focus on Comprehension

Fostering Comprehension of Print-Based, Linear Text by Using Digital Concept Maps

Successful readers of all ages and academic levels connect preexisting knowledge to new ideas founds in texts. In addition, it is important to support students as they make connections between texts, and between a text and the world in which the text was written and is usually meant to reflect in some way.

Kristan Jacobs, a fifth-grade teacher at Summit Elementary, uses electronic graphic organizers to help her students make connections as they read (see Figure 7.2). When students have completed an independent novel, one theme from the novel becomes the main topic for each concept map. Students are encouraged to illustrate relationships between the theme/topic in the novel and similar themes found in other novels. Finally, they are encouraged to relate the novel to experiences in the world, beyond their personal experiences, by relating the theme to outside sources (including images, videos, and audio clips). Relationships are shown through the use of linking words, and further explanation of the relationships is included in written text. Having used paper–pencil concept maps in the past, Kristan has learned that using them along with electronic maps can provide learning support. She recognizes the advantages of electronic concept-mapping software (e.g., Kidspiration, Inspiration) and websites (e.g., *www.bubbl.us*), including the unique way information is presented, the multiple opportunities to highlight intertextuality among all types of texts, and the capability for students to include imagery as demonstration (and construction) of their understanding.

Concept maps and other digital presentation tools, such as Prezi (*http://prezi.com*) and iMovie, are increasingly used in lieu of more traditional book reports as a means of assessing reading comprehension and reader response. These multimodal tools provide excellent forums for assessing higher-level comprehension and/or engaging students in collaborative learning opportunities. This is the case in Jeannette Wu's sixth-grade class,
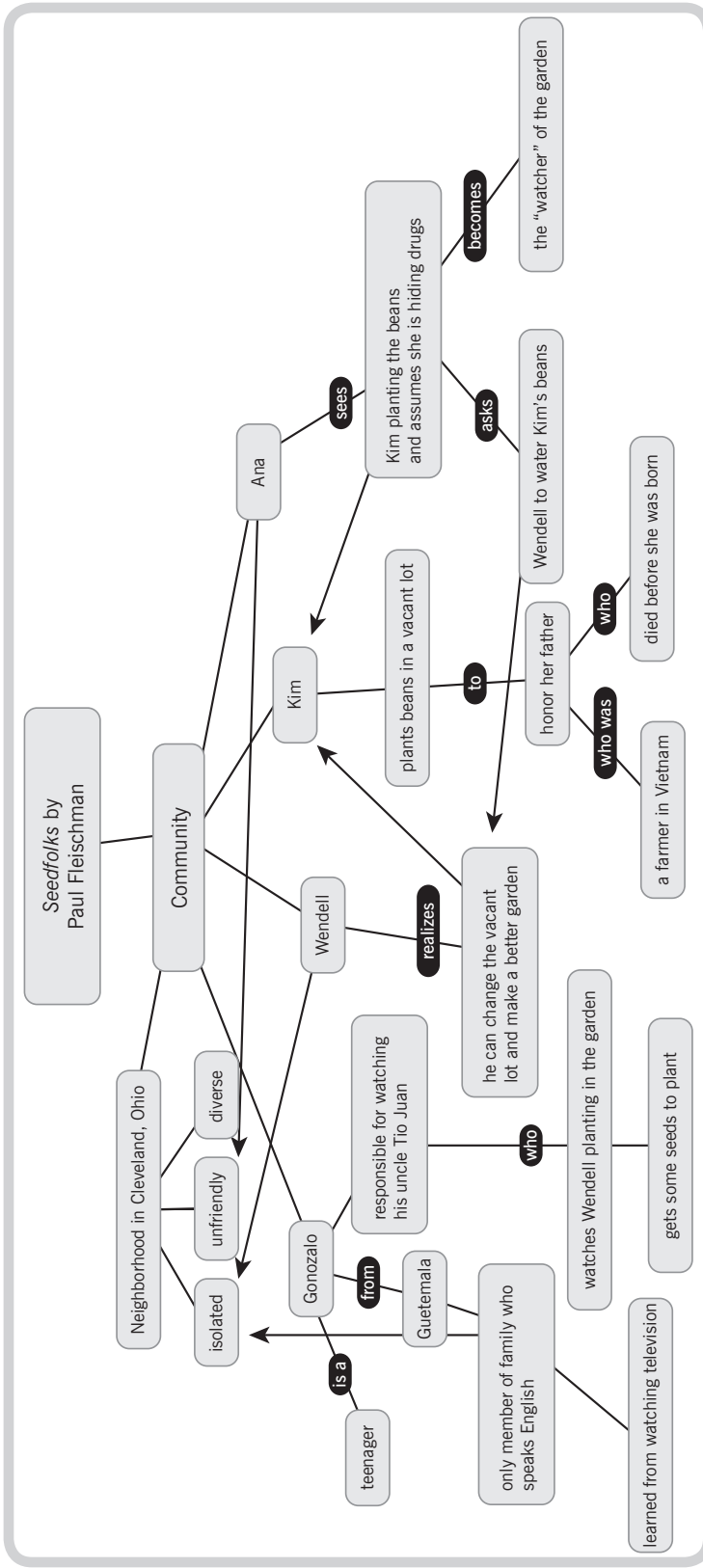
FIGURE 7.2. Concept map from a fifth-grade classroom.

