Uses of Digital Tools and Literacies in the English Language Arts Classroom

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This article reviews research on English language arts teachers’ use of digital tools in the classroom to remediate print literacies. Specifically, this review focuses on the affordances of digital tools to foster uses of digital literacies of informational/accessibility, collaboration knowledge construction, multimodal communication, gaming literacy, and reflection on learning. Researchers have found relatively high levels of students’ engagement through their uses of digital tools for the social purposes of accessing, sharing, communicating, and reflecting on knowledge as part of a shared learning commons. Students are also engaged in multimodal representations of knowledge for immediate and worldwide audiences, as well as participation in collaborative gaming activities for both acquiring knowledge and learning collaboration practices. Researchers have also found that teachers and students employ uses of digital feedback tools and e-portfolios for effectively fostering student reflection. The findings from the research reviewed suggest the need for teachers to identify the affordances of digital tools in ways that remediate and transform largely print-based learning in English language arts classrooms through uses of digital tools.

The past 5 years have witnessed a marked increase in adolescents’ uses of digital tools. Adolescents average 7 hours and 38 minutes a day or more than 53 hours a week (with multitasking: the 7½ hours is up to 10 hours and 45 minutes a day) using digital tools, which represents an increase of 1 hour and 17 minutes since 2004 (Kaiser Family Foundation, 2010). They also use these digital tools for social purposes—hanging out—to maintain continuous hypersocial interaction with peers; messing around—experimentation with online media use and production, for example, revising their social networking profiles; and geeking out—interest-driven engagement in gaming, fanfiction, or anime production communities (Ito et al., 2009). Much of this social interaction now occurs through texting.

For teenagers aged 12 to 17, texting is up from a previous 2009 survey, whereas voice calling is down, particularly for females aged 14 to 17; of all teenagers, 63% text daily versus 39% cell phones, 35% engage in face-to-face socializing, 29% send social-networking messages, 22% use IMing, and 6% engage in emailing (Lenhart, 2012). The median number of texts sent daily was 60 in 2011. Another study reported that teenagers’ monthly average of text messages was 3,417—approximately seven messages per hour; they prefer texting over voice calling because it is faster (22%), easier (21%), and more fun (18%) (Nielsen, 2012).

Students’ reading has also become increasingly digital given the increased use of tablets or smartphones for reading at all age levels. As of December, 2011, 43% of people 16 years and older had read one e-book or a long-form digital text—an increase of four-fold from 2010; those who read e-texts also read more than do non-e-text readers (Rainie, Zickuhr, Purcell, Madden, & Brenner, 2012). There are also no differences in reading...
comprehension for students reading these digital texts versus print texts (Taylor, 2011).

And, contrary to the false binary between uses of digital tools for school and non-school social purposes, adolescents are increasingly adopting tools to support their learning (Project Tomorrow, 2012). Further, 10% of high school students have posted a tweet about an academic topic; 46% of students have used Facebook for collaborating with peers to complete assignments; and 64% of parents indicate that they would purchase a mobile device for their child’s academic use at school. In mathematics and science classes in which technology is being used, students are more likely to express an interest in a STEM (i.e., science, technology, engineering, and mathematics) career than in mathematics/science classes without technology use. At the same time, students also might not find adequate learning opportunities using technology in school. As a result, 12% of high school students have taken an online class on their own.

Moreover, teachers and administrators use digital devices to a greater degree than in the past. The 2011 Speak Up survey of 400,000 K-12 students, educators, and parents conducted by Project Tomorrow (2012) researchers led to the findings that educators are more likely than are members of the general public to use technology tools such as smartphones and tablet computers; 54% of teachers and 70% of administrators employ smartphones as part of their work; 52% of teachers and principals have taken an online class for training purposes.

**English Language Arts Teachers Uses of Digital Tools**

Given adolescents’ increased use of digital tools outside of school, in this research review, I summarize research on how English Language Arts (ELA) teachers are also using these digital tools in their classrooms to engage students in learning English language arts (Beach, Anson, Kastman-Breuch, & Swiss, 2009; Beach & O’Brien, 2012; Carrington & Robinson, 2009; Coiro, Knobel, Lanksheer, & Leu, 2008; Davies & Merchant, 2009; Warschauer, 2011). In doing so, English Language Arts (ELA) teachers are redefining traditional print literacy instruction by adopting digital literacies related to play, performance, simulation, appropriate multitasking, distributed cognition, collective intelligences, judgment, transmedia navigation, networking, negotiation, and awareness afforded by uses of digital tools (Jenkins, 2009).

