Integrating Web 2.0 & Technology Tools in the Elementary Language Arts & Mathematics Curriculum

Kristy Motes

Eastern Connecticut State University
Introduction

The United States has rolled out a new set of standards entitled the Common Core State Standards to better prepare students for college, and subsequently, their career of choice. But, have the standards been effective? While the revised curriculum ideals challenge students to think deeply about content, the lessons still fall short of the previously mentioned overarching goals. In this digital age, businesses and professions are incorporating newer technologies to become more efficient and to better serve their targeted populations. Meanwhile, the lessons delivered to students are greatly lacking technology experiences to adequately prepare them to step into this upgraded professional world in the near future.

The Common Core does not have a list of standards pertaining solely to technology. Rather, there are expectations embedded in the content areas. For example, a Grade 4 writing standard specifies they “use technology, including the internet, to produce and publish…” (National Governors Association Center for Best Practices [ELA], 2010, p. 21). The document further encourages technology by stipulating the use of digital sources and appropriate lengths of typing for the duration of one session. Additionally, the new standards incorporate speaking and listening benchmarks which lend to the inclusion of technology as well. An issue that arises from this: teachers may have opted to utilize technology in the past, but have never been required to incorporate it into their lessons from a national level. These new requirements may not be received well by those who have an aversion to employing higher levels of technology in the classroom.

Recent statistics report that in 2011, nearly all (99%) teachers in education have been provided computer access and internet usage within their schools (Pan & Franklin). However, in a survey conducted by Pan and Franklin (2011), it was found that most teachers reported “never” using Web 2.0 tools in their classrooms. These statistics indicate that educators have the option to integrate technology into their classrooms, but are electing not to. As the New Media Consortium specified
“Students are different, but a lot of educational material is not. Schools are still using materials
developed decades ago, but today’s students come to school with very different experiences than those
of 20 to 30 years ago...” (Morgan, 2012, p. 168). This statement eloquently captures the stagnation of
education and a growing rift between teacher and student. Another teacher states “I have witnessed 4-
year-olds sending emails and loading pictures from a camera onto the computers. Do we really want to
bore them with an excess of paper and pencil learning?” (Lee, 2012, p. 97). As the aforementioned
teacher indicates, to ensure active, willing learners, instruction must match their technological
capabilities.

Current research indicates a few deficiencies in technology education for teachers and students
alike. It has been noted that satisfactory professional development is essential and drives whether
teachers utilize technology in their classrooms (Pan & Franklin, 2011). Without the proper training,
educators tend to avoid inclusion of technology in their lessons. Consequently, students participate in
educational activities they deem unconnected to themselves and those around them.

The purpose for this project is to identify effective types of Web 2.0 and other technology tools.
High quality examples of tools will be located based on research detailed in this review. Additionally,
each web tool will be accompanied by a reference to the Common Core standards to ensure excellence
in education. This project will provide school administrators with a research-based starting point for
effective professional development and technology integration. Moreover, with the alignment of tools
to current standards, teachers will be more likely to implement meaningful, high-quality 2.0 tools into
their classrooms. Additionally, students will have instruction that mirrors their expectations for learning
and reflects research conducted in their personal lives.

Literature Review

Web 1.0 & Web 2.0
Initially, the internet encompassed a series of websites that were edited only by the owner of the page. Page creators would post content to inform the general public or target specific populations. Anyone who did not own a website generally used the internet for research or entertainment purposes (academic or personal). As technology evolved, web page designers generated sites that allowed the common user to post their own information. This now placed the general public in a different role. They were now actively engaged in content creation, rather than only consumers of information. This divided websites into two categories: Web 1.0, where only the owner adds or changes page content, and Web 2.0, in which people other than the owner may add or change content. Various examples of Web 2.0 sites include web logs (blogs), wikis, social media, online collaborative sites, as well as content-specific sites centering on the various sciences.

**Web Logs (Blogs)**

**Defined**

Web logs, or blogs, are sites that allow someone to post journal entries on the internet. These posts may have a specific topic such as amateur movie critiques, gardening, or more academic matters that take the form of expository essays or research-driven writing. This format allows other users to write comments in response to the initial post, potentially creating a ‘dialogue’ between the readers and the author.