where students create multimodal presentations to demonstrate their understanding of *The Watsons Go to Birmingham—1963* by Christopher Paul Curtis (1995). Working in groups, they explore the capabilities of presentation software such as KidPix and Power-Point, as well as free Web-based tools such as Prezi and Camtasia (Screencast-O-Matic). Inspired by examples Jeannette found on websites such as YouTube, TeacherTube, and Prezi, her students use these tools to go beyond the limitations of a traditional book report to represent with depth and individuality what the Curtis book meant to them. Furthermore, Jeannette finds that her students reading above grade level are challenged and remain engaged.

Fostering Comprehension of Digital Text

Digital technologies provide us with different ways to achieve existing learning objectives, and often to deepen students' learning. But it is clear that digital technologies also call for different learning objectives. As noted earlier, the nature of digital texts calls for different comprehension skills and strategies from those associated with print-based text. As Tapscott (1998) stated, "It's not point and click. It's point, read, think, click." Recent research to determine the specific types of reading and thinking required (Coiro & Dobler, 2007; Henry, 2006; Leu et al., 2008) point to the use of coordinated higher-order comprehension strategies, including students' ability to do the following:

- Identify important questions.
- Navigate to locate information.
- Critically evaluate the credibility and usefulness of information.
- Synthesize to solve problems.

Think-alouds, modeling, learning guides, and independent practice are effective in teaching the higher-order strategies of digital comprehension. As early as second grade, Jenna Martin teaches her students how to navigate among hypertext links. Visiting the Eric Carle website together, Jenna begins by asking her students what they see on the site. Using her interactive whiteboard, she makes a list of what they say. She then slowly scrolls down the page and asks what else they see. One student calls out, "I want to see his studio!" and another suggests, "Let's watch the video." These comments are tied to Jenna's next step, which is to ask her students where they should go next. After hearing several different responses, she asks, "How should we decide which hyperlink to click on?" This brings a pause, and Jenna continues by explaining that a reader's purpose determines his or her navigation strategy. Here Jenna's goal is to help her students understand the thought processes behind navigational moves. She reminds her students that they have been studying the role of nature in Eric Carle's illustrations. Using this information, she asks again which sites they should visit. She then allows them to work in pairs, using a learning guide to direct their decision making. After this period of guided practice, the students come back together as a whole class and discuss the various approaches that pairs took and what they learned.

During pair work, Jenna circulates among her students to observe their decision making and provide support as needed. Knowing that this task requires different competencies than other reading comprehension tasks her students have engaged in, Jenna has paired students with complementary print-based literacy strengths. For example,

Joey, who is a very strong decoder with developing comprehension strategies, has been paired with Lucia, who uses comprehension strategies well. Marianne, who is a strong reader all around, has been paired with Dani, who is a beginning reader with strong visual and design abilities. As she is able, Jenna takes notes on what she is observing. Using these notes and the students' completed learning guides, Jenna later assesses not only how well students completed the task, but also what she has learned about students' strengths and needs within this new literacy domain of navigating a website. Later that month, Jenna brings some of these work samples and her reflections to her professional learning community (PLC) as a contribution to her and others' ongoing professional development. (For more on PLCs, see Peterson, Chapter 21, this volume.)