Such redefinition does not negate the uses of print literacies, but rather, how print-literacies can be remediated using digital tools (Leander, 2009). Leander (2009) identifies four stances that ELA teachers adopt to address ways of incorporating media/digital literacies into their teaching—resistance to media/digital literacies, replacement of print literacies with media/digital literacies, using media/digital literacies to validate or return to print literacies, and remediation that combines print with media/digital literacies through parallel pedagogy that serves to enhance student engagement in responding to and producing print and digital texts.

In examining teachers’ remediation of uses of digital tools, researchers are finding that students are more engaged in using digital tools when they are responding to and producing print/digital texts for the same social purposes that drive adolescents’ uses of digital tools outside of class to communicate with actual audiences for authentic purposes. In a study conducted by Dredger, Woods, Beach, and Sagstetter (2010), pre-service ELA teachers examined the purposes for what motivates students’ writing within and outside of school. Dredger et al. (2010) documented that students wrote essays and reports in school primarily to fulfill assignments for grades, assignments that provided them with little control over the content, whereas their writings outside of school were primarily for social communication and self-expression, particularly through texting, Facebook, and instant messaging. When asked to provide suggestions for teachers, the students noted that teachers need to make their writings more engaging by drawing on the kinds of purposeful, social communication they employ in outside-of-school writing. All of this suggests the need to go beyond a technology-integration model in which digital tools are employed simply to substitute or augment print-based tools to consider modifying and redefining the ELA curriculum involving new ways of learning that is mediated by uses of digital tools (Puenteledura, 2011).

**Barriers to Uses of Digital Tools in Schools**

There are many barriers to achieving such modification or redefinition of the ELA curriculum. When ELA teachers and their students adopt uses of digital tools, they face a number of barriers due to school Internet use policies. Bevort and Breda (2008) observed that students use digital tools far more in the home than in school. Two thirds (67%) of students’ parents indicated that they would purchase mobile devices for these students for use in school if a school allowed use of these devices; 53% of middle and high school students indicated that they are not able to use cell phones, smart phones, or MP3 players in their schools; and 71% of high school students and 62% of middle school students indicated that their
use of technology would be enhanced if access to online content was not blocked by firewalls and filters (Project Tomorrow, 2011). And, even in classrooms with 46% or teachers using digital resources in their teaching, students are not using digital resources in approximately one half of classrooms (Project Tomorrow, 2011). Only 35% of high school students and 27% of middle school students reported using an e-textbook or other online materials in school. And, even if teachers are using digital tools, they are most likely to use them for homework and practice (58%), facilitating group collaboration (32%), and tracking effort to achievement (16%), as opposed to using it for creating digital content (Project Tomorrow, 2011). There is also little evidence of students using digital tools for engaging in critical inquiry or for producing/publishing digital content for audiences outside the school (Luckin, Clark, Graber, Logan, & Mee, 2009).

One possible explanation for students not employing digital tools for learning is the lack of professional development in uses of digital tools. In a survey of 1,441 U.S. literacy teachers, 81.6% of teachers reported that a lack of professional development on how to integrate technology is a barrier to its integration (Hutchison & Reinking, 2011). Further, 73% of teachers reported that they do not have time to teach students the skills needed for complex tasks, with 45.7% of teachers reporting their own inability to use technology. Even if such professional development is available, it often occurs through decontextualized, one-shot workshops, as opposed to a long-term, collaborative activity that, over the long run, results in increased use of digital tools in the classroom (Blocher, Armfield, Sujo-Montes, Tucker, & Willis, 2011).

Teachers and students in low-income schools also do not have the same level of access to digital tools and are not employing digital tools as do teachers and students in higher-income schools. Further, class differences and access issues are more likely to result in a difference in Internet skills (Hargittai & Hinnant, 2008), particularly in low-income schools where ELA instruction often is built around teaching for mandated reading and writing state assessments based on print literacies, as opposed to teaching digital literacies associated with online reading comprehension or digital communication (Leu et al., 2011). One study of uses of wikis in schools for collaboratively sharing resources, content-delivery sites, or student assignments/portfolios led to the finding that the wikis in low-income schools had shorter lifetimes and were less likely to be exploited for their digital affordances than was the case with wikis in higher-income schools (Reich, Murnane, & Willett, 2012). However, low-income students who do have access to and employ digital tools can develop social capital. An analysis of 607 low-income high school students revealed positive associations between their use of online social networks and two measures of social capital (Greenhow & Burton, 2011). And, some adolescents are resistant to active use of the Internet; a study of 1,145 Flemish adolescents revealed that regardless of socio-economic differences, 27% identified themselves as low users, although home access was a factor in their low use (Broos & Roe, 2010).

