Connecting the Old to the New: What Technology-Crazed Adolescents tell us about Teaching Content Area Literacy

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Abstract

This article describes a study where Personal Digital Assistants (PDAs) were integrated into two eighth grade social studies classrooms to create a bridge that connected traditional textbook teaching with new technology. This article will explore the motivation for this type of integration, give specific details about the study, and share what we learned from students about how using the technology gave them control over their reading, connected to their lives, and gave a new spin on the old in terms of content area literacy strategies. Finally, this article will conclude with future directions for educational implications for research and practice.

The bell rang to usher in third period social studies and soon a mob of twenty -five eighth graders made their way into the classroom. Noisily these awkward adolescents pushed and shoved; papers drifted out of battered binders as they entered the narrow classroom door. However, only a few short minutes later, the students were given their PDAs and commenced with the lesson of the day on Colonial America. Almost immediately, silence permeated the classroom, as the eighth graders sat hunched over their handhelds clicking and scrolling as they read about colonial life. The room continued silent and focused until the first melodic beeping sound indicated that someone in the class just received a memo from a classmate. Soon there was a cacophony of beeps as students sent each other questions from the reading to other students. As soon as one student would receive the memo, they would start typing with their stylus on the internal keyboard to respond. This class no longer resembled the restless students who entered only a short time ago and the teacher proclaimed that in all of his years of teaching he had never had a group so interested in Colonial America.

This scene was played out many times in the year we worked with two groups of eighth graders as they used Personal Digital Assistants (PDAs) to learn social studies content. Although we hoped that it was the content of Colonial America that stimulated their rapt attention, we were quite certain that the medium through which they were engaged with the content had a more profound effect. As we are all aware, today's educational technology climate is rapidly changing. The way we are engaging in texts is shifting. At the beginning of the previous decade, paper was the preferred mode of consuming text, but as we begin a new decade we are seeing the proliferation of digital texts entering our lives in an explosive way.

People are turning to technologies such as the Kindle, the Nook, iPods, iPads and even cell phones to turn the pages of their favorite books. Students who currently sit in our classrooms will most likely become adults who are accustomed to reading books in a digital format. This shift has significant implications for how we approach teaching reading. As a result of this changing medium, school districts are looking to adopt more digital texts and textbook companies are responding by producing more digital textbooks. In fact both Texas and California (two of the largest textbook consuming states) are leading this movement. Furthermore, schools are looking not just at laptops (like the state of Maine's

laptop initiative) but now are turning to netbooks (smaller, scaled down versions of notebook computers) and assigning them to students as they would traditional textbooks (E-School News 2010).

There are even initiatives at the federal level to encourage states to integrate these new digital-text technologies. For example, in May 2009 West Virginia Democrat John D. Rockefeller IV introduced a bill that would provide matching federal funds to states that offer a curriculum that integrates 21st century technology skills. We are living in an age where technology is changing the educational landscape. As such, it is incumbent on us (educators) to embrace these advances, maximize their potential, and better teach our students.

To keep up with this increase in technology we need new definitions, new ways to look at curriculum, and new instructional practices. We need to make sure that our students' learning is relevant to both their current lives and the world they will enter as adults. To help clarify our efforts, the National Council of Teachers of English (NCTE) has expanded its definition of literacy to encompass what it means to be literate in the 21st Century. This expanded definition helps teachers to think about literacy in a more expansive, technology focused way:

> *Literacy has always been a collection of cultural and communicative practices shared among members of particular groups. As society and technology change, so does literacy. Because technology has increased the intensity and complexity of literate environments, the twenty-first century demands that a literate person possess a wide range of abilities and competencies, many literacies. These literacies—from reading online newspapers to participating in virtual classrooms—are multiple, dynamic, and malleable.* (NCTE 2008)

