



Enacting Change: A Study of the Implementation of e-Readers and an Online Library in two Canadian High School Classrooms

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Abstract

In this paper the authors discuss their interdisciplinary pilot project entitled 'Teaching for the 21st Century: A Pilot Project on E-Reading with SD62' that engaged in the development and implementation of a customized and purpose-specific online library for two selected high school classrooms at a time when such systems did not exist for this purpose. This project combined (1) information literacy issues, (2) pedagogy and e-pedagogy, and (3) computational modeling

activities founded on a productive confluence of these perspectives all situated at the intersection of pertinent theories and practices pertaining to each. The result of the research project was a functional online library environment that worked in the classrooms to support born-digital students' engagement with e-readers and findings of the way in which these both worked in the context of multiliteracies classrooms.

Key Words: online library; e-readers; born-digital students; multiliteracies

Born-Digital Learners and e-Readers

More than half of all people living in developed countries make use of computers and the Internet to read newspaper pieces, magazine and journal articles, electronic copies of books, and other similar materials. The next generation of adults already recognizes the electronic medium as their chief source of textual information. Today's born-digital youth then are engaged in an unprecedented experimentation with literacy, learning, and cultural practices on an individual and societal level (Palfrey & Gasser, 2008) through a variety of multi-modal textual composition and consumption characterized as multiliteracies (Cope & Kalantzis, 2000, 2009). These young people inhabit a world of ubiquitous twitch-speed content in which they can connect to peers, ideas, and information almost instantaneously, as well as tailor their own online spaces that promote a sense of freedom and individuality. As such, these changes present both complex challenges and opportunities for institutions such as schools and libraries, and those digital immigrants (Prensky, 2001) who manage them.

Our knowledge repositories increasingly favour digital products over the print resources that have been their mainstay for centuries. And those professionals who produce and convey textual information have, as a chief priority, activities associated with making such information available electronically in ways that meet the standards of quality, content and functionality that have evolved over half a millennium of print publication.

The movement toward the use of the digital medium is an obvious one, with clear benefits associated with the production, dissemination and reception of the record of human experience, as well as the ultimate societal impact of these processes on our knowledge-based society. But, for

all the good we perceive, we also realize that there is much still to know about this new media form. Such knowledge is necessary to the end of ensuring that we make the best use of all that the digital has to offer us. It was such a desire for further understanding that led to the interdisciplinary inquiry into born-digital students' use of e-readers as well as the production and implementation of the online library for students' and teachers' use.

The School Context

WestShore Centre for Learning and Training, where the study took place, is an alternative school within School District (SD) 62 in Langford, British Columbia, Canada. The school is flexible, innovative and can move to address students' needs quickly. Consequently, WestShore Centre offers a wide variety of programs and services to over 1500 youth and adults at three different locations. The school is open year round, day and night, and students select from many unique and flexible learning options including teacher directed, distributed learning and blended instruction. The pilot study took place at the main campus in the Foundations program, a program specially designed to meet the diverse needs of at-risk youth aged 14 to 17. Structured as a cohort to promote community and facilitate relationship building, the Foundations program places twenty students with one teacher for all core subjects. The main goal is to address academic and emotional needs with an emphasis on literacy and numeracy skills. The pedagogical philosophy is inclusion, collaborative learning, formative assessment and differentiated instruction.

The academic, social and geographical challenges of creating a school library were as diverse and unique as the students. A school library would need to be accessible to all students, contain relevant and engaging content, and have the potential for assistive technology to facilitate varying literacy levels. An online library and e-readers not only met all these requirements but also provided a platform for educational goals to merge with digital native strengths. Instead of excluding adolescent technological savvy, an online library and e-readers would allow instructors to harness innate student ability in order to promote the multiliteracies required in the 21st century.

Goals and Development of the Online Library

SD 62's Online Library was developed as an extended classroom space where teachers could post assignments and discussions in their respective classroom spaces, and students could find reading materials, discuss literature, and work through concepts taught in the classroom. As a result, the library did not function within a traditional virtual classroom learning model. While online learning environments typically focus on synchronous learning strategies such as chat rooms, video-led lessons and packaged course materials (Clark & Mayer, 2008, pp. 10–11), SD 62's online library extended classroom discussions, provided accessible material for assignments, and offered a space for students to contribute outside the classroom. In effect, learning was meant to take place both offline and online.