These results indicate that there continues to be a disconnect between students’ use of digital tools outside versus inside school, suggesting the need to revise school policies to provide greater use of mobile devices and online textbooks, as well as access to online content. Although some secondary ELA teachers are redefining classroom spaces and time related through uses of hybrid classes or online learning courses, other teachers and the public remain skeptical about major redesigns of schooling. A Gallup/Phi Delta Kappan survey (Bushaw & Lopez, 2011) indicated that the majority of public school parents (52%) are opposed to allowing students to be in school fewer hours if they were using digital tools in the home for learning.

Moreover, research on processing of online reading texts has yielded a small relationship between strategies involved in print and online texts, suggesting that print-based reading tests might not be measuring the same kinds of processes associated with reading online texts (Leu et al., 2011). And, because mandated writing tests in the ninth grade are still represented by paper-and-pencil tests, whereas 12th-grade students report an increase in use of computers for writing drafts and revising between 2002 and 2007, eighth-grade students report a significant decline in the use of computers for drafting/revising (Applebee & Langer, 2009).

At the same time, when low-income schools created special after-school programs focusing on the uses of digital tools, as evident in the urban Chicago Digital Youth Network program, students in those programs reported a wider variety of technology tool use and fluency than did a Silicon Valley comparison group with high home access (Barron & Gomez, 2009). Moreover, disparities in issues of costs of computer access are being addressed through the increased use of less-expensive mobile devices/tablets for learning given the fact that 75% of students aged 12 to 17 own a cell phone or a smart phone (Lenhart, Purcell, Smith, & Zickuhr, 2010). The majority of middle and high school students prefer using their cell or smart phones over laptops.
for learning, and 0.62% of responding parents from all class levels report they would purchase a mobile device for their child for use in schools (Project Tomorrow, 2011), leading authors of the 2011 Horizon Report (Johnson, Adams, & Haywood, 2011) to predict that use of mobile devices will be one of the major two developments in school technology use in the 2011-2012 school year, given the increased access at a lower cost.

**Redefining Literacy Learning Outcomes for Uses of Digital Tools**

Just as teachers are redefining the ELA curriculum around digital literacies, so researchers, given their focus on determining the degree to which digital tools enhance literacy learning, are redefining literacy learning outcome measures (Sharpe, Beetham, & de Freitas, 2010). Using traditional learning outcome measures based on print-based reading or writing test scores in traditional experimental research designs might not capture the kinds of digital literacy experiences and benefits afforded by digital tools, suggesting the need for qualitative or ethnographic methods sensitive to the social interactions and identity constructions involved in student engagement with uses of digital tools.

One useful concept for redefining literacy learning is the concept of affordances of digital tools—the fact that tools or iOS or Android apps have certain features that allow students to employ certain literacy practices (Beach & O’Brien, 2012). For example, the large number of iPad or iPhone apps have certain affordances fostering collaborative reading, writing, discussion, and gaming, allowing students to share their work in a larger public square with competing interests (boyd, 2009). In using Twitter, Facebook, or blogs to share information, students are communicating with larger audiences with whom they might have no personal relationship, but are doing so because they perceive the value of sharing their knowledge with the larger public.

On the other hand, even research employing print-based tests indicate positive effects for the use of digital tools. For example, an analysis of one of Maine’s one-to-one middle-school laptop programs, in which all seventh- and eighth-grade students were issued their own laptops beginning in 2002, indicated that over 5 years (i.e., 2000 to 2005), there was a significant increase in students’ writing scores, with students who reported high computer use scoring significantly higher than did students reporting little laptop use (Silvernail & Gritter, 2007). On the other hand, two studies of one-to-one laptop programs in two states led to the finding of no improvements in students’ reading or writing test scores. However, findings revealed an increase in authentic and iterative writing; gains in technology literacy skills; increased engagement in the teaching and learning of reading; and, when using blogs, an increase in how to access information, share and learn, self-directed learning, and engagement with new media; students not using laptops had a decline in ELA scores versus those students who used laptops (Warschauer, 2008; Warschauer, Arada, & Zheng, 2010). And, another 3-year study of eighth graders’ use of threaded discussions revealed that students’ perceptions of themselves as writers improved; with boys’ perceptions significantly improving, as well as students’ increased knowledge of new literacies, engagement, and authentic responses to literature (Wolsey & Grisham, 2007). It is also the case that middle school boys who were reluctant readers valued reading more after using e-readers, enhancing their self-concept of their reading abilities (Miranda, Williams-Rossi, Johnson, & McKenzie, 2011).