It is one thing to create new definitions such as NCTE's; however, translating them into pedagogical implications can be challenging. Often teachers want to integrate technology but are not sure how this looks, don't have the technological support and resources, or feel overwhelmed. Technology is forcing us to carefully scrutinize not just *what* we teach but *how* we teach it. The integration of new forms of media—such as Palm Pilots—has the potential to help students develop new habits of inquiry that can enhance how students investigate content in non-traditional ways. Although technology integration (in this case the use of PDAs) has un-

limited potential to provide integrated and interactive opportunities, we are still at the tip of the iceberg of its potential. In many cases, (including ours), teachers worry that they would have to spend more time dealing with technology than actually teaching and that they will not know enough about the technology themselves. As we look to take these new technology integration opportunities and new expanded definitions into classroom practice, we need to consider how difficult it is to change classroom practice. We also need to recognize that changing classroom practice does not mean throwing out everything we have done before—rather, we need ways to connect tried and true pedagogical practices with the benefits of these new technologies. In this study we began to explore one way to take a technology medium and investigate how this integration could lay the groundwork for future pedagogical implications.

The Study

With this in mind, our mission in this yearlong study was to learn how technology—specifically the use of PDAs— could be integrated with existing curriculum and instructional practices to improve content area literacy. We had multiple goals as we engaged in this research. First, we wanted to assist teachers in looking at their current curriculum with new technology in mind. We wanted to help them expand upon previous instructional practices and use these to create new ones using technology. We also wanted to see if the integration of this technology could improve content area literacy skills for these eight graders—a goal clearly shared among researchers and policy makers who study adolescent literacy. Finally, we wanted to document how the students interacted with this technology and how this facilitated the growth of these multiple, dynamic, and malleable literacy competencies as defined by NCTE's mission of 21st Century skills. This article will specifically highlight the last goal as we share what we learned from these students about how technology can facilitate their literacy growth and lead to dynamic instructional opportunities that bridge the old with the new.

Our idea for this project arose out of a conversation about the potential of PDAs improving content area literacy. We were both aware that Adolescent Literacy was an area of concern—not just in our state where in 2007 the state convened an Adolescent Literacy Task Force but at a national level as well (Biancarosa and Snow 2007; Jacobs 2008; Moore, Bean, Birdyshaw, and Rycik 1999). We also had been following the explosion

of research indicating that our student body was rapidly changing, being called "digital natives" (Prensky 2001) and "Generation M" (M for media), (Kaiser Foundation 2006). These two converging lines of research led us to apply for several small grants that enabled us to buy a set of 30 Palm TX which is powered by a 312 MHz Intel XScale (PXA270 family) processor and has both Bluetooth (v1.1) and Wi-Fi (802.11b) wireless technology in addition to funds to cover materials such as tape recorders, electronic documents, surge protectors, lock boxes, and incentive pay for the teachers to participate in several curriculum planning sessions.

We chose to use Palm Pilots for a few reasons. First, unlike laptop computers, PDAs are small and affordable. One barrier to technology integration is often cost and a PDA is significantly cheaper than other technological devices. Also, PDAs closely mirror cell phones in their size and abilities. Cell phones are a form of media that are intimately tied to the culture of these middle schoolers and we wanted to explore how such a prevalent device could have educational implications. Although we purchased these PDAs through our grant, it was suggested to us that we could have easily solicited used Blackberries and other PDAs from local businesses that could have served the same purpose. While in the ideal world our choice of technology would have been driven by the curriculum, in this case we chose to use PDAs for their cost, ease, and practical applications. We also hoped that this choice would help provide a bridge into greater technology integration in the future.

Subjects and Setting

The school is located in a rural school district located approximately twenty miles south of our university. Although the census report shows that this county has 9.8% of families below the poverty level, it does have a low percentage of adults with high school degrees (72.4%) and only 6.7% of adults with bachelor's degrees. This part of the state is racially homogenous (98.4% Caucasian, 0.5% African American, and 0.7% Hispanic). Our study occurred in two middle school social studies classrooms. The school itself had an enrollment of 703 with 46% of the students qualifying for free and reduced lunch. The school's passing rates on the annual state reading test were below the state passing level. Furthermore, they had not met AYP goals the previous year. As such, the school was motivated to

participate in the study by the promise of technology integration opportunities and the hope to improve students' academic achievement.