The library had to appeal to two distinct groups: students and educators. Not surprisingly, both demographics displayed varying needs in terms of their use of online learning environments. In her study on the implementation of e-learning technologies in the classroom, Laurillard (2002) points out that in order for students to learn effectively, classroom goals and objectives must be taken seriously and address the students' needs (p. 181). During the planning stages of the pilot site, Serina asked the teachers and students to brainstorm a list of features they would like to have implemented on the site. The students desired an interactive experience with features including rating and recommendation systems and customizable profiles, common to social networking sites such as Facebook. The teachers, on the other hand, focused on the ease-of-use for the classroom space, student management and an easy content uploading system: features which were necessary to properly manage a class online.

For the pilot project, then, SD 62's Online Library needed to satisfy the following requirements:

- provide reading materials for students
- provide a forum for discussion of texts and classroom assignments
- integrate web 2.0 technologies with traditional library systems
- provide a hybrid learning space between the virtual and physical classroom.

Design and Implementation of SD 62's Online Library

Following these requests, Serina Patterson devised a site that would implement an interactive navigational experience for the students while maintaining elements of a traditional learning management system. SD 62's online library was built using Drupal, an open source PHP content management system. Drupal was selected primarily due to its flexible taxonomy system, views framework, and ability to create specialized permissions for content. At the time of writing this paper, the online library site contains fifty-two extended modules in addition to its core functionality. As part of the pilot project, the library also houses a selection of 170 literary pieces for the students' use. For teachers who aim to let students direct, in part, their own learning, the library provides an easy way for a student to find books, lyrics, and comic books that pertain to his or her interests.

SD 62's online library contains a number of modules that enable active participation from users within a virtual classroom space and with site users as a whole. Many of the modules used Views and Content Construction Kit (CCK) as bases for their implementation on the site. One concern raised by the teachers was privacy for specific content, such as assignment or classroom discussions; thus, Serina Patterson enabled and modified Drupal's 'Organic Groups' module, along with forums and user role plugins, that allowed teachers to form private classroom spaces exclusive to their students. In addition, students could create user groups for various topics, such as a group assignment. Other community modules included:

- blog: this module enabled users to maintain a 'reading journal'. Other students could post comments.
- community forums: this module provided a framework for building a dynamic forum system consisting of public and private threads, comments, and cross-domain discussions.
- profile: each user was granted a public profile that they could modify by adding personal information (e.g. interests) and a profile image.
- recent comments: enabled users to comment on a library content page.

Personal Navigation Strategies for Content

Although the pilot project online library contained only 170 items, we wanted to mimic navigational strategies that would encompass a

larger library. As a result, Serina Patterson included many decentralized access points to content, which relied on community-driven activity in addition to an index. Modules pertaining to navigational strategies included:

- taxonomy and cumulus: Based on Drupal's taxonomy system, cumulus displays tags and vocabularies in a three-dimensional tag cloud. When a user clicks on a term, a list of library content attributed to that term appears. For books written for young adults, traditional genres were not appropriate, since the stories tended to deal with themes relevant to teen experiences and desires; thus, this list was extended to include common themes such as 'family issues', 'friendship', and 'animal fiction'. Vocabulary lists included time periods and book categories, so a user could find books of interest or recognize common trends based on these tags.
- similar terms: This module also utilizes the taxonomy module and displays items that are linked by taxonomy. If a user is looking for 'science-fiction' novels, for instance, other books with the tag 'science-fiction' will be displayed. In short, this module shows the relationship between books through their tags and allows users to find books that are of interest to them.
- flag: This module enabled users to add a library item to their 'booklist' (e.g. favourites) page. This page is public to other users and accessed from the user's profile page.
- voting: The voting module 'Plus1' was utilized for a couple of features on the site. First, registered users could vote up a library item they enjoyed. Voted items appear on the 'what's hot' list on the front page. The increased visibility of an item theoretically makes it more likely to be downloaded by other users. Second, 'Plus1' was configured to work on comments; thus, comments for a book or class discussion could be voted for if a user deemed it interesting or relevant to the conversation.
- download counter: If a user downloaded a library item, the download will be added incrementally to the total number of downloads for the item. A list of total downloads is displayed on the 'downloads' page.
- coverflow: Newly added items to the library are displayed in a 'coverflow' format on the front page. Users can browse through new content visually by scrolling through the images.

