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Twenty-First Century Literacy: A Matter of Scale from Micro to Mega

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Abstract: Twenty-first century technologies require educators to look for new ways to teach literacy skills. Current communication methods are combinations of traditional and newer, network-driven forms. This article describes the changes twenty-first century technologies cause in the perception of time, size, distance, audience, and available data, and offers suggestions for teaching with these differences in mind.

Keywords: twenty-first century skills, classroom teaching, Internet, K-12 teaching, literacy

It would be difficult to find a K–12 school district's technology plan that does not reference "twenty-first-century skills" as building blocks for enhancing global citizenship and rendering future leaders equipped for the twenty-first-century world of work. According to the Partnership for 21st Century Skills (2004), a program sponsored by the U.S. Department of Education, there is a gap in practical skills acquired in schools and skills needed in the workplace. To close this gap, the partnership has developed a Framework for 21st Century Learning detailing the need to recognize the importance of twenty-first-century themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; and information literacy. The partnership's framework references information literacy as articulated by the American Association of School Librarians in its call for building student skills in becoming "discerning consumers and creative producers of information and ideas" (American Library Association 2009).

It appears that twenty-first-century technologies require teachers to guide students in honing their information culling skills as well as refining their decision-making skills for distributing information. Simply put, students are using technology to access and present information in and out of the classroom at will, encountering unprecedented global playgrounds. It falls to teachers to provide guidance for students to become productive contributors within the global community. Currently, the realization of this need generates more questions than answers. A teacher looking to the literature for guidance will find that specific recommendations for considering the differences between new literacy needs and traditional approaches are lacking. Therefore, the purpose of this article is to serve as a guide in the discovery of how current literacy issues differ from their twentieth-century counterparts. We view literacy from a new perspective, one that may help educators understand the critical differences between life in the past and life in the twenty-first century. In this article we examine literacy in terms of new scales and measures, which we have termed "mega" and "micro" literacies.

Life in the Twenty-First Century: New Literacies

The ISTE NETS (International Society for Technology in Education National Educational Technology Standards) for Students 2007 outlines our expectations for students in the twenty-first century. As educators, we want our students engaging in authentic problem solving, collaborating in activities beyond the classroom, and demonstrating good digital citizenship ("NETS for Students" 2007). We asked ourselves:

- What has changed as we enter the twenty-first century?

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- What aspects of literacy have altered significantly in this new century?
- What new approaches must we take to literacy activities based on these changes?

In the twenty-first century not that much is different when it comes to human development and needs. Organisms develop slowly, and throughout many generations we have not seen any significant change in how humans grow and develop. We humans continue to need other people to interact with and learn from; we need time to learn new ideas and practice new skills; and we often rely on the patience of others as we experiment with different behaviors as we grow to adulthood. Something that is very different about twenty-first-century life, however, is the amount of information available to individuals and their ability to share that information via the Internet. By 2011 the digital universe will be 10 times the size it was in 2006 (Gantz et al. 2008). The networked computing system that began as an undertaking of the U.S. Department of Defense Advanced Research Projects Agency (DARPA) in the 1970s now presents people with unprecedented access to ideas, information, and audiences, often on a global scale. It is this access, and its scale in particular, that we need to examine closely.

> In 2008, Americans consumed information for about 1.3 trillion hours, an average of almost 12 hours per day. Consumption totaled 3.6 zettabytes and 10,845 trillion words, corresponding to 100,500 words and 34 gigabytes for an average person on an average day. A zettabyte is 10 to the 21st power bytes, a million million gigabytes. (Bohn and Short 2009)

New Magnitudes of Scale: Mega and Micro Literacies

As we examine the necessary skills for coping with the modern, networked world, we have noticed that much of the difference between pre-twenty-first-century and current literacy has to do with matters of scale. Time, size, distance, audience, and available data must be approached differently than they once were. The Internet and other modern networks (e.g., cellular) impose their own scale to just about any endeavor. Educators in this century must understand these differences in scale if students are to benefit from a curriculum that looks at literacy differently than it has in the past. With that in mind we propose that we consider time, size, distance, audience, and available data as either a *mega* or *micro* version of what it was prior the twenty-first century.

Harnessing Time

The amount of time necessary to distribute information is different in the twenty-first century. One can establish a blog, Facebook or MySpace page, or a Twitter account and share information almost instantaneously. Time becomes a micro consideration—students must be made aware of the immediacy of the message sent. Conversely, there is a mega aspect to time in a networked world. The amount of time things last is different in the twenty-first century. In his book *The Future of Reputation*, author Daniel Solove (2007, 17) writes: "We're heading toward a world where an extensive trail of information fragments about us will be forever preserved on the Internet, displayed instantly in a Google search." Solove uses the famous example of "The Star Wars Kid," in which a high school student filmed himself acting out a fight sequence from the movie *Star Wars Episode 1: The Phantom Menace*. The performance was unflattering to the student; other students found the video, digitized it, and placed it online. It became one of the most popular videos on the Internet in 2003. The student became the subject of ridicule and a lawsuit was brought against the student's classmates. The incident has been reenacted and referenced in a number of popular television shows, and numerous revisions of the video (adding sound and special effects) have continually appeared on the Web.

We have an obligation to explain to students how digital presentations created for school projects, or just for fun, may be transmitted in an instant and stay available to the world for most or all of one's life. Young people may be drawn to the idea of creating instant notoriety for themselves and others, but in the twenty-first century the problem with this type of notoriety is that it may potentially never fade. More than ever before, teachers need to help students understand the potential scope of a near-instant action; pressing "send" may have consequences that last for years.