Two eighth grade teachers agreed to participate in this year long project. Both teachers had been teaching this content for a number of years and combined had over 20 years of experience. Both classes had twenty-five students and covered the same state-wide Social Studies curriculum. It is important to note that the classes were tracked where one class was considered upper level. Although this contributed to some differences in pacing and material presented the overall data was similar for both classes. We met with these teachers four times before the beginning of the school year to familiarize them with the technology and to familiarize ourselves with their curriculum. The four of us collaborated to modify five units and determine appropriate times to integrate technology. Criteria we used to make these decisions included: (a) feasibility of converting traditional text into digital text, (b) appropriateness of integrating digital text with reading strategies, (c) comfort level of teachers to integrate digital text with planned activities, and (d) ability to meet curricular standards.

Based on these criteria, we created materials and designed activities for the following units: Native Americans, Explorers, Early Colonial Life, Foundation of Government, and Revolutionary War. The district had adopted the *History Alive* textbooks as the primary text for 8th grade social studies. Furthermore, the teachers utilized several primary documents and teacher-created materials to supplement the textbook. As such, we created our materials and designed reading strategies from these sources.

Data Collection and Analysis

Throughout the 2008-2009 school year we met with the classes once a week during their typical Social Studies class period. In addition, we held lunch sessions where we ran focus groups with the students. Throughout the academic year, we kept field observation journals, conducted semi-structured interviews and focus groups, used comprehension protocols based on a comprehension strategy checklist used by proficient readers when they make meaning of texts (Dole, Duffy, Roehler, and Pearson 1992; and Pressley 2000), engaged in a comparative analysis of test scores based on paper vs. digital text, collected weekly exit slips, gathered unit test data, and administered student surveys. These multiple data sources were then analyzed

using both qualitative strategies (coding, looking for themes, and member checking) and quantitative techniques (descriptive statistics of test scores) to help us answer our guiding questions. We hoped that this year of research would generate both a new perspective on learning with these digital tools and seeds for future research.

This paper deals specifically with the qualitative data that was collected and analyzed—specifically the one-on-one interviews, focus groups, researcher field notes, and student reflective writing. The focus groups met bi-monthly to help us understand how students use technology in their every day lives, their thoughts and feelings about technology in school, and their general impressions of handheld computer integrated units. Individual interviews with students were also conducted to further explore these topics. In addition both of us kept weekly field notes and descriptive observations during our time spent in the classroom. We met bi-monthly to compare notes and observational records. Finally, we constantly engaged the students in written reflection of their experiences—both as exit slips and responses to targeted prompts.

The data from the focus group, interviews, reflective notes, and student writing were audio taped, transcribed, and analyzed to generate and confirm themes and categories of interpretation. The multiple data sources enhanced triangulation of data as we analyzed multiple data sets. By reading through this data and generating coding schemes and patterns, we were engaged in grounded theory. Grounded theory (Strauss and Corbin 1994) was necessary since we were trying to build theory vs. testing a theory and since this data examined how readers approach digital texts, it was an appropriate analytical strategy for systematically starting with basic description and then move to conceptual ordering based on codes and themes. Themes that emerged from the data analysis seemed to align themselves into one of three categories: how the text contributed to learning, how the activity contributed to learning, and how the reader contributed to learning. From these themes and smaller codes we were able to draw the following conclusions. We felt it was important that we listened to the students as they told us what it was like to learn using this type of media, as we believe that student input should be respected, valued, and acted upon as we consider how we should teach using technology.