Meanwhile, back in Jeannette's sixth-grade classroom, students are learning how to critically evaluate information on the Internet. During the process of making connections between *The Watsons Go to Birmingham—1963* and the real-world events of the 1960s, particularly the civil rights movement, Jeannette conducts a lesson on website evaluation, using the site *www.martinlutherking.org.* Although the URL for this site seems reasonable, and the homepage speaks directly to students, the site is in fact hosted by a white pride organization and is aimed at disseminating misinformation and encouraging hate. Due to the nature of the site, Jeannette obtains parents' permission before teaching this lesson; it could also be taught with other sites, including "hoax sites" designed specifically to fool the reader and promote more critical reading among students. (See, e.g., *www.zapatopi.net/treeoctopus,* a site devoted to saving the "endangered Pacific Northwest Tree Octopus.") Jeannette's interest in using a real site, and one so disconcerting, is both to underscore the dangers of consuming online information without thinking critically and to make a powerful connection between the tragic 1963 bombing of a Birmingham church (depicted in the Curtis book) and the present-day existence of hate among some individuals and groups. This approach to one dimension of *The Watsons Go to Birmingham—1963* includes a look at nationwide and worldwide organizations that work toward peace and the elimination of violence based on hate. Instruction such as this reflects a critical stance and is aligned with powerful teaching and learning in our diverse society. (For more about comprehension instruction, see Stahl, Chapter 9, and Garas-York, Shanahan, & Almasi, Chapter 10, this volume.)

Focus on Written Expression

Fostering Digital Communication

After completing an author study on Grace Lin, students in Chris Leezer's third-grade class are interested in getting to know Lin even more as an author. Lin's website (*www. gracelin.com*) provides some of the information students are interested in knowing, as well as new information about her work and her life as a writer. However, they still have questions. Drawing on the interest of the students, Chris suggests that they contact Lin directly. Her website provides several ways to get in touch with the author, and after much discussion, the students decide that as a class they will send a written letter and post a comment on her blog. This decision is informed by a mini-lesson comparing and contrasting letters, e-mail messages, and blog posts. Since students want to reach out quickly in an informal message to convey their appreciation of Lin's books,

the blog seems like the perfect avenue to complete this task. To ask some of their more personal questions, and to discuss specific connections they've made with Lin's work, the students choose a letter to the author as the most appropriate vehicle. Through these activities, Chris's students practice writing across genres, as well as decision making with respect to available genres. Since many of Chris's students have never created a blog post, this is an entirely new genre with new conventions to learn. Once learned, students can appropriate it by creating a class blog to keep parents and community members apprised of school events.

Responding to Reading

After a reading of *When You Reach Me* by Rebecca Stead (2009), Lucy Garcia has her fourth-grade participants in a gifted languages arts program complete a book review by using VoiceThread (*www.voicethread.com*), a collaborative, multimedia site that encourages group conversation. Throughout this interactive project, students are expected to discuss information about the text and their reading experience by using voice, images, and videos. After students have uploaded their final VoiceThread book report, they have the opportunity to view and comment on their classmates' work. Comments can be recorded by using a computer microphone, by making a telephone call, or by uploading an audio file. In addition, students can leave typed comments or video comments via a webcam. This innovative project takes the standard book report to a new level and provides students with the opportunity to become producers not only of their own work, but of their own learning. This lesson encourages students to socialize and situate themselves in a social environment while creating meaning in response to a text. Learning opportunities such as these build upon the social and oral traditions of meaning making that are prevalent in many students' homes and communities. (For more about developing students' written expression, see Troia, Chapter 12, this volume.)

Focus on the Disciplines

Historically, content-area literacy has involved instruction intended to help students better comprehend material as presented in textbooks (Lesley & Matthews, 2009). More recently, researchers have illustrated that disciplinary literacy "requires an understanding of how knowledges are constructed and organized in the content area, an understanding of what counts as warrant or evidence for a claim, and an understanding of the conventions of communicating that knowledge" (Moje et al., 2004, p. 45). In this respect, digital technologies offer amazing opportunities for students to step into the worlds of scientists, mathematicians, historians, artists, and other. This type of meaningful participation, engagement, and reading *in* the disciplines provides learning opportunities far beyond those afforded by reading *about* the disciplines (Bean, 2010).

