Students’ experience of using electronic textbooks in different levels of education
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Abstract
Electronic textbooks are not new; however, they have not been widely used in the public education system. Although many have predicted the popularity of electronic textbooks, the uptake has been less than anticipated. This essay reviews research literature to uncover the use and the acceptance of electronic textbooks in different levels of education. It discusses research studies which have shown an effect on students’ learning and concludes with a discussion based on the studies and provides suggestions for further development.

Keywords: Electronic textbooks, e-textbooks, Education, Learning

1. Introduction
Electronic textbooks have been around for a while but are still not widely recognized. Even with the rapid growth in technology and the electronic world, the acceptance of electronic textbooks varies at different educational levels. Although students are more technologically savvy these days, the demand for electronic textbooks has been slow (Jesdanun, 2006). Major reasons limiting the uptake of electronic textbooks include digital rights management restrictions (Regan, 2008), software and hardware diversity, limited collections, and design issues related to electronic textbooks. Most importantly, the value of using electronic textbooks for students remains unclear. Finally, the term electronic book is not well understood (Bennett & Landoni, 2005). This essay focuses on students’ experience with electronic textbooks. First, it outlines the definitions and different types of electronic textbooks. Next, it explores recent studies that show a cross section of how electronic textbooks impact different levels of education. The paper concludes with a discussion drawing from these studies. The goal of this essay is to reveal the users’ experiences of electronic textbooks and to provide suggestions for further development. How can electronic textbooks contribute to students’ learning? What do students want from an electronic textbook?

2. Definitions and different types of electronic textbooks
‘Textbook’ means “a book used as a standard work for the study of a subject” (Textbook, 2008, para. 1). ‘Electronic textbooks’ means textbooks that are available in digital or electronic format. The content of electronic textbooks can be read on a desktop computer, laptop, handheld device, Personal Digital Assistant (PDA) or specific electronic platforms such as Sony or Kindle Reader, through web browsers or in specific e-book software readers such as iLibrary or ebrary, to name a few. Electronic textbooks can also be in CD-ROM, DVD-ROM, or portable document format (PDF) file. They can also be downloaded from websites. Electronic textbooks are sometimes called web-textbooks, online textbooks, or digital textbooks. Some institutions custom design and implement electronic textbooks to meet their specific needs (McFall, 2005; McFall, Dershem, & Davis, 2006; Morton, Foreman, Goede, Bezzant, & Albertine, 2007; University of Georgia, 2006).

3. How do students feel about using electronic textbooks?
There are a number of studies on electronic textbooks incorporated into course curricula that attempt to examine how well students utilize the electronic textbook (McFall, 2005; McFall, Dershem, & Davis, 2006), how well electronic textbooks facilitate students’ learning (Luik & Mikk, 2008; Waycott & Kukulska-Hulme, 2003), or students’ preference between an electronic textbook versus paper (Maynard & Cheyne, 2005; Shepperd, Grace, & Koch, 2008). Maynard and Cheyne (2005) found that electronic textbooks are widely accepted by young students. Youths with different learning abilities have different needs in electronic textbooks (Luik & Mikk, 2008), and the two genders also have different needs (Luik & Mikk, 2005). In one case, computer science students did not utilize the electronic textbook and found its features difficult to use (McFall, 2005). Some students agreed that reading a text in electronic format was beneficial (Waycott & Kukulska-Hulme, 2003), but others preferred text on paper (Shepperd, Grace, & Koch, 2008; Vernoon, 2006). Ugaz and Resnick (2008) compared the use of print and electronic textbooks in the Medical Science Library and found that the total use of electronic titles was dramatically higher than that of print titles. Evidently, the use and the acceptance levels for electronic textbooks are diverse. A cross section of studies shows how electronic textbooks have impacted different levels of education. These studies are divided into three groups: young students, college students, and graduate students.

3.1 Young students

Young students referred to in this essay are students between the ages of eleven to sixteen. Two studies concerning young students are described below. The first study compares the difference between students using an electronic textbook and a print book. The second study provides a closer look at how different features and characteristics affected students with varying learning abilities.

Maynard and Cheyne (2005) studied 60 students from age eleven to twelve from four local schools in the UK to investigate the learning difference between students using an electronic textbook and a printed textbook. The study shows significant differences in students’ performance and behaviours for students using electronic text and print. Students using the electronic textbook scored higher in both group tests and individual tests, and were more keen and willing to particulate in group activities, whereas students using the printed textbook were less involved and less well behaved. The authors suggest that students using electronic textbooks had a higher desire to learn; therefore, they increased their learning capacity and became more self-motivated. This in turn suggests that the medium itself may have a positive effect on youth. Young students seem to be more receptive to new technologies and to different ways to learn. They are more eager to use new tools and are easily encouraged by interactive media. Using electronic textbooks in the classroom can promote the active learning approach, which improves both the motivation and quality of learning.