Listening to the Students

"The more control you think you have the more you want to read."- Sam, 8th grader

Control over the format of the text environment

As we began to implement the units, it quickly became apparent that the students were motivated by the technology. However, this motivation was not just about the novelty of the devices. Rather, we discovered that the digital text and the technology itself allowed the students to engage with information in ways that is generally prohibited by traditional text. As we worked throughout the year with the PDAs, it became evident that one of the most significant features of the textual environment was that the students had control over it. The students repeatedly reported that they enjoyed working with the PDAs because they could "hold it in my hands", "turn it sideways", or "write on the text" as they read. One student in this class commented that he was able to "interact with the text in a different way (underline, highlight) that I can't do with a textbook."

Over the course of several focus groups we let the students manipulate the text features. For example, they liked to change the font size of the text. The most popular size decided by the students was a 16 font. As the students explained, "Sixteen is perfect because if you make the font bigger you don't have as many words to look at on one page but if you make the font too much bigger you have to scroll more." Additionally, they frequently changed the orientation of the text (72 % of students preferring a horizontal over a vertical orientation). Also, students would change the font color before reading the text with blue being the most popular color after black. One student told us that blue made the text look different by sticking out more and that "if you pick a color that you like it makes you want to read it more."

In addition to altering the look of the text itself, they also would bold, underline, or highlight the text as they read. One student commented, "I use highlighting and underlining to help me remember where I am when reading from the Palm." This was something that we initially encouraged through our instruction but gradually the students took it upon themselves to manipulate the text in ways that suited their learning styles and preferences.

Students' desire to have choice and control has been closely correlated with reading engagement in the literature (Ivey and Broaddus 2001; Oldfather 1993).

Researchers have found that students respond to being given choices in what to read (Gambrell et al. 1996) as well as choosing topics and formats for projects (Picher et al. 2007). Similar to this research the students were responding to being given options on how to read using the PDAs.

Control over the reading process

The students also responded that the PDAs assisted them with certain desirable reading skills; specifically chunking the text, focusing on the text, and pacing their reading. First, the students found that since only a certain amount of text was shown on the screen at a time that this forced them to chunk the text. Furthermore, since they could control the size of the text, they could control the amount of information that was chunked. They found that this was "easier to read since everything was right there." There has been much research that shows that when we can chunk text into more manageable segments then comprehension increases (RRSG 2002). Chunking allows a passive reader to break text into smaller parts and allow time to coordinate phonics, fluency, and comprehension (Rasinki and Padak 2001). The PDA presented text in natural chunks, which assisted many readers who were often overwhelmed by seeing all of the text at once. The students were able to control how much of the text to view at once and this ability to chunk the text as they read was appealing to them.

Students also commented to us on exit slips and in focus groups that since they were forced to scroll down to see more text it made them concentrate more. The actual physical act of scrolling forced their attention onto the text in a way that flipping pages did not afford. One student commented, "this made me pay more attention because I had something to do with my hands." The students felt that the PDAs kept them more focused as they read.

Finally, many students commented on the fact that the PDAs allowed them to work at their own pace. This was important—especially in classes where there were many different abilities. One student commented that the "[PDA] helped me because I could work at my own pace. I have my own method of learning and remembering things. Also when I got done I could mess around on the Palm. And it kept me quiet. Which is always good." Others liked that they did not feel rushed and that all the information they needed was right there.

The students liked that they were able to pace themselves in their reading – an important skill in making meaning with a text.

"Palms are more modern—we LIKE technology"- Chris, 8th grader

Connecting to their lives

As we worked with the students and started sifting through the data it became clear in both classes that the most powerful factor that contributed to comprehension and engagement was students' attitudes towards the PDAs. The students were captivated by working on the PDAs and whenever we came the students would squeal in delight (much to the teacher's dismay it was not because they were excited to learn about Colonial America). The students were quick to point out that textbooks were boring and that "we like technology." Consistently, the students responded to us on exit slips that using the PDAs were *easier*, *faster*, and more *fun*—words that appeared over and over as we coded exit slips and focus group transcripts.