**Redefining Classroom Spaces**

Researchers also have examined how adolescents’ uses of digital tools in informal, non-school contexts can transfer their use to supporting formal academic learning in school contexts. Drawing on results from the large-scale British JISC Learning Literacies for a Digital Age (LLiDA) research project (Beetham, McGill, & Littlejohn, 2009), Beetham and Oliver (2010) recommended that researchers focus on teachers’ design of classroom contexts or spaces supporting collaborative knowledge construction mediated by uses of digital tools. One useful concept for doing so is the idea of the learning commons, a concept derived from information/library science that involves organizing media centers and classrooms around time devoted to sharing knowledge (Kocchlin, Luhtala, & Loertscher, 2011). (See http://www.schoollearningcommons.info/home). For example, classroom spaces are being redefined as flipped classrooms in which classroom time is devoted to collaborative creation and sharing work—completing homework assignments, whereas homework is devoted to reading or viewing that work. Adoption of the flipped classroom model at Clintondale High School in Detroit resulted in a 33% decline in failure rates in ninth-grade English and a 66% decline in over-school discipline rate for ninth graders.

The concept of the learning commons also points to the importance of integrating school media centers in supporting ELA instruction. An analysis of differences in level of technology support and student usage among 657 Illinois school libraries yielded
statistically significantly different relationships between support and usage; with eighth graders meeting/exceeding reading and writing standards, 11th graders meeting/exceeding reading standards and 11th graders’ ACT scores (Lance, Rodney, & Hamilton-Pennell, 2005). Schools with more library and library-connected computers demonstrated average higher test scores. And, in another study, an analysis of online discussions on computers in a public library indicated that adolescents employed online talk for the purposes of reference, authority, experience, expression, and instrument (Berg, 2011).

Media specialists also employ digital tools to foster students sharing responses to texts. For example, an analysis of the use of the Digital Booktalk site (http://digitalbooktalk.com) for Florida middle and high school students to create and share book talk video trailers about recommended books yielded the finding that use of the site resulted in significant changes in students’ attitudes towards the value of reading and storytelling, as well as an interest in sharing their book talks and growth in self-confidence in communicating with peers (Gunter & Kenny, 2008).

Creation of a digital learning commons in a school district such as the OneVille project, in Somerville, Massachusetts (http://oneville.org) connected students with teachers, peers, counselors, administrators, and parents through texting and e-portfolios. An analysis of teachers and students texting each other regarding their work provided students with a sense that their teachers cared about them; whereas teachers, counselors, administrators, and parents were able to track issues in student performance and to intercede when necessary (Pollock, 2011).

Uses of Digital Tools to Foster Digital Literacies

Researchers also have examined the ways in which uses of digital tools foster digital literacies of informational/accessibility, collaboration knowledge construction, multimodal communication, gaming literacy, and reflection on learning.

Informational/accessibility literacies. One essential set of digital literacies has to do with students’ ability to readily access and acquire online information: including processing, accessing, subscribing to, and tagging online material through identifying important questions leading to locating, synthesizing, critically evaluating, and communicating information (Coirio & Dobler, 2007; Leu et al., 2011). Central to information processing is the ability to effectively access online databases using keyword searches, leading to synthesizing relevant information as opposed to relying on Google searches (h, Laurinen, & Marttunen, 2008). Students also need to analyze critically online information in terms of accuracy, reliability, and bias (Graesser et al., 2007).

Processing online texts also involves the ability to select and navigate hyperlinks as well as, in constructing texts, employing navigable, relevant, and useful hyperlinks that help users build social connections between people and ideas (Leu et al., 2011). An analysis of sixth graders’ reading and navigation of hypertexts revealed that students possessed skills in selecting links, but did not possess an ability to process information from those links (Salmerón & García, 2011).

At the same time, concerns are often expressed about the degree to which superficial online reading processes and information-overload limits deep reading and thinking without contextualizing or synthesizing that information to construct knowledge (Carr, 2011). For example, sixth-grade students perceived online reading as faster than print-based reading, involving a snatch and grab approach to obtain immediate results (Sutherland-Smith, 2002). One limitation of these perceptions is that they perceive online reading as an overall, generic category as opposed to examining the specific digital literacies involved in online reading for certain students in certain contexts. This suggests the need for more fine-tuned qualitative analyses of specific processes involving online reading for specific purposes related to students’ knowledge construction.

Collaborative knowledge construction. Another digital literacy involves teachers and students using online discussion forums, social networking/bookmarking sites, note-taking and annotation tools, blogs, or wikis collaboratively to share and construct knowledge. For example, to construct knowledge collaboratively in response to texts, students can employ social bookmarking or digital note-taking tools such as

Diigo (http://www.diigo.com)
Reframe It (http://reframeit.com)
Trailfire (http://trailfire.com/pages/download.php)
Evernote (http://www.evernote.com)
Thoughtboxes (http://thoughtbox.es)

as well as annotation tools such as

Highlighter (http://highlighter.com)
iAnnotate PDF (http://www.ajidev.com/apps.html)
Goodreader (http://www.goodreader.net)
Readmill (http://readmill.com)

or the Kindle app (http://kindle.amazon.com) for sharing annotations with other Kindle readers.
Studies of students’ use of the HyLighter annotation tool revealed that it effectively fostered peer critique and critical interpretation of texts (Mendenhall & Johnson, 2010).