**Educational Applications**

A blog is an attractive Web 2.0 tool because its versatility encourages utilization for any educational discipline. Examples cover a broad range of disciplines and instructional ages. Handsfield, Dean, and Cielocha (2009) have created classroom blogs to provide an alternative to typical pencil and paper journals. These blogs permit students to share their thoughts about the books they read with their teacher and peers. Additionally, researchers and educators have worked together to incorporate blogging into a Child Development course, adding a new element to lectures during and after class.
Blogs have also been used in college level courses for a participation grade as well (Bartholomew et al., 2012; Park, 2013; Wilson et al., 2011). In a social studies course, a teacher often posts news clips or photos from current events and encourages students to engage in discussions around these media selections. Other teachers have successfully implemented blogs with language acquisition. English language learners wrote cooperatively on these blogs to practice writing skills (Boas, 2011; Istifci, 2011). All cases mentioned above reported some type of improvement in student work, motivation, or learning.

**Educational Effects**

Blogs have made their debut in classrooms with success. Handsfield et al. have noticed improvements in students’ writing efforts, such as becoming “more careful writers. Students who previously did not proofread their writing soon began adding conventional punctuation” (2009, p. 45). Researchers in the same study observed that students would frequently answer questions posted by peers compared with teacher-posed questions in their notebooks (2009). By creating an online space that allowed students access to an authentic audience, the teacher perceived that her students wrote with higher levels of enthusiasm (Bartholomew et al., 2012; Boas, 2011; Handsfield et al., 2009; Istifci, 2011; Park, 2013; Wilson et al., 2011).

This same phenomenon was noted by many other researchers as well (Istifci, 2011; Bartholomew et al., 2012). Moreover, researchers, Wilson, Wright, Inman, and Matherson (2011), discovered students are more likely to respond digitally when compared to more traditional means, such as paper and pencil. Another study described English language learners as “reluctant” about classroom writing assignments, but “eager” when technology was included (Istifci, 2011, p. 219).

Comments posted to blogs by peers were found to act as positive reinforcement for pupils. Bartholomew et al. (2012, p. 23) described students as “quicker to repost again and their subsequent
posts tended to have greater detail”. Furthermore, Dr. Istifci (2011) identified that 80% of students articulated a positive feeling regarding peers reading their compositions.

Researchers have ascertained that blogs improve undergraduate study patterns. Two-thirds of students from one study reported utilizing a dictionary to complete their blog assignments (Istifci, 2011). The same study also found that 80% of students created a draft prior to posting online. With a supposed ‘real’ audience, learners seem to put an extra effort into their assignments. One pupil captured this sentiment with the following statement: “The teacher always corrected my work in the class but in the weblog I am alone. I exchange ideas with my friends and I feel free to write” (Istifci, 2011, p. 218). Perhaps knowing peers will view their prose helps them focus and develop the content of their pieces. Moreover, their peers are reading for content, not the purpose of checking grammar as a teacher might.

Instructors might worry about creating a positive environment online since this freedom may present challenges. However, the Bartholomew study (2012) found by establishing rules early, very little inappropriate language appeared in the blogs. A single confrontation was recognized in the aforementioned study. Though professors patrolled it, one student accused another being too prolific, resulting in other students’ performances looking poor by comparison. However, as time went on the learners resolved their differences and an unprompted apology from the guilty party came forth. Additionally, Wilson et al. (2011) wrote that blogs had a clear impact on the classroom environment. Educators reported that students would initiate discussions online that spilled over into the classroom in the form of healthy discourse.

**Tips**

In order to select the blog appropriate for the classroom, an educator should become very familiar with the tool prior to implementation (Wilson et al., 2011). It is also recommended that teachers either create names and passwords or have students submit them for easier communication
and policing. Additionally, Bartholomew et al. (2012) endorses the use of a “blog log” to help students track their online involvement. The log is a digital (or paper) document in which students chart the number of comments each post receives. By completing such a record, students will be more aware of their own blogging activity. Moreover, it will force them to revisit and reflect on their previous work. Finally, educators in the same study refrained from correcting student work or participating heavily in student blogs. This created a safe environment with “organic correcting” from peers, allowing students to explore their ideas without the professor commandeering discussions.