When we met with the teachers over the summer to introduce these PDAs, it took us adults two days to familiarize ourselves with these new devices; conversely it took the students about twenty minutes. The students seemed to intuitively navigate their way around in this technological world and were willing to dive right in. Their learning curve was quick and they were always willing to try new things. As the students pointed out to us in numerous lunch groups, "technology is our present and our future" and that "textbooks are sooooo ancient."

Gutherie and Wigfield (1997) write about motivation and believe that students are more motivated when the activities that they are presented with in school closely match their personal beliefs, values, needs, and goals. For these students technology is part of their everyday lives. No longer are technologies such as cell phones, social networking, email, or texting novel forms of communication, rather they are the primary means by which peers maintain friendships (Palfrey and Gasser 2008). As a result of growing up in a media saturated environment, "today's students think and process information fundamentally different from their predecessors" (Prensky 2001, 1). In fact, the Kaiser foundation surveyed 2,000 3rd through 12th graders and found that current students are spending an increasing amount of time using new media such as computers, the Internet, and video games (Kaiser Foundation 2006).

As all of the recent popular literature asserts, these students are typical of the world around them. When given a technology usage survey we learned that 80% of these eighth graders have cell phones and 75% of them have computers in their bedrooms. Close to 40% of the students responded that they used technology between 1-3 hours a day, while 30% reported using it more than 3 hours daily. Not surprisingly, it was the students' motivation to engage with this technological medium that enhanced their reading comprehension most significantly.

"I like working with the PDAs. It got me out of class work."- Joel, 8th grader

Perceptions of something different

Through the students' comments on their exit slips and discussion in focus groups it was clear that they enjoyed the PDAs especially since they were something different from what they had been doing in class. They often felt that when they worked with the PDAs that they really weren't doing school work at all. This was especially noticeable when we allowed them to beam content to each other. This was clear not just in class –where we would comment repeatedly in our reflective notes how on-task the students were when they were beaming to each other -but especially in the focus groups.

Whenever we brought the PDAs to our lunch time focus groups the students were usually patient with us during the discussion only so they could get their hands on the PDAs and start to beam one another messages. The students pointed out that their love for beaming was connected to their interest in texting (which on the technology survey 71% of the students claimed to do on a daily basis). Students also had the option of beaming anonymously which was hugely popular. One student explained to us that "We like to beam because it is anonymous and we can send things to everyone and no one knows who it is from." The students also liked to beam to their friends, as it is much like texting, instant messaging, or posting on their MySpace accounts. It was also like writing notes to each other—but this time notes were encouraged in the classroom.

The students were highly motivated to beam their partners and this proved to be an excellent post-reading adaption that was facilitated by using the PDAs. Also these classroom post-reading activities led nicely into homework assignments and longer more traditional assignments that the classroom teachers had pre-

pared. As the students reported, "I like this better than a textbook because with a textbook you can't beam or send messages."

Since we only integrated the PDAs throughout one school year we have no way of knowing if the students were motivated by the novelty and if once these became more routine if this excitement would wane. We do speculate, however, that the affordances that these devices provided such as giving students control, chunking, and pacing would continue even if the novelty wore off. Furthermore, we also have observed informally that adolescents' interest in their cell phones, texting, and computers has proved unflappable even with the passage of time.

Future directions and educational implications

Implications for Literacy Instruction

As we forge ahead to connect pedagogy and curriculum with new technology we can learn a lot by watching what our students do with technology in an educational setting and by listening to what they say. Through this year long study we have taken away a couple of lessons that impact both our current practice and our future directions. For example, we learned that having control over the reading environment appealed to the students. As anyone who works with or has a middle schooler knows these students are hungry to find ways to exert power over their seeming powerlessness and perhaps manipulating these texts appealed to these students by giving them a small bit of control in an otherwise powerless world. Giving students the opportunity to control the reading environment either through using a technology device such as a PDA or another technology tool could perhaps have strong literacy implications and can help develop the types of literacy skills as desired by NCTE 's 21st Century Literacy Skills.

