"It's a Book" (Smith, 2010) presents a timely conversation between a digital native donkey and a book-loving gorilla. In this story, the donkey is introduced to traditionally bound, printed text by the gorilla. As the donkey sits in a chair with his laptop open, he tries to make sense of this artifact called a book, asking the gorilla a series of questions such as "Do you blog with it?" "Can it text?" "Does it need a password?" Frustrated, the gorilla repeatedly responds "No," eventually leaving his friend for a trip to the library.

In this delightful story, Lane Smith illustrates the prevalence of technology in today's society. As we equip kindergarten classrooms with iPads (Canfield, 2011), middle school students with Kindles (Lovelace, 2011), and high school libraries with Nooks (Lamb, 2011), it is realistic to imagine a time when the traditional conceptualization of a book no longer exists. However, along with technology adoption comes the critical responsibility of preparing students to use the tools effectively to support their learning.

In order to meet this challenge, we must focus on the new literacies required by new technologies.

Rachel Karchmer-Klein is an associate professor in the School of Education at the University of Delaware, Newark, USA; e-mail karchmer@udel.edu.

Valerie Harlow Shinas is a doctoral student in literacy education at the University of Delaware, Newark, USA; e-mail vshinas@udel.edu.
What are new literacies? Research tells us there are unique cognitive processes required to communicate with information communication technologies (ICT) (Coiro, Knobel, Lankshear, & Leu, 2008). One must know how to navigate nonlinear text, repeatedly evaluate resources, sift through extraneous materials, infer meaning, and use a range of features to compose unified messages (Bezemer & Kress, 2008; Coiro & Dobler, 2007). Additionally, there are unique social practices afforded by ICT. One can be engaged with others 24/7 through blogs, wikis, social networking sites, instant messenger, multiplayer online games, and a multitude of other activities. We must only spend a few minutes exploring Twitter and Facebook to be convinced of the power of the collaborative, participatory nature of ICT.

Although some believe traditional literacy instruction is sufficient to prepare students to use ICT effectively, many literacy scholars argue that in order to participate in electronic environments, students must be taught a new set of skills (Leu, Kinzer, Coiro, & Cammack, 2004). Consequently, teachers must recognize the new literacy demands of the 21st century and, most important, must transform their programs to meet these demands with timely literacy instruction.

So what is important to know about new literacies to successfully integrate them into our classrooms? Given the rapid development of new technologies, it is difficult to pinpoint a static set of skills. Instead, in this article we recommend that teachers keep four principles in mind as they consider how to use technology to support teaching and literacy learning opportunities in their classrooms.

"Focus your efforts on your own professional development by maintaining a finger on the pulse of technological advancements."

**Principle #1: Keep Your Eye on the Moving Target**

Much like a moving target, literacy is constantly changing in response to technological advancements (Leu, 2000). That is, as more sophisticated technologies emerge, more complex literacies do, too. Consider how the role of the author has changed with the transition from Web 1.0 tools to Web 2.0 applications. The first iteration of Internet-based tools were defined by their one-way delivery system, which allowed an author to develop and convey information to the audience, typically through read-only webpages and hyperlinks. In contrast, Web 2.0 applications, such as wikis, are framed by a transactional relationship between author and audience. The reader is encouraged to contribute by becoming an active coauthor rather than a passive audience member.

As the landscape of Web 3.0 is realized, educators must remain mindful of how quickly technology changes and how new environments for literacy learning develop (Leu, Karchmer, & Leu, 1999). One can never know everything there is to know about technology. Instead, we encourage you to focus your efforts on your own professional development by maintaining a finger on the pulse of technological advancements. For example, there are many free, Web-based tools that facilitate interactive information sharing in collaborative digital environments. Accessibility coupled with little or no usage cost has made them incredibly prevalent in today’s society. Moreover, their use in educational settings has increased so dramatically in recent years that many developers are designing educational versions specific for students and teachers. VoiceThread (ed.voicethread.com/#home), a digital storytelling tool, and Glogster (edu.glogster.com/), a virtual poster tool, are two of our favorites.