Classroom Management

Apart from the group system, teachers requested features for auto-generating student accounts, quizzes, pages to test students' understanding of concepts taught in class, and user relationships on the site:

- user import: Enables teachers to import user accounts onto the website via a CSV (comma separated values) file.
- quiz: This module enables teachers to create online quizzes for their class, including short answer, multiple choice, matching, and essay questions.
- reflection zone: This feature is a combination of CCK and the voting module 'Fivestar'. Teachers can post a concept questions and students can rate whether they have understood the lesson via a five-star rating system. Additionally, students can ask questions or post comments.
- user relationships: This module defines hierarchical (e.g. teacher-student) and two-way (e.g. student-student) relationships. With this module, teachers and students can create associative relationships with each other. These relationships are especially useful as identifiers when there are multiple classes and districts using the site.

Security, permissions, and caching were also important issues for the school district. As a result, modules such as Captcha and Content Access were configured for the site. In addition, the modules Administer Users by Role and Delegate Menu Admin allowed teachers to have special permissions for accessing certain portions of the site that were restricted for students and unregistered users.

Online Library User Behaviour

The library was used as an instructional tool over the course of two terms, so teachers and students were able to experiment with the library's various features. Through the course of the two terms, usability trends did, in fact, emerge and differed significantly between teachers and students.

Students were more likely to use interactive features, such as the coverflow and cumulus modules, in order to find books of interest. While a few would

occasionally browse through the library index and appreciated the visual aspect of the library, many of the book downloads relied on the 'downloads' page. In other words, the more a book was downloaded, the more students perceived it to be of value. A few students used the voting and commenting tool, but they were not significant motivators for book downloads. Students also commented on the use of 'theme' tags to describe books as opposed to genres and often navigated through books interests by using the 'similar terms' feature. Book interests varied between teen-centric content and older content: the most downloaded novel, *Tell*, was a mystery and crime novel for teens, but short stories such as *The Legend of Sleepy Hollow* and *The Veldt* were also popular. Only a handful of students used the 'reading journal' and no student created a group. Forums were only used when the teacher assigned students to use it. From these user behaviours we can infer that students preferred personal points of access with the content — a navigational strategy that could be customized to their own interests. Community features that have less to do with library content, such as groups and forums, were ignored. In order to generate use from these features, teachers must work to integrate them into their curriculum. Furthermore, students claimed that they desired user experiences that were more interactive and customizable, such as those provided by Netflix or iTunes.

Educators focused their attention primarily on managing their students online. They posted information in groups and created lesson plans that utilized the library, reading journal and community forums. Their concern was to use the site in order to extend discussion, provide another platform for evaluation, and connect students to information, such as links and books. Although the quiz and reflection zone features were available, teachers did not use them in any capacity.

Technical Issues

Technical issues encountered with the online library included:

- scalability: One of the primary issues with the library was Drupal's scalability. Many of the modules, such as Organic Groups, were data-intensive and required a great number of queries from the database. Although we implemented caching for certain modules and turned off database tracking, a large, complex site with multiple permissions

levels requires consistent attention to its optimization for a larger user-base.

- content licensing: Another issue involved security and distribution of copyrighted material. While only registered users had access to download library content, the library did not have any integrated lend-and-borrow system for content. As a result, students could potentially distribute copyrighted material without penalty. We secured one contract with a publisher, but had difficulty purchasing books for the library. Variety of reading materials is a necessary future goal when considering the diversity of the students' and teachers' classroom experiences with the e-readers and SD 62 online library.

The Classroom

The Foundations program at WestShore was specifically designed to meet the needs of students challenged by the mainstream school system. Consequently, the two classrooms studied were comprised of diverse student profiles including high functioning autism, moderate and intensive behaviour, mental illness, learning disabilities, and gifted designations. Students had a wide range of needs, generally low frustration thresholds and unfiltered communication abilities. This facilitated blunt and immediate feedback regarding what worked and did not work for them throughout the study.