One area that we collected a little bit of data on was what comprehension strategies students used with this type of digital text and if these differ from reading using a paper text. Currently much research work has been conducted on online (Internet) vs. offline (traditional text) reading comprehension strategies (Corio and Dobler 2007; Leu et al. 2004). Unfortunately, due to technological issues with the school's server we were not able to get online with these PDAs. As a result, although our students were reading a digital text, they were still reading in a one-dimensional reading environment. This meant that they were not able to use hyperlinks or move to other texts within their text as an

online environment would provide. In our study we did gather data on what comprehension skills our students used given both paper and digital texts. One way that we did this was by having students use a self-reporting checklist as they read. Over multiple sessions we gave the students short texts on both paper and on the PDAs. We asked the students to self-report which strategies they used as they read. From this data we found that students used similar strategies with both texts. Coiro and Dobler (2007) found that there were comprehension strategy differences that students used with online vs. offline texts; however as pointed out earlier since the texts that the students were reading on the PDAs were not connected to the internet, students were essentially reading in an offline environment similar to that of a paper based text. This would be an interesting area for further research as it would be important to know how these textual environments shape the types of comprehension strategies used by students.

We also were interested to see how achievement differed as a result of reading either with a digital text or a paper based text. To test this curiosity, during one unit we arranged for half of the students to read a piece of text from the PDAs and half of the class from the traditional textbook. We then gave them a short quiz on the material. We then switched the reading environment and again gave each group a quiz. After each student had read from both the PDAs and the text we then gave a third reading task followed by a test but this time the students could choose how they wanted to read the text. In both of the classes there was no difference in the average score regardless of the text medium. In fact on one class the average was exactly the same regardless of the text they read from and the other class had only a one percentage point difference (in favor of the digital text). In our small sample the text medium did not appear to have a difference in comprehension scores regardless of the class. One thing we did not do in this study was to collect state social studies test scores and correlate it to the units that were taught with the PDAs. Anecdotally we were told that the students' overall test scores had improved but we think this is an area for future research—especially in light of the current high stakes testing climate in schools.

The students in our study self-reported that they became better readers by using these PDAs, however, more research would be needed on a larger scale to connect these students' input to make a case for rethinking reading pedagogy as a whole.

Implications for technology

Our students were not shy about telling us over and over again how much better they liked learning with technology. Countless times in our reflective notes we commented upon how engaged and motivated the students were when we brought the PDAs to their classrooms. The students are used to having technology in their lives and their biggest complaints were that the PDAs were "too slow", and "not modern enough." Some of the students provided detailed suggestions for how to improve upon the use of PDAs. For example, the students wanted us to make the PDAs more interactive. They thought that learning would be enhanced with more videos, audio, animation, music to go along with these devices. They also wanted us to get rid of stylus in favor of a touch pad. The students discussed that they became annoyed with the stylus especially with activities that had them going back and forth between the PDAs and their pencils. They also felt that a touch pad would be easer for them to navigate—especially when typing on the keyboard. Finally, as mentioned above, these PDAs were not hooked up to the Internet. The inability to hyperlink texts, go to the web to look up further information on topics, and download more exciting graphics and videos were seen as a major flaw to the students. If technology is here to stay and the landscape changes so quickly it is important that we closely examine the features of these new tools and how they contribute to enhanced learning for our students. Laptop computers may be the best way to connect students but not all schools have this resource. Something small like a Palm Pilot, an iTouch, or a tablet may be more economical and easier for the students. We feel that although this study used PDAs to facilitate integration that many other forms of media devices that transmit multiple forms of text would yield similar results. Furthermore, using technology allows for the integration of multiple forms of a text that can be presented within a learning experience. By allowing a range of media texts (such as audios, videos, photographs, Power Points) students are given diverse opportunities to develop a range of habits of inquiry. It would be beneficial to further explore what features most closely connect to improving learning for students as we consider which technology to add to our classroom.