One key affordance of digital tools for collaborative construction of knowledge is that students can both access and share creation of the same text. In working collaboratively, students are then exposed to each other’s particular literacy practices, resulting in their acquisition of those practices. In a study of two seventh-grade students working alone and with each other in reading online texts, each had their own unique interpretive strategies—with one student (i.e., Student A) engaging in more integration of information—when they read collaboratively, the other student (i.e., Student B) then took up those integration strategies employed by Student A (Coiro, Castek, & Guzniczak, 2011).

Students also employ collaborative writing tools such as blogs and wikis to share their ideas with others (Beach et al., 2009). One analysis of 168 teachers’ perceptions of their students’ uses revealed that 89% of teachers indicate that blogging changed their instructional methods, resulting in increased peer interaction and collaborative sharing of ideas among students and between teachers and students, particularly in terms of providing immediate feedback through comments (Felix, 2008). And, in another study, writing collaboratively on a wiki resulted in 60% of the students reporting that writing on the wiki made them consider their audiences and more frequently to use engagement markers in the argumentative texts (Kuteeva, 2010). As a reflection of how writing integrates with reading, students’ use of blogging in a development reading course led to the finding that blogging enhanced their reading and resulted in a higher levels of motivation and retention (Hsu & Wang, 2011).

Students also employ digital tools for constructing online literary texts. For example, Yi (2008) documented that students engaged in collaborative *relay writing* of an online novel in which they extended each other’s storylines, resulting in high levels of student engagement. Similarly, an analysis of students’ constructions of hypermedia digital stories revealed that the hypermedia stories fostered more effective collaboration than was the case with students writing print, linear stories (Liu, Liu, Chen, Lin, & Chen, 2011). And, an analysis of adolescents’ posting of fiction and receiving of feedback on Fanfiction site—a website that archives stories about characters or settings that are written by fans of the original work (http://www.fanfiction.net)—indicated that students valued the collaborative exchange of critical responses to their fiction; female English Language Learning (ELL) students used creative writing in ways that achieved identities that challenged the deficit identities often ascribed to them by their schools (Black, 2009). An analysis of eighth-grade students’ collaborative construction of different sections of an e-zine for their peers (http://flash.lakeheadu.ca/~teenezine) indicated that students were highly engaged in working together to produce their e-zine (Courtland & Paddington, 2008).

Students also use mobiles or online chat for collaboration. An analysis of 20 students’ cell-phone audio logs of how they employed digital tools for collaboration indicated that they most often used cell phones for working on texts, followed by Skype, instant-messaging, email, and blogs (Conole, de Latt, Dillon, & Darby, 2006).

Students applying alternative perspectives to a certain topic or issue is one of the affordances of collaborative online writing. This perspective-taking results in what Davidson (2011) defines as *collaboration by difference* constituted by an openness to different levels of culture, perspective, expertise, ability, and insight about their reading or writing. An analysis of readers engaged in individual versus collaborative reading revealed that individual readers focused on gathering facts, whereas in a collaborative context, readers focused on sharing ideas and adopting alternative perspectives on those ideas (Leu et al., 2011). By participating in the global social networking site, *spac2cre8*, students in New York, Norway, South Africa, and India experienced cross-cultural perspectives that served to challenge their status-quo cultural perspectives (Hull, Stornaiuolo, & Sahni, 2010). In a study of California high school students, Kahne, Feezell, and Lee (2012) found that exposure to alternative perspectives through social networks led to more awareness of diverse viewpoints.

ELA teachers are also drawing on students’ active use social networking sites to foster dialogic classroom interaction among students to improve their argumentative writings (Daly, 2011). In my own research, I have examined high school students’ participation in an online role-play debate in a Ning social networking platform designed to teach students collaborative argumentative writing strategies (Beach & Doerr-Stevens, 2011). In this online role-play, students adopted virtual roles, formulated competing positions, refuted arguments, and moved toward some recommended synthesis or solution. In this study, given their concerns about websites being blocked in their school, students adopted a range of different pro-con roles and formulated arguments about the legal and pedagogical aspects related to their school policy of blocking websites, leading to
their formulation of face-to-face arguments in a meeting with the school administration to unblock the sites, resulting in the administration unblocking the sites.