Visualizing Size

Sizes change in a networked environment. Some things become quite small, for example, Twitter "tweets" (individual messages sent using Twitter) are 140 characters or less, as are most text messages sent using cellular networks as well as updates posted to one's social network on Facebook. This creates a need to develop a micro literacy in terms of communicating sophisticated ideas with very few keystrokes. Cell phone novels, which are lengthy works delivered via cellular networks, have gained popularity in Japan and are the subject of literary experimentation in the United States, giving rise to Web sites such as quillpill.com and textnovel.com (Goodyear 2008).

In addressing the interest in concise communication, teachers may find a number of opportunities to promote both expository and creative writing. The study of poetic form (e.g., the European sonnet or the Japanese haiku), which encourages conciseness and the construction of multiple meaning (double entendre) might help students find their voice in a world that values messages of less than 140 characters. Text messages might inform by

reporting local events or conditions, or just as easily entertain by presenting stories in serial form (a textnovel) or by employing creative wordplay, which encourages vocabulary development.

Comprehending Distance

Because physical and geographical constraints are much less of a limitation than they once were, participation in activities outside of the local community becomes relatively easy. Students can participate almost seamlessly in activities in neighborhoods, countries, or cultures far from their own (Northrup 2002; Sleeter and Grant 1999). Growth in social-networking products in particular has made joining a group in Cairo, Egypt, as easy as joining a group in Kansas City, Missouri, no matter where one is geographically located. A simple text message can be delivered to the other side of the world in about as much time as it takes to reach someone across a school corridor. Geographic distance is no longer a factor in sending messages, and this creates a new and constantly evolving sense of community that is suddenly not quite as localized or micro in nature as it once was.

With the ability to communicate across greater distances comes the obligation to employ good judgment in composing messages sent to members of other cultures. Teachers are presented with a chance to explore cultural differences and the opportunity to model appropriate greetings and social gestures necessary for comfortable social interactions across great distances (Slagter van Tryon and Bishop 2009). In the twenty-first century teachers need to help students understand the need to know one's audience and to be aware of and considerate toward people who may take a different view of the world.

Web-based organizations such as ePals (www.epals.com) facilitate communication among distant school groups. A few of the more time-honored long-distance projects available to any school group include the Monarch Watch (www.monarchwatch.org), which observes and reports monarch butterfly migration, and following the famous Iditarod dogsled race (see www.education-world.com/a_lesson/lesson103.shtml for a number of Iditarod-related teaching ideas).

The Endless Audience

The audience for student work in the twenty-first century is different than the audience of previous eras. Students have long been accustomed to displaying their work in the classroom. Students need to be aware that the classroom microcosm, with its limited number of viewers, may now become something completely different. The new mega aspect of audience availability cuts across school, grade level, occupation, socioeconomic status, age level, and purpose. Students must now be guided in reframing their thinking outside the private audiences housed within classroom walls (McVay Lynch 2002). Web-based avenues for display and sharing of student original work opens up the classroom to entirely new and larger audiences. These audiences are often cross-cultural; we must, therefore, help students to better understand not only other cultures but also how those other cultures might perceive their work. As some schools incorporate authorship controls, limiting the amount of identifying information displayed for safety purposes, student work may be rendered out of context and may attract comments and feedback that are not necessarily representative of the work at hand. Teachers must continually be aware of the affordances and constraints of these mega audiences and how they become a factor when determining when, how, and what to display on the Internet.

Teachers may facilitate students' evolving understanding of audience and the implications of publicly displaying one's work by encouraging class participation in online collections of creative work and discussing the results of this involvement. One resource for displaying student work on the Internet is Artsonia (www.artsonia.com), a site that claims to be the world's largest children's art museum.

Analyzing Available Data

In Ian Ayres's *Super Crunchers* (2008) and James Surowiecki's *The Wisdom of Crowds* (2005) the authors point out that massive amounts of data are much more accessible than ever before. Much of this data is collectively produced as large groups of contributors from all over the world engage in an interactive process to supply information, refine it, and then move toward consensus in determining what final data set remains. The group, or "crowd" as it is termed, is always functioning and is always open to increasing its number of members. In fact a common demonstration of this is noted by Surowiecki: "Many of the Net's most distinctive landmarks—Google, Slashdot, Wikipedia—are the products of the wisdom of crowds" (275).

Ayres observes that large data sets, generated and distributed via the Internet, are relatively easy to obtain and it is possible to use these data sets to find previously unnoticed connections among things that might not immediately seem connected. Suroweicki reports that making use of the collective wisdom of a large group tends to be remarkably reliable for purposes of identifying and predicting.

Students in the twenty-first century must learn how to work with data in mega quantities. Teachers seeking datasets to use for illustration and practice can find them online at places such as the NASA datasets and images site (http://data.giss.nasa.gov) and the Data and Story Library (DASL, pronounced "dazzle") at lib.stat.cmu.edu/DASL.

Where Do We Go From Here?

Twenty-first-century literacies, the mega and micro, are important now. However, this is the beginning of the century and it may take a while for all aspects of society to make full use of these changing paradigms. As an example, reporter Evan Ratliff (2009) observes that the White House tends to communicate in a pre-twenty-first-century manner based on both its traditions and the legal restrictions placed on federal government communications. Therefore, our students must develop literacy skills that span the centuries. They must understand traditional communication even as they practice with new and different approaches.

The most important thing to keep in mind is that this discussion about literacy changes in the twenty-first century, from the mega to the micro, is just a starting point. Educators must continually examine how literacy is affected by new technologies. We hope the information provided here is useful as more complete answers to our initial three questions are developed.

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