For teachers looking to implement a classroom blog, Kidblog (www.kidblog.com) is a great resource. With brief set up required, a teacher can quickly add an entire class to her blog. Kidblog has many safety features so teachers ultimately control how ‘public’ student writing is showcased. Controls allow it to be an open forum or restricted to only classroom students. Teachers also have the option to create guest accounts (for other students, parents, or administrators). Guest accounts may comment on writing, but are not provided their own blog space. A teacher can set parameters for filtering what is posted directly and what he has to approve before it is posted on the web.

**Wikis**

**Defined**

A wiki is an online space that allows a community or special population to post original content such as text, still images, video, or audio files. The purpose for a wiki is to gather media files through a collaborative effort, centering on a single topic. A popular wiki is Wikipedia (www.wikipedia.com) which permits the general public to post information in order to develop a comprehensive virtual encyclopedia. A resource containing so many authors (the entire online community) has been thought to be unreliable by students and teachers alike (LaFrance & Calhoun, 2012). However, LaFrance and Calhoun established a different set of beliefs by requiring students to use the site. Pupils who previously dismissed its use in academic research later amended that they would use it as a starting point, but not
reference it directly in a paper. Through their participation in the wiki, they came to realize its unique value as a source.

**Educational Applications**

Wikis, similar to blogs, are abundant in educational settings since they allow for any content. Wikis have been created as a micropedia or “small student generated version of an encyclopedia (Ducate, Anderson, & Moreno, 2011, p. 502). Students may design a micropedia to extend a text from selected key words. Learners may hone their writing skills by positing their pieces, such as a branching story in which the reader makes choices for the characters, resulting in multiple alternate endings (Ducate et al., 2011). Students might build background knowledge by gathering media to reference later as they read an assigned text. Students can gain deeper knowledge by collaboratively researching topics in science or social studies (Wilson et al., 2011). In younger grades, wikis can be used to share current units of study with parents (Lee, 2012). Lee discovered a set of grandparents in India that stayed connected with their American grandson about his studies through a classroom wiki. In science, teachers have posted photographs related to content for students to explain for extra credit (Lee, 2012).

Moreover, choir instructors report posting rehearsal tracks so chorus members may continue practice at home (Lee, 2012).

**Educational Effects**

O’Bannon and Brit (2012) found that wikis were effective in increasing students’ content knowledge. They specified that students who were part of creating the media uploaded experienced “hands on” knowledge and therefore had the best knowledge gain. Moreover, it focused on specific content, encouraging students to delve deeper into a given subject. This sentiment was echoed in Bowman’s research as well. Furthermore, Bowman found the use of a wiki allowed students to report on theories in action. Students became aware of disparities within the criminal justice system while
posting media and provided them “expansion beyond the traditional ‘book and lecture’ pedagogy” (Bowman, 2012, p. 14).

When interviewed by Lee (2012), a teacher explained to researchers that “students were likely to express themselves in the space of a wiki more freely than a usual classroom” (p. 95). Educators also found students were more receptive to peer editing through wikis and they would “enhance their writing by themselves” (Lee, 2012, p. 95). Likewise, students viewed their work as a piece still in progress rather than a completed assignment. Students realized the process of writing and revising is ongoing since others could comment on their work at any time.

Students also recognized the value of wikis in their learning. Research conducted by Ducate et al. (2011) indicated many students consulted outside sources (other than the course text) to complete the assignment. In the same study, pupils also reported gains in “grammar, vocabulary, and cultural content” (p. 515) when employing a wiki in a world language course. Furthermore, many expressed knowledge gain of pertinent facts throughout the wiki process.

Teachers also feel that the use of wiki is an authentic way to evaluate student learning (Lee, 2012). One teacher asks early education learners to post their “good, better, and best” (Lee, 2012, p. 94) from the week which provides insight regarding what they learned. In the same qualitative research by Lee, another educator stated peer feedback on the wiki “became the good pressure to make it something of which they can be proud” (p. 97). This indicates an increase of effort from students since they had an authentic audience for their work.