One central aspect of the study was the students’ construction of their fictional profiles on the Ning profile site that served as the persona or ethos for their argumentative stances. Drawing on their experiences in creating Facebook or MySpace profiles, students created relatively elaborate biographical descriptions of their roles that they drew on to define their beliefs and stances. In their exchange of arguments on the Ning forum, students also drew on different discourses consistent with their positions on maintaining or changing their school’s Internet policies, for example, to discourse of administrator control and protection versus discourses of academic freedom of information. Adopting these competing discourses created dialogic tensions requiring students to defend their positions by formulating counter-arguments. Students could then draw on this online material for writing their own personal position papers to formulate effective arguments for the school administration to change their Internet policies.

One future development in collaborative knowledge construction is the concept of Web 3.0 or the *semantic web* in which computers or literacy robots (*litbots*) themselves store, organize, and provide users with relevant knowledge consistent with their needs, just as Amazon now stores information about their buyers’ book interests (McEneaney, 2011). As McEneaney notes:

> A big part of the next version of the Web will focus on software that automates what we do as readers and writers, creating a new kind of *who* in reading and literacy—that is, *machines* that read…Now imagine what happens when Google starts using Web crawlers that read and remember what we think of as Web content. Web searches won’t rely on search terms; we’ll be able to ask for a 10-page brief based on the most recent research posted to the Web on any topic we desire. (p. 378)

The use of *semantic web* tools might, therefore, allow students to construct and organize their own *personal learning network* (PLN) based on a searchable repository of accumulated, cloud-computing, stored knowledge over time that could be shared with others (Richardson & Mancabelli, 2011). Further research is needed on ways of constructing, accessing, linking, navigating, searching, mapping, reflecting on, and sharing these digital repositories, as well as how the *semantic web* can be used to support e-portfolio construction (as discussed later).

**Multimodal Communication**

Another set of digital literacies revolves around students’ uses of multimodal communication involved in responding to and producing digital videos or storytelling. Adolescents are actively engaged in producing videos, with 64% of online adolescents engaged in some form of content creation, and with 28% operating as *super-communicators*, for example, creating videos to share on YouTube (Lenhart, Madden, Macgill, & Smith, 2007).

A key consideration in the production and consumption of digital images and videos is how the meaning of aesthetic features of images and videos—uses of camera shots, sounds, music, and embodied actions—functions emotionally as social practices appealing to peer audiences (Beach & Swiss, 2010). Through production of digital storytelling (Ohler, 2007; Center for Digital Storytelling: http://www.storycenter.org/), students acquire an aesthetic awareness of effective visual rhetoric to engage their audiences. For example, in a study of digital storytelling videos created by middle and high school students located in Oakland, California, Hull and Katz (2006) found that the participants combined images, video clips, audio, and text based on the aesthetics of digital rhetoric.

Consistent with Leander’s (2009) notion of *parallel pedagogy*, students’ production of digital video/storytelling production draws on (in writing scripts/storyboards) and transfers to enhancing their print literacies. Students aged 9 to 12, who participated in a 3-year summer program involving the creation of digital stories, increased their writing skills (Figg & McCartney, 2010). Students’ video production also enhanced their engagement and critical analysis of issues in their lives as well as led to redefinitions of their deficit identities (Vasudevan, 2006). Through their video productions, marginalized students explore alternative identity constructions constituted by their alliances with alternative cultural worlds (Rogers, Winters, LaMonde, & Perry, 2010). A student video, *Life on the Reservation*, produced in a youth media program in St. Paul, MN, reflected a collective identity evident in the use of *we* and *us* as markers of ties with Native American community building (Halverson, Lowenhaupt, Gibbons, & Bass, 2009).

Consistent with the importance of focusing on contexts for uses of digital tools, students are more likely to be engaged in multimodal communication when they have an authentic rhetorical purpose and audience (Barron, 2006). Los Angeles urban high school students’ participation as *critical researchers* (i.e., skilled researchers who constructed and shared...
knowledge that was pertinent to social change; p. 419) in a summer seminar involving addressing problems in the Los Angeles public schools yielded high levels of engagement, given the fact that they were creating videos on issues of social change and power to actual audiences (Rogers, Morrell, & Enyedy, 2007).

Participation in the Digital Youth Network (http://digitalyouthnetwork.org) designed to support seventh- and eighth-grade African American youth producing a range of different digital media in both after-and-in school settings resulted in increases in measures of creative production for personal expression, subject-matter learning, and the ability to communicate with larger audiences (Barron, 2006). Production of podcasts and digital video markedly increased student acquisition of digital literacies sixfold, as well as their engagement in learning uses of digital tools and their recognition of the value of use of these tools for learning compared with students who did not use these tools (Barron & Gomez, 2009). A review of 53 studies on uses of video podcasts revealed that use of these podcasts resulted in positive affective and cognitive attitudes toward video podcasts, control over learning, improved study habits, and increased learning performance (Kay, 2012). In these studies, students were more engaged in multimodal production when they were communicating for some actual rhetorical purpose to achieve some audience uptake.