Such a diverse student group requires an inclusive classroom community, complete teacher transparency, careful scaffolding and differentiation. Responsive teaching is most crucial, however. As a teacher, one breathes the same air as one's students. You do not have the luxury of transposing your own theories on your students; your actions have to be informed by their needs. To ignore those needs is equivalent to attempting to win a race in first gear: frustrating, futile and an exercise in agony for everyone involved. Hence, it was impossible to ignore the strong 'digital' culture of the students and the different literacy skills saturating their comprehension, communication and collaboration. The e-readers and online library provided the natural marriage of digital native multiliteracy needs and educational objectives.

Classroom Findings for the e-Readers

Fundamentally grounded in theoretical cross-sections of information literacy issues, pedagogy, e-pedagogy and computational modeling activities, the study revealed that the participants' experiences specify particular requirements, challenges, and opportunities for digital age learners, educators, and librarians. As with any new technology, integration was both challenging and rewarding. The online library provided a space where students could interact with each other, the teacher and texts while the e-readers became a single platform for downloaded texts and class handouts. For example, the first class during which students accessed the online library and used the e-readers began with the logistics of e-reader and laptop allocation, library passwords and usernames and then the opportunity for students to personalize their profile on the online library. Next, students browsed the online library and downloaded an e-book of their choice onto their e-readers. In later classes, we downloaded news articles onto the e-readers, found and posted our own news articles on the online library and then used the forum to comment on other students' postings and comments. The students enjoyed the merging of school with their virtual habitat, but were also frustrated by technology glitches.

The benefits of the e-readers for student literacy development and engagement were mixed. Foremost, the e-readers leveled students' reading disabilities by rendering book choice invisible. Also, the devices allowed literacy supports such as text enlargement and audio. However, the annotation function proved to be too difficult to incorporate. Ideally, if you tapped twice on any highlighted text a small keyboard would appear with which you could enter comments. However, only one in five students could successfully bring up the keyboard and complete an annotation in the time allotted. Given the limited class time, student frustration levels and related behaviours, this rendered the e-readers ineffective for difficult text and resulted in a return to traditional pen and paper annotation. As well, the e-readers limited students to a linear reading experience, perhaps more so than a traditional book, as page jumping on the machines required an exact page number rather than the ease of flipping through a physical book. Students expected the intuitive usability of iPods and were stupefied by the lack of visuals and the unresponsive touch screen. In short, the Sony e-reader's disadvantages outweighed its benefits for student literacy development and engagement. Although e-reader devices are robust with potential for

literacy support and development, this early version was inadequate from a teaching perspective.

Classroom Findings for the Online Library

The online library proved to be more versatile and flexible than the e-readers and therefore more successful. Serina Patterson was able to quickly implement feedback from the students and resolve any technological glitches. The main advantage of the online library was its visual nature and facilitation of interaction, personalization and non-linear reading patterns. A wide range of texts was possible and accessible from any location at anytime. The disadvantages of the online library were more logistical such as undeveloped teacher management tools, content security concerns, and navigating school district security settings when downloading books. As the online library was not simply a passive warehouse of materials to be retrieved but an interactive learning environment, teacher management and interaction tools became crucial. It was just as necessary to monitor and scaffold student learning and interaction in the virtual arena as it was in the physical classroom. Communication, team-work, accountability, effective peer feedback and ethical interaction need to be modeled and taught in any venue. Ironically, as teacher involvement in the virtual learning environment increased, so too did student freedom through a gradual release of responsibility.