**Tips**

In order for a wiki to be successful, seasoned technology users encourage teachers to establish rules and review them often (Lee, 2012). What’s more, educators also stated it is imperative to provide students with time to use the wiki, and even more importantly, that there will be errors. Teachers know that children make mistakes and need reminders. A wiki is no exception. Teachers should also invest
time in becoming familiar with the wiki. One teacher reported her first wiki took approximately 45
minutes to generate, but successive wikis took far less time (Wilson et. al, 2011). Finally, with any
technology implementation, teachers should act as a facilitator, not a dictator. By taking on the role of a
guide, the teacher transfers the responsibility of learning to the student (Lee, 2012).

An educator looking to add a wiki to his or her digital learning space should check out
Wikispaces (www.wikispaces.com). Although there is basic no-cost plan, educators can register for a
free upgrade with a school-issued email address. The adult in charge of the wiki may select a classic wiki
style, a basic website (that behaves like a wiki but is presented as a website), or one designed for the
classroom. The administrator of the wiki may quickly add new users via email addresses. There is also
an option to produce a bulk list from a spreadsheet. Privacy settings can be set so only members may
view and edit pages. However, with the basic no-cost plan, this only provides five memberships. If the
wiki is made public, the number of members is unlimited.

**Podcasts, Vodcasts, & Screencasts**

**Defined**

With the development of Web 2.0 tools on the internet, more projects have emerged such as
podcasts, vodcasts, and screencasts. Podcasts originated from radio interviews conducted by
Christopher Lydon (Hammersley, 2004). Lydon uploaded some of his work using an MP3 recorder,
which was later designated a “podcast” by journalist Ben Hammersley. Over time, people began
creating their own podcasts centering on a variety of topic. Later, video was added and Peter Meng
relabeled the product a “vodcast” (as cited in Rocha & Coutinho, 2011). Instead of video, some have
added photos or screenshots to a podcast, creating a “screencast.” These projects all utilize audio (and
sometimes visual) media to produce original content about any given topic.

**Educational Applications**
Again, with media that has been designed with no specific content in mind, these three innovations may be applied to any educational subject. Researchers have applied “cast” technologies to mathematics. Students recorded narration and added screenshots to explain complex geometric concepts (Rocha & Coutinho, 2011). Given the sound component, Coutinho and Mota (2011) found it effective when applied to music education. Students listened to clips of songs to identify mystery composers or write their own interpretations of selected works. Students also recorded their own secret melody for classmates to identify. In the same unit, students collaboratively researched an era in music history to create an informative podcast for peers. Finally, Wilson et al. (2011) found vodcasts and podcasts from news sources (such as CNN, C-SPAN, or NPR) can be used to study current events. The teacher reported favoring the sound clips because they do “not take up large chunks of classroom time, but [do] allow students to get to the heart of the matter on relevant news stories of the day” (Wilson et al., 2011, p. 71). By utilizing this media, the instructor covers the material in an appropriate amount of time and engages the student population.

**Educational Effects**

Student motivation and participation improves with the implementation of “casting” technology in an educational setting. In one study, all students reported satisfaction with podcast activities and the project as a whole (Coutinho & Mota, 2011). A teacher in another study asserted that her learners thoroughly enjoyed editing, sharing, and viewing their work as well as the creative nature of the project (Wilson et al., 2011). Researchers in the same study discovered students are motivated to use technology and are “committed to turning in quality work if they know they can become ‘video stars’” (p. 71). Also, Coutinho and Mota (2011) found that students participated in an online activity to identify a mystery music composer as soon as it was posted. The music teacher affirmed that she was approached numerous times by many eager students to verify if they had posted the correct answer.
each month. Furthermore, students from other courses began posting their answers, even though they were not part of the class. This indicates a high level of motivation, especially for those not enrolled.