Developing Gaming Literacy

Another set of digital literacies revolves around the use of video/online games. One third of adolescent gamers play games daily and one fifth play games 3 to 5 days a week (Lenhart et al., 2008). A recent survey of game-playing in 1,200 U.S. households revealed that 72% households play video games, 45% of parents report playing online/video games with their children at least weekly, and 68% of parents believe that playing games contributes positively to learning (Ipsos MediaCT, 2011). A survey of 505 K-8 teachers yielded the finding that 32% of these teachers use games 2 to 4 days per week, whereas 18% use them every day; 70% of teachers agree that using digital games increases motivation and engagement with content/curriculum; and 60% report that using digital games helps personalize instruction and collect data on student learning (Levine & Millstone, 2012).

A primary aspect of gaming literacy (Appleby & Beavis, 2011) involving uses of serious games is the development of collaborative problem-solving, reflection, and critical evaluation as a form of transformational play (Barab, Gresalfi, & Ingram-Goble, 2010) that can transfer to lived-world contexts (Bogost, 2011). For example, students can address issues of war and poverty in games such as Dafur is Dying (http://www.dafurisdying.com) or Ayiti: The Cost of Life (http://costoflife.ning.com). A comparison of game-based versus story-based instruction in argumentative writing taught by the same teacher revealed that gains in writing quality were higher for the game-based group; students in those groups also were more engaged, had different goals motivating their participation, and received fewer teacher reprimands to stay on task (Barab, Pettyjohn, Gresalfi, Volk, & Solomou, 2012).

Through creating their own video games, students are employing a range of print and digital literacies, for example, writing scripts or drawing on their literary/popular culture knowledge. For example, seventh graders created their own video games using the software program, Game Maker (http://www.yoyogames.com/gamemaker) based on their responses to A Wrinkle In Time (L’Engle, 1973) (Oldaker, 2010). Drawing from scenes and characters from the book, the students wrote narrative plans for creating different levels for their game in which players were coping with multiple complications. In doing so, they recognized that some of their original written plans had to be modified in creating their games. In addition to playing games to learn, teachers and students can also collaboratively share learning to play games. In a 3-year study, teachers and students provided each other with game-playing strategies through creating paratexts—guides, tips, and materials on a game wiki that included an analysis of the archetypes represented by game characters (Apperley & Beavis, 2011). Sharing these paratexts enhanced their learning from games and literacy practices, as well as improved students’ critical reading analysis of their paratexts’ usefulness in playing games for their peers. Rather than focusing only on devising games for use in the ELA, one larger implication of this research is the need to integrate engaging playing-to-learn experiences into all aspects of the ELA curriculum, as reflected in the use of the online role-play to teach writing (Beach & Doerr-Stevens, 2011).

Reflection on Learning

Another important digital literacy is the ability to employ digital tools to reflect on one’s learning. This includes identifying practices acquired from certain experiences and how one can improve on those practices in the future. To do so, students use e-portfolios for collecting, annotating, noting patterns in, and critically reflecting on their work over time.
uses of digital tools and literacies in the English language arts classroom

(Cambridge, Cambridge, & Yancey, 2009). They can employ e-portfolio systems such as Adobe Systems, Angel Learning, Chalk and Wire, Desire2Learn, Digicitation, ePortfolio.org, Epsilien, Follotek, LiveText, Mahara, ePEARL, or Nuventive (Waters, 2009), or simply use websites, blogs, wikis, or Google apps for e-portfolios. In a recent study, 388 students in Grades 4–6 in Canada using an e-portfolio (ePEARL) had a statistically significant improvement over students who did not use an e-portfolio as assessed on a constructed response subtest of the Canadian Achievement Test, 4th edition, along with improved performance on certain metacognitive skills in a self-report measure (Meyer, Abrami, Wade, Aslan, & Deault, 2010).

One advantage of e-portfolios over paper portfolios is that students can organize their collections within categories, import images/videos, employ hyperlinks to connect texts to define consistent patterns in their work, and keep adding material over an extended period of time. Use of e-portfolios also affords a wider potential audience for evaluating student work. A study of high school students’ work at two Ohio high schools in coordination with Ohio State University composition instructors to define what constitutes effective college-level writing involved an e-portfolio system to share the high school students’ writing with these instructors, so that students then receive feedback from both high school and college instructors (Acker & Halasek, 2008).