Virtual Field Trips

Virtual field trips provide students and teachers with a wealth of resources that are visually appealing, interactive and provide accurate, current information tied to content-area standards. The Smithsonian National Museum of Natural History, for

example, currently offers The Ocean Portal (*http://ocean.si.edu*), an expansive website designed for marine exploration. This website includes a section entitled "For Educators," offering lesson plans and activities, as well as a number of additional resources for building background information or for further reading. Providing students with the opportunity to navigate and experience this website before a required reading helps situate their learning and has the potential to lead to autonomous problem solving and increase overall understanding. Such activities, however, are not limited to science and social studies; a quick browse through different websites will show the expansive and diverse resources available. For example, the San Francisco Museum of Modern Art (*www.sfmoma.org*) and the Exploratorium's The Science of Music (*www.exploratorium.edu/music*) provide online exhibits, movies, podcasts and interviews that appeal to students and encourage active exploration and learning. See Table 7.3 for a list of museum websites that offer interactive exhibits for teachers and students to visit without leaving the classroom. (For more about teaching literacy in the disciplines, see Cervetti, Chapter 14; Halvorsen, Alleman, & Brugar, Chapter 15; Fogelberg, Satz, & Skalinder, Chapter 16; and Fisher, McDonald, & Frey, Chapter 17, this volume.)

The Evolution of Effective Classroom Practices

Much of what we know about effective practice with respect to digital texts and new literacies is emerging. This is true both for the field at large and for individual teachers who are learning from their experiences each day. The rapidly changing nature of digital technologies requires a high degree of teacher observation and reflection, in order to gain insights into what and how to teach most effectively. Watts-Taffe and Gwinn (2007)

TABLE 7.3. Museum Websites and Interactive Museum Exhibits

- Benjamin Franklin Tercentenary
  www.benfranklin300.org
- Colonial Williamsburg
  www.history.org
- Exploratorium's The Science of Music
  www.exploratorium.edu/music
- Field Museum
  http://fieldmuseum.org
- John F. Kennedy Presidential Library and Museum
  www.jfklibrary.org
- Louvre
  www.louvre.fr/llv/commun/home.jsp
- Monticello Classroom
  http://classroom.monticello.org
- Museum of Modern Art
  www.moma.org
- NASA
  www.nasa.gov
- San Francisco Museum of Modern Art
  www.sfmoma.org
- Smithsonian National Air and Space Museum
  www.nasm.si.edu
- Smithsonian National Museum of African Art
  http://africa.si.edu
- Smithsonian National Museum of American History
  www.americanhistory.si.edu
- Smithsonian National Museum of Natural History
  www.mnh.si.edu
- Smithsonian National Postal Museum
  http://postalmuseum.si.edu
- Smithsonian National Zoological Park
  http://nationalzoo.si.edu
- Sterling and Francine Clark Art Institute
  www.clarkart.edu
- Victoria and Albert Museum
  www.vam.ac.uk

highlight the importance of planning for literacy–technology integration; implementing meaningful, purpose-driven instruction; assessing student learning; and assessing and reflecting on instruction. They have found that when teachers work through this cycle together, within school buildings, districts, or even virtual PLCs, their efforts are greatly enhanced.

Guidelines for Incorporating Technology into Literacy Instruction

- Encourage students to become critically aware of what is written and read on the Internet.
- Allow students to be creators and producers of text.
- Don't be afraid to learn from your students and show interest in their technology discoveries.
- Engage in the cycle of planning, implementation, assessment, and reflection, based on the instructional needs of your students.
- Include activities that highlight imagination, curiosity, and innovation.
- Focus on audience awareness and purpose when selecting digital tools.
- Remember that the flexibility and adaptation you model when things don't go as planned, and as you continue to learn new things, is vital to your students. The world they are growing up in is a world in which adaptation is key.