Students report positive thoughts and demonstrate optimistic attitudes as well. In a survey at the conclusion of one study, all students indicated a desire to utilize podcasting in the second half of the course (Coutinho & Mota, 2011). The same survey also revealed three-fourths specified wanting to use them in another course. Such a strong desire for revisiting the technology denotes a high opinion of the opportunity. Likewise, students testified that the use of a podcast in learning was helpful in music education. One student commented “I think it’s cool that the teacher makes a project for the students” (Coutinho & Mota, 2011). This statement hints that incorporating Web 2.0 tools in education mirrors what students crave and anticipate in their daily lessons.

Applying casting technology to classroom activities also positively influences the environment. One teacher reported “healthy competition was developed” (Coutinho & Mota, 2011, p. 71) as students tried to identify a secret composer. Students fed off of peer excitement as the suspense built and more clues were revealed. The teacher also maintained that the “use of the podcast proved to be innovative and helpful in creating a relaxed and pleasant class” (Coutinho & Mota, 2011, p. 72). This might be attributed to student connections with the teacher who recognizes their preferences as learners, putting them at ease in the schoolroom.

Rocha and Coutinho (2011) found students who participate in repeated tapings (in the hopes of getting a quality recording), have a more in depth understanding of their screencast content. Additionally, students who view peer projects will gain further understanding of the work. Finally, in a project that forced students to construct their own answers to real problems, researchers reported elevated levels of engagement (Rocha & Coutinho, 2011).

Tips
As previously mentioned, students may participate in multiple audio recordings to perfect their project. This necessitates that additional classroom time be allotted for project completion. Additionally, researchers caution teachers to design activities that match student competencies. Coutinho and Mota (2011) reported that students struggled with group research of a music era because they had not yet developed the appropriate skills, but were motivated to try anyway. These students met with success since the project was scaffolded, being just outside the realm of their abilities. Conversely, they also recount low engagement (4 students out of 20) in an online activity that was excessively challenging for students.

Whether educators intend for students to record basic narration for a podcast or create multiple tracks for a musical presentation, Audacity software will work. This no-cost downloadable program (from www.audacity.sourceforge.net) provides recording through an external microphone (or an internal one if it is sufficient). The software provides fade in or fade out options for the author. The program also offers more effects to enhance a recording such as echo or reverse (Audacity Development Team, 2014). Multiple tracks may be recorded and overlaid to create more intricate recordings. The Audacity site also features an extensive wiki for multiple applications of the program, including basic classroom use.

**Bookmarking Tools**

**Defined**

Bookmarking tools allow the user to save the location of an article so it may be quickly found later. ‘Tags’ consist of one or two words that connect to the main idea of the article. Tags aid a user in tracking down previously discovered articles or search for new ones related to a topic. Many bookmarking tools also provide a highlighter feature so key text or phrases can be retrieved with ease. Some also include an annotation element which allows the reader to add his own notes (comments, questions, or reflections, etc.) to an article that may be saved for future use.
Educational Applications

Bookmarking tools are designed for research purposes, whether academic, career-oriented, or personal. Given this, the technology is a bit more limited in its application when compared to the previously mentioned technologies. One study encouraged an instructor to select a series of articles on a central theme, which students read (Mendenhall & Johnson, 2010). Students could conduct research, either individually or cooperatively, to present. Moreover, researchers in the same study supported students in uploading their own writing and share with peers for editing purposes. Annotations could be made during peer critiques which reflect suggested revisions for the author.

Effects

Students have conveyed bookmarking tools to be advantageous in their studies (Mendenhall & Johnson, 2010). In the same study, many pointed out that the tool was a favorable method to receive peer editing advice and all demonstrated a positive attitude when working with the technology. Results in the aforementioned study indicated that students also thought the tool nicely facilitated collaborative work.

Mendenhall and Johnson (2010) surmised that critical thinking skills slightly improved by utilizing the highlighter and annotation features. Researchers believe the elevated proficiencies are due to a “higher level of interaction with the text” (p. 272). Additionally, students are able to compare their thoughts with their peers’ annotations if working in a partnership. This comparison can serve as a self-check for comprehension and processing.