Luik and Mikk (2005, 2008) explore the different characteristics of electronic textbooks and report on how these differences influence students of various learning abilities and different genders. They studied 54 students from age fifteen to sixteen in four different schools in Estonia. Six electronic textbooks in different designs were selected from the school curricula including texts in mathematics, history, geography, chemistry, and the Estonian language. The findings clearly indicate which features and characteristics encouraged or discouraged students of different achievement levels and in each gender. They suggest that providing clear instructions and examples, familiar icons and commands, using keyboarding as the data-entry method, and using dark text on light background will better support the low-achieving students. In contrast, high-achieving students will benefit from more complex levels of navigation, use of analogies, and fewer terms in the contents of the materials. This study also indicates that the density of information design and complexity of navigation...
design can have a negative impact on girls’ learning. In other words, the different characteristics of an electronic textbook have a direct influence on how students with different learning abilities interact with each text, and therefore affect how students learn. Matching the characteristics of an electronic text to the learning abilities of the students who will use it can enable students to learn more effectively.

Although these two studies are unique, they show that young students can utilize electronic textbooks to maximize their learning skills. Electronic textbooks can empower young students and facilitate learning.

3.2 College students
Three studies relating to college students are identified which include students from computer science and psychology. All three studies show that students’ views about using electronic text were either neutral or unfavourable.

McFall (2005) explores how electronic textbooks transform the ways that students learn inside and outside the classroom setting. An electronic textbook application, the eTextReader, was designed and implemented for the course Introduction to Computer Science. McFall, Dershem, and Davis (2006) discuss the results on how students used their custom designed and implemented electronic textbook. The electronic textbook created for this study was Programming Languages: Design and Implementation, 3rd. edition, by Dershem and Jipping. It was set up in for the HP TC1100 tablet PC and a computer was given to each student for the study. Both studies took place at Hope College in Michigan with full-time college students. Both the eTextReader and the electronic textbook were designed to enhance the interactivities between instructors and students; therefore, their features were designed with the goal of supporting active and collaborative learning. These features included shared annotations, shared bookmarks, multiple highlighter, note taking, and search functions. The first study found that most of the features from the eTextReader were difficult to use; therefore, many of the features were not utilized. Hence, activities that are considered useful in supporting active reading on paper may not apply the same way in the digital environment. While electronic textbooks may offer functional advantages over paper, their usability should not be overlooked. In the second study, the shared annotations feature was shown to have increased students’ learning. Furthermore, the study notes that the instructor of the course had a very positive experience in using the electronic textbook; he felt that he had “a better connection to the students” (p. 343) and it had “completely changed the way he taught” (p. 343). Accordingly, electronic textbooks have the potential to connect students and instructors, promoting better communication and learning opportunities. In this sense, an electronic textbook is not only an artifact that provides content, but also an agent between instructors and students or among students.

Shepperd, Grace, and Koch (2008) compare the students’ experience and performance in using an electronic textbook versus a printed text. They studied 392 college students in an introductory psychology course. The textbook was Myers’s Psychology (2001), which could be purchased in print at full price or in CD format with a more than a 50% discount. Only thirty-seven students purchased the electronic format. The result shows that there were no performance differences between the different formats, and that students generally prefer paper to electronic text. Moreover, even though the electronic text was reported to be easy to use, it was rated inconvenient. This study demonstrates that these students were strongly accustomed to print, since over 90% of students chose print. It seems that changing from print to electronic reading will not happen easily in this group. The price reduction does not provide enough incentive to promote electronic textbooks in this case.

3.3 Graduate students
Three studies have been identified which include students from information technology, social
work, and medicine. The first and second studies below describe two groups of Master’s degree students with busy lifestyles. One group used PDAs for reading course materials; the other used an online textbook. The third study addresses the needs of medical students.

Waycott and Kukulska-Hulme (2003) studied graduate students using PDAs to read course materials from the Applications of Information Technology in Open and Distance Education course run by the UK Open University. The study was based on the Palm m105 PDA and WordSmith document reader. It shows that the mobility of the device and its additional electronic features were well received by students. It also identifies a number of tradeoffs, including small screen size, data entry problems, navigation issues, and difficulties in multiplexing documents in the device. The findings suggest, “the PDA introduced both new possibilities and constraints to the reading task” (p. 42). This study illustrates that for mature students with a demanding and busy lifestyle, using a PDA to deliver electronic text is on the right track. Useful time and information management features are what they look for. Balancing the design and the delivery of an electronic text enabled this group to maximize their time spent on learning and reviewing course materials. Electronic textbooks are expected to have both digital-organizer functions and wireless communication features.

Vernon (2006) studied students in a Master’s of Social Work course using an online textbook as the only source for readings. The selected text was provided from the Community Tool Box website, which was organized like a printed textbook. The study shows that instead of reading directly from the electronic version, many students read from printout copies. Clearly, students indicated their preference for a paper version over the electronic one. The findings suggest that these students, constantly struggling for the balance among their home, work, and school, preferred using paper because “paper is embedded in [the] culture” (p. 426). In this case, a print textbook was more accessible and user-friendly, providing a better fit with these graduate students’ busy lives. Electronic textbooks copied directly from the print versions do not provide additional value to these students. Comparing this study with Waycott and Kukulska-Hulme’s (2003) study shows that the success of electronic textbooks relies greatly on the presence of value-added features.