Another researcher found that junior high students employing e-portfolios demonstrated higher levels of self-evaluation and motivation than did students who employed traditional assessment (Chang, 2009). At the same time, one of the challenges in the use of e-portfolios is how to foster authentic reflection of strengths and areas that need improvement (Belgrad, Burke, & Fogarty, 2008). Another challenge has to do with achieving valid and reliable assessment of e-portfolios given the subjective nature of assessing e-portfolio work. A study of high school students’ e-portfolios indicated low inter-rater reliability for peer raters and low agreement between peer and teacher ratings (Chang, Tseng, Chou, & Chen, 2011). A third challenge is how to broaden the use of e-portfolios “as a way of being and of interacting, as well as an artifact” (p. 202) so that students reflect on changes in their identity construction over time (Hughes, 2010).

Another issue in the use of e-portfolios is how users can readily search for material on an e-portfolio and how long students can retain e-portfolios when they are stored on a school’s or commercial server. Given the previously mentioned development of the Web 3.0 semantic web, researchers are examining the use of cloud-computing, which represents digital repository versions of e-portfolios that might address some of these issues (Kim, Ng, & Lim, 2010).

ELA teachers are also using digital tools such as track changes or sticky note annotations, podcasts, screencasting software, blog commenting, chat sites, or videoconferencing to provide feedback to student work (Herrington, Hodgson, & Moran, 2009). Given students’ preference for feedback embedded within texts, teachers can use these tools to provide pin-point comments within their digital texts (Wolsey, 2008).

Teachers also can readily store examples of their comments for use in training peers to give peer feedback and share examples of students’ revisions, for example, displaying revisions on a wiki platform made as a result of feedback. Teachers’ use of video conferencing for the purpose of giving feedback led to positive increases in students’ reading test scores (Houge & Geier, 2009) and writing test scores, as well as motivation, retention, and self-esteem (New York City Central Department of Education, 2009).

Teachers also can give feedback using face-to-face conferences with online synchronous conferencing via synchronous chat tools that allow teachers (as well as peers) to engage in real-time discussion of students’ drafts. For example, tutors at the University of Minnesota Student Writing Support Online (SWS.online) provide feedback to students, including high school students taking courses for college credit, on a site that allows students to view comments on their drafts and then discuss needed revisions, resulting in enhanced participation in revisions (Beach, Clemens, & Jamsen, 2010; Breuch & Clemens, 2009). One study of 184 10th graders’ use of online peer-assessment indicated that students significantly improved their writing due to the peer feedback and the peers’ scores were highly correlated with expert scores, suggesting high validity for the peers’ scores (Tseng & Tsai, 2007).

One challenge using e-portfolios or online feedback tools for assessing students’ digital writing is that ELA teachers need to redefine their criteria based on digital literacies employed in effective visual rhetoric, for example, the ability to employ readable design features, purposeful links, relevant embed images/video, and invitations to interact criteria that differ from those used in assessing print-based writing.

Implications for Teaching ELA and Research

This research has a number of implications for redefining or remediating print literacies in terms of digital literacies in teaching ELA, including that ELA teachers:
• Identify the affordances, as well as the challenges, associated with uses of digital tools for fostering use of digital literacies of informational/accessibility, collaboration knowledge construction, multimodal communication, gaming literacy, and reflection on learning, affordances associated with engagement in a participatory culture (Jenkins, 2009). Identifying these affordances and challenges can lead to modeling or scaffolding ways of using digital tools to engage in certain digital literacies.

• Design engaging, authentic contexts for teachers and students to operate as co-learners using digital tools for collaborative construction of knowledge and addressing of issues in learning commons spaces. In doing so, teachers can encourage students to adopt alternative perspectives that create dialogic interactions and challenge status-quo perspectives.

• Redefine criteria used to assess student learning in terms of digital literacies, as opposed to relying only on criteria associated with traditional print literacies. And, using e-portfolios and digital assessment tools to provide feedback to students’ work allows teachers to build on and support students’ production of digital texts.

This research also has implications for researchers studying the effects of uses of digital tools on learning. Researchers need to employ outcome measures and assessments consistent with the digital literacies constituted by uses of digital tools, as opposed to relying on traditional measures of print literacies, for example, multiple-choice reading tests or paper-and-pencil written essays, as well as crafting authentic assessment spaces that support students’ uses of a range of different digital literacies. Rather than examine presumed effects for an overall digital tool category, for example, digital reading (Carr, 2011) or videogames, on learning, researchers need to focus on variations in the quality or design of specific digital tools to study the specific kinds of learning afforded by certain digital tools. Further, rather than assume that playing videogames results, per se, in certain positive or negative effects, researchers need to adopt a more ecological perspective to examine how playing a certain game might involve certain types of experiences (Bogost, 2011). In doing so, they can then make recommendations regarding how certain design features or pedagogical uses of digital tools resulted in certain specific kinds of learning.

References


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