Additionally, much can be learned from K–12 students who use the Internet regularly. According to the Pew Internet and American Life Project (Lenhart, Arafah, Smith, & MacGill, 2008), 85% of 12- to 17-year-olds engage in some form of electronic communication, including blogging, texting, and social networking. Younger students are also using new technologies, mostly in the form of e-readers, blogs, and wikis (Boling, Castek, Zawilinski, Barton, & Nierlich, 2008; Marsh, 2011). In fact, research has taken a closer look at students’ perspectives of Internet use to gain a better understanding of how different types of learners navigate the complex skills required of ICT (e.g., Chandler-Olcott & Mahar, 2003; Coiro & Dobler, 2007; Larson, 2010). As a result, we encourage educators to recognize the knowledge students bring to the classroom and consider their perspectives of the complex relationships between literacy and technology.
Principle #2: Recognize the Complexity of New Literacies

Internet activities tend to use an inquiry-based model, requiring students to solve problems or answer questions (Leu, Leu, & Coiro, 2004). Research tells us that this model demands a set of skills different from those needed for traditional reading comprehension activities (Leu et al., 2009). For example, students must begin by succinctly identifying the topic under investigation. This clarity helps students use search engines effectively to locate appropriate content.

Once Internet-based information is identified, students must then make meaning of electronic text, navigating the complex, ill-structured electronic environment. Students may need the most instruction on this skill given the vast differences between nonlinear electronic text and linear traditionally printed text. Specifically, unlike traditional print text, where format and sequence are dictated by the author, Internet-based texts require readers to “navigate their own paths through an infinite informational space to construct their own versions of the online texts they will read” (Leu et al., 2009, p. 3). As readers process the information presented, they must also critically evaluate sources, making important decisions about quality and reliability. Although most educators would argue that this is a necessary skill for all types of reading, experts suggest it is even more critical in online environments because of the ease of publishing.

Research has also identified differences in online and offline writing. Words alone no longer portray the depth of meaning in written communication. Instead, one must be able to make meaning out of an array of modes, including “gestures, speech, images, writing, 3D objects, colour, music and no doubt others” (Kress, 2003, p. 36). For instance, when comparing a traditionally printed textbook with a website on the same topic, there are clear differences in the design and presentation. The traditional textbook consists primarily of words and still images. The website, however, includes different representations of content in the form of moving images, video, and speech.

These features pose two challenges. First, as writers we must learn the basics of using them. How do I insert graphics? How do fonts convey the tone of the work? Which colors work best together? How do I upload a video? Second, as writers we must consider the wide-reaching effects of our electronic text and how these features communicate meaning to a greater audience. Will bolded or italicized letters offend? Where should the images be placed to make the greatest impact on the reader? Does the video accurately represent the message?

These questions illuminate an important difference between traditionally printed and electronic text. Whereas we used to send our work off to printers and typesetters, writers now dictate the “visual entity” (Kress, 2003, p. 65). That is, we control image placement, sound, color, and font, directly affecting our readers’ comprehension. These important considerations must be woven into K–12 writing instruction so that students are prepared to communicate effectively over the Internet.

Wolf and Barzillai (2009) suggested that learners will struggle with new literacies until their brains develop the necessary “decision-making, attention-monitoring, and executive skills” (p. 36). Although we believe very young children can use new technologies in important ways, we do emphasize the importance of identifying appropriate learning outcomes and activities to best match students’ needs. Much like we differentiate traditional literacy instruction, we recommend that teachers use the same tenets to differentiate online reading and writing instruction in their classrooms.
Principle #3: Digital Natives Still Have a Lot to Learn

Digital natives are characterized by their overwhelming access to and experience with ICT (Prensky, 2005). Specifically, those born since 1980 have been immersed in a technology-saturated culture where computers, the Internet, cell phones, instant messaging, and social networking are readily available and 24/7 interaction is expected. Multitasking is typical as they integrate two, three, or four different tools at once. Much like the donkey in Smith’s story, digital natives look at the world through a technocentric lens, relating new experiences to those found in the virtual world.

Along with these characterizations comes the assumption that digital natives are skilled technology users who understand the range of basic to complex skills of ICT (Oblinger & Oblinger, 2005; Prensky, 2005). We observe this belief each semester in our undergraduate educational technology course, where preservice teachers are required to develop and implement technology integrated lessons in K–8 settings. As part of their end-of-semester reflections, our students identify assumptions they brought to their classroom teaching and whether or not those assumptions were confirmed.

The two most commonly cited assumptions are (1) the children in their practicum classrooms have basic computer knowledge such as turning on the computer, typing in a URL, and manipulating a mouse; and (2) the children are able to navigate websites to locate and evaluate content with little support. These assumptions are logical, given data that 100% of U.S. public schools have at least one Internet-connected computer used for instructional purposes and that classroom teachers use them on a regular basis (National Center for Education Statistics, 2010). Also perpetuating these beliefs is the hype that K–12 students are digitally sophisticated and demand new ways of learning (Prensky, 2005). Many of the preservice teachers are then surprised to learn that access does not guarantee use, and use does not assure deep understanding.