Morton, Foreman, Goede, Bezzant, and Albertine (2007) evaluate the utility of TK3 eBook in content authoring and distribution for use by students in a dermatology course at the University of Utah School of Medicine. Ninety-one students were studied. The study indicates that students preferred the eBook as a self-study tool and as a way to distribute course content, but preferred paper for note taking. Medical students’ responses were neutral in reaction to the electronic text, but they did prefer to use both electronic and print for different purposes. Again, this shows that paper cannot be easily or totally replaced by the electronic format.

4. Discussion
Interestingly, young students were the most accepting of electronic textbooks. They can utilize electronic textbooks to maximize their learning skills and performance. In contrast, the majority of college and graduate students were either less favourable or neutral in reaction to electronic text, and most of them preferred paper. Even students who are more computer savvy do not necessarily embrace electronic textbooks. The findings suggest that certain students resist using electronic textbooks. What do students really want from an electronic textbook? A successful electronic textbook should empower students and facilitate their learning – it should be an effective learning tool. The key areas to consider in such a tool include students’ learning style, ability, and behaviour as well as the balance of design features and usability.

4.1 Learning style
Young students using electronic textbooks can
benefit from the active learning approach, which traditional print books may not offer. Youths have better understanding, remember more, and learn more about the subject when using electronic textbooks (Maynard & Cheyne, 2005). Designers of electronic textbooks for youth should focus on features that increase students’ intercreativity, collaboration, and interaction. Easy access, convenience, and value-added features were also identified as important factors that support mature students’ learning styles and habits (Morton, Foreman, Goede, Bezzant, & Albertine, 2007; Vernon, 2006; Waycott & Kukulska-Hulme, 2003). In particular, graduate students often need to find balance among family, professional, and school life. Digital features that help them to integrate learning and lifestyle are valuable. Evidently, students want more than just a textbook in electronic format.

4.2 Learning ability
Learning ability has a direct influence on how effectively one can access reading materials. Because students have different learning abilities, educational software should be designed to meet specific needs. For instance, both keyboard and mouse are recommended for low-achieving students (Luik & Mikk, 2008). When acquiring knowledge, high-achieving students prefer analogies, whereas low-achieving students benefit from using examples (Luik & Mikk, 2008). Low-achieving students often need more help in order to excel in school. The development of electronic textbooks to address low-achieving students’ needs will not only help them to access the text itself, but more importantly, it will empower them to acquire knowledge and build their self-confidence. Understanding students’ learning ability, teachers can choose the electronic text to match with students’ needs.

4.3 Learning behaviour
Learning behaviour changes when one accesses text in electronic format. Students are accustomed to scan through the text to get an overview of the material. This, however, becomes difficult while using an electronic version (Waycott & Kukulska-Hulme, 2003). Instead of scanning through the text, students may skim it. When reading electronic text, students prefer to start from the table of contents to determine which chapters seem relevant (Hernoon, Hopper, Leach, Saunders, & Zhang, 2007). Highlighting, underlining, and note taking, activities that are considered to support active reading, are not equally represented in digital form. For instance, medical students found that taking notes in electronic format was not as natural as with paper (Morton, Foreman, Goede, Bezzant, & Albertine, 2007). These findings suggest that designers of electronic textbooks should consider how students would use them differently from print. Directly mimicking a print version may lead to problems in accessing the materials. Furthermore, adult learners have been trained to read in print; therefore, using electronic format means a behaviour change. A well-designed electronic text should minimize the users’ learning curve. To replicate a more natural style in digital form, methods such as touch-screen and electronic-pen are worth exploring.

4.4 Balance of features and usability
Traditional textbooks do not always cover all the materials that are required in a course curriculum. Instead, electronic textbooks can be easily updated with new materials and tailored to meet the need of a specific course. Electronic textbooks should utilize the digital features to add value that supports course requirements and different learning activities. Interactive features such as shared annotations, shared bookmarks, or multi-highlighting (McFall, 2005; McFall, Dershem, & Davis, 2006) can facilitate active and collaborative learning, but they need to be both useful and usable for students and teachers. Navigation was identified as one of the main usability issues which needs to be addressed in many studies (Maynard & Cheyne, 2005; Luik & Mikk, 2005; Luik & Mikk, 2008; Waycott & Kukulska-Hulme, 2003). A more seamless integration between the hardware device, software reader and value-added features is required to meet the needs of graduate students.
5. Conclusions
Electronic textbooks should be seen as an extension of print books, not a replacement but an enhancement. Since reading from print books is deeply rooted in our culture, switching from print to electronic format requires a learning curve for adult learners, whereas young learners find it a lot easier to adjust. Designing electronic textbooks for youths may have greater potential for success. The shortcoming of this essay is that it had to be based on the very limited number of studies available. The outcomes of each study cannot be generalized; they represent a unique setting of each case. They also illustrate the reaction from a cross section of different levels of education and a wide range of disciplines. It seems that many disciplines do have an interest in using electronic textbooks; however, students are generally not ready for it.

Works Cited