Tips

If tight on time, select sites for students to peruse beforehand so students do not squander class time browsing the internet without direction. Additionally, one teacher recommends adding a unique tag to articles that includes the teacher’s last name (Wilson et al., 2011). This speeds up the process of searching for articles since students can search for a tag and compile the required reading with ease.
Diigo (www.diigo.com) is a great resource to utilize, providing highlighter and sticky note annotation features. Secondly, pages or articles are archived so that if a site is not available, the article is still accessible. Lists can also be created which offers privacy features and helps organize materials.

**Content Specific Tools**

Content specific Web 2.0 tools are created with one focus in mind, such as mathematics or science. These tools are beneficial if a quality example can be located. Each discipline has processes explicit to itself. By designing tool with one academic focus in mind, it will be a better representation of the subject matter. Four examples of these are Primary Access, nQuire, iSpot, and Toondoo.

**Primary Access**

Primary Access (www.primaryaccess.org) was designed for student use in social studies. The tool allows students to assemble primary sources to create documentaries, complete with script writing and narration recording. Completed projects may be shared with other Primary Access users. While no current research regarding classroom benefits exists, it seems likely that students will find it engaging.

**nQuire & iSpot**

nQuire (http://www.nquire.org.uk/home) and iSpot (www.ispotnature.org) are both considered ‘open education resources’ that encourage ‘citizen science’ (Scanlon, 2012). These grassroots efforts aim to break down the myth that scientists in labs are the only individuals participating in scientific progress. nQuire guides the user through all steps of the scientific method. A user may replicate an investigation already posted or create her own inquiry. iSpot is designed for nature enthusiasts and has established an online community for wildlife/ plant life identification.

Both sites have had an interesting impact on the scientific community. Participants find them highly motivating and inclusive, such as a young boy who identified a new species of moth through the use of iSpot (Scanlon, 2010, p. 230). Researchers have found that participation in either increase enjoyment for students who in turn demonstrate an “increased understanding of the inquiry learning
process” (Scanlon, 2010, p. 227). This research indicates students will have mastery of scientific processes with repeated use of these sites.

**Toondoo**

Another Web 2.0 tool created for a specific purpose is comic book creation tools that are popping up on the internet. While most are not created with educational applications in mind, the brief nature of the writing may be used as an assessment tool for grammar concepts, summarizing short stories/chapters, and vocabulary acquisition.

Toondoo ([www.toondoo.com](http://www.toondoo.com)) is an exceptional site that presents students with many options for creativity. The tool makes use of drag and drop interface. With a variety of characters, backgrounds, and speech bubbles to choose from, student creativity will not be limited. Students can create comic strips, comic books, or characters.

In one study of comic strip creations, 96% of participants reported satisfaction in the activity and an enthusiasm to participate again (Kihçkaya, & Krajka, 2012). One student claimed “Creating my own comic strips helped me improve my writing as well as reviewing my grammar knowledge” (Kihçkaya, & Krajka, 2012, p. E163).

An analysis of student writing in the strips “contained longer utterances than they normally did” (Kihçkaya & Krajka, 2012, p. E163). Kihçkaya and Krajka (2012) also noted that there was an increase in sentence variety among all students when compared to previous writing. Finally, the student writing also displayed “increasing structural complexity” through “more sophisticated expressions” (Kihçkaya & Krajka, 2012, p. E163).

**Conclusion**

In conclusion, as teachers begin to decode the new standards, it is imperative they keep technology applications in mind. If not added now, it might never be realized. With these new standards comes an opportunity to rethink current teaching practices. Implementation of blogs, wikis,
podcasts, bookmarking sites, and content specific tools is an excellent place to start this endeavor. As one explores online, it will rapidly become apparent that while the above-mentioned tools are some of the popular ones, many other educational possibilities await. For example, video creation, which has limited research in the field, is another appealing method for enlivening lesson plans. Moreover, social media might come into play for the upper grades (Note: given that this research project is geared towards upper elementary students, social media was intentionally left out due to age requirements often associated with membership). One thing remains clear: by realizing technology’s influence, teachers will close the digital divide between instructor and pupil.
References