As teachers, it is necessary to suspend assumptions regarding the technological knowledge and experience students bring to the classroom and instead develop instruction designed to address curriculum goals and students’ individual needs. For instance, the Common Core State Standards (2010) integrates standards for media and technology throughout, reflecting the importance of digital technologies in the workplace and the world. We argue that in order for tech-savvy learners to use digital technologies effectively and develop the critical literacy skills needed to communicate effectively in a digital environment, new literacy skills must be taught. When planning for integration of and instruction in digital technologies, we recommend that teachers begin with these standards in mind and use ongoing assessment to determine what students actually know rather than what we assume they know.

Principle #4: Reconsider Assessment Methods

When we think about assessment in relation to new literacies, two important areas come to mind. First, just as we administer phonemic awareness, phonics, and fluency assessments to gauge our students’ knowledge of foundational literacy skills, we must evaluate students’ technology skills from the basic to the more complex. Keep in mind that each new technology tool encompasses content and concepts students must master. For example, before you can expect students to use
“Students must be encouraged to use the capabilities technology affords them to develop rich, dynamic, forward-thinking presentations of their knowledge.”

Glogster (edu.glogster.com) to create virtual posters, they must learn the procedural knowledge associated with the tool, such as how to insert graphics, change background colors, and add audio. Concurrently, students must carefully examine multimodal literacy, thinking about how images, video, audio, text, and hyperlinks can be packaged together to present unified messages.

The best methods of assessing procedural technology knowledge have yet to be determined. Yet there is evidence that informal measures requiring students to explain or demonstrate the strategies they use when reading and writing online provide useful information (Leu et al., 2009). Once strengths and weaknesses are identified through such assessment data, teachers can differentiate technology instruction, providing students with lessons targeted to areas in need of improvement.

Second, when engaging students in technology-integrated lessons, we must design assessments that evaluate how students use the technology’s capabilities to present thoughtful, well-articulated responses. This issue has become of particular interest to us as we examine more and more teacher-developed scoring rubrics. It seems that in many instances, rubric categories focus on traditional notions of literacy, mostly ignoring technology’s capabilities.

For instance, we have found that many rubrics designed to score asynchronous conversations conducted on discussion board threads tend to evaluate traditional notions of responsive writing, such as whether the students’ comments include examples, reference other postings, and are based on substantive and relative points. Although we agree that these areas are important, we believe there is a lack of attention paid to how students use electronic features to argue their points. Might there be differences in content and depth between a response consisting solely of words and one using a conglomerate of modes to convey its message? Of course the most important component is substance, and use of audio, video, and hyperlinks certainly does not guarantee substantive comments.

However, we believe multimodality is powerful. Students must be encouraged to use the capabilities technology affords them to develop rich, dynamic forward-thinking presentations of their knowledge. Furthermore, if we neglect the role technology plays in instruction, then quite frankly, we question why it was included in instruction in the first place.

One of the best ways to jumpstart your thinking about assessment is to explore what other educators are doing about it. For example, the rubric used to evaluate student blogs for the ReadWriteThink.org lesson Blogtopia, Blogging About Your Own Utopia (www.readwritethink.org/files/resources/lesson_images/lesson942/Rubric.pdf) incorporates measures of digital literacy skills, such as the effectiveness of the layout and design of the blogs, as well as evidence that students gained appropriate permissions for use of embedded images. Likewise, Kathy Schrock, a well-known educator, maintains a compilation of teacher-developed scoring rubrics for a range of technology tools, including Glogs, VoiceThreads, podcasts, wikis, and Twitter (school.discoveryeducation.com/schrockguide/assess.html). Although some of the examples could be improved upon, we feel it is a valuable resource to get you thinking about assessment of technology-integrated lessons.

We encourage you to extend the assessment conversations in your schools to include pointed discussions of how you will best evaluate your students’ knowledge of 21st-century skills. These conversations are timely, although some would argue late, given the impact that technology has had on K–12 instruction.

Blending the Old and the New

It’s a Book (Smith, 2010) may resonate with teachers because it reflects a sense of trepidation that an increasing emphasis on technology will cause traditional conceptions of literacy to fall by the wayside. For this reason, we believe its premise rings true for those of us so fond of traditional literacy experiences such as reading aloud at bedtime or relaxing on the beach with a good book. We also believe it is time to make sense of 21st-century literacies and consider ways in which we can meld important literacies of the past, present, and future.

We argue that in an ideal world, the gorilla and donkey would read a book together, move to the laptop to post a collaboratively written review on a literary blog, then search the Internet...
for a new e-book to share. Although teachers may worry that new literacies may supplant traditional, text-based literacies in the 21st-century classroom, they must set aside those concerns and replace them with the knowledge that, when taught well, new literacies can support and extend students’ abilities to read and write for real purposes.

REFERENCES

LITERATURE CITED