Implications for curriculum

With the changing students, changing technologies, and changing definitions of 21st Century learning and literacy must come the need to revise our curricu-

lum. In 2007, the International Society for Technology in Education (ISTE) issued revised technology standards for students and teachers. One of the most profound shifts (from the initial ones introduced in 2000) was the depth to which they standardized technology integration. ISTE no longer believes it has to convince teachers to get "on board" with technology, in fact they see this concept as accepted practice. Rather, ISTE now recognizes that they must qualify what is, and is not, appropriate technology integration. Lajaene Thomas, Chair of ISTE Standards, pointed out that when they wrote the new standards they began with the assumption that every teacher recognizes the importance of technology and how it can transform teaching and learning (Pierce 2008). Unlike years ago, teachers no longer need convincing to use technology, but instead the emphasis had shifted to how to help them use it better. We need to find ways to help teachers in ways that does not throw away previous ways of teaching but expand on what they already do.

We found that beginning to use these PDAs in selective units and thoughtfully collecting data around this integration gave us a great place to make the process realistic and manageable for the teachers. One thing that we did was to purposefully incorporate the technology into proven content area literacy instructional practices such as re-reading, during reading, and post-reading. We also realize that this is a small step forward but in no means the end goal. In this specific project the end goal was improved comprehension of social studies text. This is clearly a far cry from a loftier goal of analysis and critical thinking around multiple types of text. Although we will detail some of the more traditional literacy activities that we did with these PDAs, we acknowledge that this is still a starting point, but we believe this type of technology integration has much broader potential to push the boundaries of both traditional content area literacy and media literacy to produce engaged consumers and producers of text. We think this is the first step.

Pre-reading

We worked with the teachers to plan some effective pre-reading activities using this technology. The students and the teachers responded positively to the activities that activated prior-knowledge and highlighted the multi-media features of the PDAs. For example we had them go to photographs on the PDAs and write down predictions or think what life would be like in a certain region. They would watch mini-videos—such

as about early explorers or listen to audio before reading and think about the most important part and share this with a partner.

During Reading

We used both the PDAs and graphic organizers to slow down the during reading process to make the students more aware of making meaning while they read. We also encouraged highlighting, bolding, and underlining texts as the students read as intentional parts of the reading process. We also would have them stop as they read to do things like going back to the photographs and writing on the photograph with the stylus as to which tribe settled in each region. Or read about Colonial America and use the web on the PDA to take notes on the most important things about the topic.

Post Reading

Finally we used many post-reading strategies such as come up with three fast facts from the reading about early government and beam these to a classmate who read a different passage. Or we asked students to beam their partners two questions about the early explorers, answer these, and beam the answers back.

We found that by beginning to use these PDAs in selective units and thoughtfully collecting data around this integration gave us a great place to start with these teachers. We would like to see more instructional curriculum integration planning across the curriculum and more coordinated efforts with schools providing support to teachers who are engaged in this work. We also would like to see the enhanced use of PDAs that are accessible to the Internet so to extend learning activities to allow for differentiation amongst students and further exploration on topics.

Conclusion

While it would be wonderful if student were intrinsically motivated by the topic of Colonial America, that is not always the case (as many social studies teachers know). It is our challenge to make this subject come alive and of course there are many ways to do this but technology affords us with exciting opportunities to capture students' attention. However, we need to do better than just using technology for bells and whistles; we need to simultaneously teach our students the technology skills that will enable them to develop the expanding multi-literacy skills that they will use in both the present and the future. As we thoughtfully integrate technology into the classroom we need to pay

attention to what the students are telling us about their learning, experiences, and desires when technology is used. Middle schoolers are not much different from the adults around them. Like us they want to be able to control the environment around them, they want material in usable chunks, they want to see how what they are doing in the classroom is relevant to their lives, and they want to be interested and motivated to learn new content. Using new technology in the classroom can provide a bridge to do this and we should be finding ways to create new instructional practices while at the same time adhering to what we know already works. We hope that this study will become part of a larger conversation about technology, literacy, and instructional practice as together we work to maximize learning for students in our classrooms now and for those to come.

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