Emergent Challenges

From a teaching perspective, incorporating new technology into a classroom presents both logistical and pedagogical challenges. To begin with the former, it can never be forgotten that in addition to teaching, a teacher mobilizes, motivates and directs a large number of people daily. In a mainstream Canadian school where the average class has 30 to 35 students, a teacher can see 90 to 150 students in one day. Although the participating classes in the study had approximately only 22 students in each, the sheer logistics of managing humans still must be considered. Complications in technological infrastructure such as wireless access and school district security systems play havoc, often wasting more than half a class and

generating user frustration. As many students have low frustration thresholds and connected behaviours, the latter is a concern. Additionally, reading device eccentricities such as not maintaining a charge, being inaccessible while charging and requiring individual wire hook up to charge all have ramifications when implemented on mass. For example, the e-readers would charge by being plugged into computer USB ports but could not be used while charging so students would have to hook up the e-readers while working on laptops at some other time. As this would involve coordinating other assignments, laptop access and 22 wires, it was easier for the teachers to spend two hours every night at home to charge 25 e-readers by connecting four at a time to their desktop computer. As well, storage and security issues must be navigated. Acceptance of technology by any classroom teacher will depend heavily on the required preparation time required and the interference posed to instruction and learning within the classroom.

Additionally, the partnered use of the online library and e-readers posed further logistical challenges. Although both served different purposes, they were mutually dependent. The library was an interactive learning environment that facilitated access, interaction and collaboration. Computers are not ideal personal reading mediums, and so materials were transferred from the online library to the more manageable personal e-readers. However, when materials were downloaded as PDF files onto the static e-reader platform, the beneficial characteristics of the library environment were lost and the e-reader became an electronic version of the traditional book. As well, the relationship between the library and individual e-readers that required a computer intermediary made usage complicated as it required two separate logins, two wire connections and multiple steps before actual literacy activities were possible. Importantly, a major affordance of digital resources for educators is the potential for incorporating assistive technology, software that allows literacy supports such as audio, oral, visual and kinesthetic supplements. The Sony e-reader is as yet incapable of hosting these supports and is therefore limited in meeting multiliterate needs of students and teachers. Arguably, the amalgamation of these devices and their functions realized in new e-devices such as the iPad is needed before educational implementation will be successful.

The findings of the study are summarized in Figure 1.

Fig. 1: Pros and cons of e-readers and the online library.

e-Readers		Online library	
Pro	Cons	Pro	Cons
<ul style="list-style-type: none"> - no paper used - masks reading disability by rendering book choice invisible - holds many books in one platform - can hold PDF files either created by teacher or student - annotation ability - can jump to pages and annotations quickly - text can be enlarged - audio supplement available - supports pictures 	<ul style="list-style-type: none"> - grey screen, no colour available - linear reading experience (i.e. no hypertext) - supports only traditional text (no internet access, video, etc.) - no collaboration possibilities - annotation tool unwieldy and difficult, limiting text interaction - short battery life and loss of charge while static - charging logistics (i.e. cords, access to computers, etc.) - screen inaccessible while charging (by being connected to a computer) - PDF files do not transfer well and are hard to read on the screen - audio and text are separate (no assistive technology potential) - graphics novels do not transfer well ***doing the same thing but electronically 	<ul style="list-style-type: none"> - collaboration sites - interactivity (forums, journals, voting, comments, etc.) - students can personalize profile - visual (pictures, colour, movement, etc.) - non-linear literacy patterns supported - anytime, anywhere, anyplace accessibility - wide range of 'texts' possible 	<ul style="list-style-type: none"> - teacher management logistics (signing up students, adjusting accounts, etc.) - security of eBooks and copyright concerns - school district security settings blocking downloading - school hardware and server hiccups - students can't upload material (security concerns) - assistive technology support not yet integrated - literacy disabilities public - development bugs (text tool, relationship tool, etc.) - unable to track students easily (i.e. see all entries by a student)

Conclusion

Inclusion of new technologies such as e-readers and online libraries directly impacts learning and teaching. As witnessed throughout this study, the development and implementation of e-readers and online libraries are an important step in addressing the gap between born-digital learners' personal contexts and the learning contexts of contemporary classrooms. Unique understandings of born-digital students' changing literacies have been arrived at through this study, alongside clear evidence of the complications that arise through the development, implementation, and integration of new literacy technologies and environments such as e-readers and online libraries. Yet such an effort and understanding is needed. Throughout this study, there emerged the need for re-inventing reading and learning spaces to address the changing reading patterns and epistemologies of born-digital students as they navigated through ideas and information from page to screen. Importantly, this re-invention can only occur through a co-authoring of the reading and learning spaces of born-digital students by those very students, their teachers, the online library developer, and others such as experts in digital corpora.

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