LOOKING FORWARD

Research on digital learning with respect to literacy acquisition and development is still in the early stages. Having established that digital texts are in fact different from print texts, requiring different and new literacies, research and development for the future is likely to include the following:

- A focus on instructional strategies that work best to address the new literacies' requirements in the areas of asking important questions, searching for information, critically evaluating information, and synthesizing information. Questions will focus on the degree to which current effective practices (such as reciprocal teaching) can be successfully modified for online environments, as well as on the construction of very new instructional approaches (see Castek & Langham, 2005, for teaching resources on Internet reciprocal reaching).
- Attention to students who are experiencing difficulty learning to read—and, specifically, how they can attain "basic literacy skills" as well as the higher-order skills required for digital reading and writing.
- Concern for equity issues related to digital learning, to ensure that students living in poverty or students whose language or culture does not match that of the school have equal access to high-quality digital learning experiences.
- A focus on teacher professional development related to digital learning, with concern for how to support teachers as they support their students in obtaining the knowledge, skills, strategies, and dispositions needed for success in the 21st century.

QUESTIONS FOR REFLECTION ●

1. Before reading this chapter, how much did I know about the new literacies associated with digital technologies? What ideas presented in this chapter are resonating with me as I consider my own teaching practice?

2. What are my personal dispositions toward digital technologies? Am I an eager explorer with respect to new digital tools, or am I more wary of new tools? How do I see my personal disposition playing itself out in my instruction? In what ways does my disposition support effective instruction, and in what ways is it holding me back?

3. Whether I am personally using digital technologies often or not, what opportunities do I provide for students to "learn to learn"? In what ways do I foster exploration and inquiry among my students? How can I enhance my practice in this area?

4. In a typical day, how often do I incorporate digital technologies into my instruction?

5. In a typical day, how often do I provide instruction in some aspect of new literacies?

6. In a typical week, do all of my students have similar access (in terms of quantity of time, quality of time, and attention to higher-order skills and strategies) to digital tools and instruction in new literacies? If not, what changes can I make to equalize access?

7. In what ways do I link assessment with instruction in dimensions of new literacies?

8. What are my existing resources to support effective integration of digital tools into my instruction? (These resources may be online.) How can I be strategic about using these resources to improve my practice?

SUGGESTIONS FOR ONGOING PROFESSIONAL LEARNING ● ● ● ● ● ●

As discussed throughout this book, PLCs are powerful forums for professional learning and instructional improvement. They are particularly important in building teachers' capacity to address new literacies in digital learning environments. Whereas reflective practice is the hallmark of all powerful instruction, it is vital in the ever-changing landscape of digital learning, where teachers cannot learn to use "one tool, once and for all." Rather, like their students, teachers are learning how to learn. Given the vast range of individual teachers' dispositions, knowledge, and available contextual resources (i.e., what is available in the school or district), it is important that collaborative inquiry occur within PLCs of shared trust and mutual support, regardless of where individuals are on the spectrum of digital teaching and learning. It is also important that PLC meetings be as "hands-on" as possible. So PLC members should make the necessary arrangements to meet in the school computer lab or to bring laptop computers to the meetings. This way, instead of talking about what they might do, they can concentrate on doing the things that they will continue to do. Another possibility to consider is the option of "distance PLCs." Tools such as Skype and Adobe Connect make it possible to widen the scope of a PLC beyond the parameters of a single school or district.

Exploration

One of the challenges of digital teaching and learning is finding the time to keep up with the ever-expanding array of tools available. Teachers who use digital tools effectively spend a great deal of time exploring, experimenting, and reflecting on the ways in which various tools can support student learning. Simultaneously, they are discovering firsthand the skills and strategies associated with new literacies, and thinking about how they can address these skills and strategies in the classroom.

Session 1

Discuss this chapter with members of your PLC. Describe your current practice with respect to (a) integrating digital tools into your instruction, and (b) addressing new-literacies skills and strategies in your instruction. Share one idea gleaned from the chapter that you would like to follow up on by doing some personal exploration. This might be a website, an application such as iMovie, or a professional development streaming video. Your focus may be on the digital tool itself or on a new-literacies strategy associated with the tool. Make a commitment over the next 2 weeks to this exploration. Prepare the following to share at your next PLC meeting:

Digital tool or new-literacies strategy	What it is and how it works	What I have discovered	Possibilities for integration into my practice	Questions I have

Session 2

Report the results of your exploration to your PLC. If possible, provide an informal demonstration of or quick look at the tool/strategy. Talk with other members of your PLC to process each tool/strategy shared as a group. What experiences have others had with the tool or new-literacies strategy? What might one of you know that can help another better understanding each tool or strategy? What ideas do others have for ways to integrate the tool into practice? What questions might be answered, or further exploration undertaken in the moment, as a part of the PLC meeting? At the end of this meeting, make a commitment to explore the same tool/strategy further or to explore a new one during the next 2 weeks.

Session 3

Once again, provide a report of your exploration to your PLC. This time, do some thinking in advance and share a brief demonstration of the tool or strategy, with specific thoughts about how it fits with your current literacy instruction. As a group, brainstorm

considerations for planning instruction around this tool or strategy. What complications can you foresee? What links can be made with students' prior knowledge and/or prior instruction? What types of grouping arrangements might work best for this instruction? What will be needed in terms of hardware and learning supports (e.g., hard-copy learning guides)? For the next meeting, take the ideas from your PLC conversation and design a lesson or series of lessons around this new-tool or new literacies strategy.

Session 4

Share your lesson with your PLC. Be prepared to discuss your learning objectives and how they align with your students' learning needs. Describe the lesson, then walk your colleagues through a portion, just as you would with your students. (In other words, practice.) Provide time for your colleagues to share constructive feedback.

Implementation

Session 1

Working with your PLC, engage in "interactive planning" for a lesson series (two or more sequential and related lessons) you will teach within the next 2 weeks. Together, determine an appropriate instructional focus, learning objectives, and general lesson design. As you plan, be mindful of ways to differentiate your instruction for the variety of literacy learners in your classroom. Select at least two students, with very different literacy-learning strengths and needs, as focal students. After teaching the lessons, make brief reflective notes related to the lessons in general, as well as to your observations of the two focal students' responses to instruction.

Session 2

Share your reflective notes and work samples from the lesson series with your PLC. Collaboratively, think about what you can learn from each set of reflections and work samples. What do these data say about possibilities for improving instruction? What do they say about the strengths and needs of the students, especially the two focal learners? In the next 2 weeks, teach another lesson series, and continue to monitor the progress of your two focal students. Video-record a segment of your instruction to share at your next PLC meeting.

Session 3

Share instructional video clips with your colleagues. What do you notice about each other's instruction? What are you learning about the digital tools employed? What are you learning about the new-literacies strategies being taught? How can you further support one another in your continuing efforts?

Session 4

Along with members of your PLC, determine a plan for continuing your professional development with respect to digital technologies and new literacies. What resources can you utilize? What time-saving strategies can you share with one another? What changes, if any, are required at the school or district level in order to support your continued professional development? How can you actively work to bring about the needed changes?

RESEARCH-BASED RESOURCES

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Websites for Teacher Professional Development

The following websites offer downloadable research reports, policy updates, books for purchase, professional development webinars, and conference opportunities. They are sponsored by the leading professional organizations focused on literacy learning.

www.ncte.org (National Council of Teachers of English)
www.reading.org (International Reading Association)

The following website offers free, downloadable research reports, lesson plans and related materials, and video clips of lessons in action. It is sponsored by a research team leading efforts to further understand new literacies and how to address them in the classroom.

www.newliteracies.uconn

The following website, cosponsored by the International Reading Association and the National Council of Teachers of English, offers free downloadable lesson plans organized by theme and grade level, as well as parent and after-school program resources.

www.readwritethink.org

Digital Tools to Support Teaching and Learning

Wordle—word cloud generated by written text (*www.wordle.net*)
Toondoo—comic strip generator (*www.toondoo.com*)
Glogster—generator for interactive posters (*www.glogster.com*)
Aviary—image and audio editor (*www.aviary.com*)
CoolText—graphic generator (*http://cooltext.com*)
Avidemux—free video editor (*http://avidemux.sourceforge.net*)
Diigo—personal information management system allowing students to highlight text on a webpage, attach sticky notes, and discuss via threaded discussion (*www.diigo.com*)
Idroo—online educational whiteboard (*www.idroo.com*)
Bubbl.us—mindmap creator (*https://bubbl.us*)
PhotoPeach—slideshow creator (*http://photopeach.com/about*)
Prezi—cloud-based presentation software (*http://prezi.com*)

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