Library Hi Tech

Ease of use and usefulness as measures of student experience in a multi-platform e-textbook pilot

David James Johnston Selinda Adelle Berg Karen Pillon Mita Williams

EXPERIENCING MOBILE LIBRARIES
Ease of use and usefulness as measures of student experience in a multi-platform e-textbook pilot

David James Johnston, Selinda Adelle Berg, Karen Pillon and Mita Williams
Leddy Library, University of Windsor, Windsor, Canada

Received 18 November 2014
Revised 14 January 2015
Accepted 18 January 2015

Abstract

Purpose – The purpose of this paper is to contribute to the understanding of how students accept and use e-textbooks in higher education by assessing their experiences with e-textbooks from Flat World Knowledge (FWK) and Nelson Education during a two year campus pilot.

Design/methodology/approach – Students enrolled in one of 11 classes involved in the library's e-textbook pilot were recruited to complete an online survey including questions related to the perceived usefulness and perceived ease of use of electronic textbooks, as well as their general habits with the textbook. This study uses the Technology Acceptance Model as a framework for analysis.

Findings – Students experienced a drop in enthusiasm for e-textbooks from the beginning to the end of the pilot. While research suggests that students prefer for print over electronic in some contexts, students rarely acted on that preference by seeking out available alternative print options. Student experience with the open/affordable textbook (FWK) was very comparable to that of the high cost commercial text (Nelson).

Originality/value – While previous research suggests that students have a general preference for textbooks in print rather than electronic, the study suggests that preference may not dictate the likelihood that students will use print options. Students appear to be willing and able to easily make use of the content and functions in their e-textbooks. Despite overall positive reviews for the e-textbooks, students experienced a drop in enthusiasm for e-textbooks from the beginning to the end of the pilot.

Keywords Students, Universities, Technology adoption, Electronic resources, Technology Acceptance Model, Electronic textbooks

Paper type Research paper

Introduction

Textbooks have been a standard tool for learning in universities and colleges for more than two centuries; however, in the last decade the fate of the physical textbook has been questioned. While print is currently the dominant format in the textbook marketplace, the emerging environment is supporting a shift toward electronic textbooks (e-textbooks). The current state of technology, the publishing industry and student technological aptitude is threatening to move the print textbook into obsolescence. The body of literature addressing the potential of e-textbooks highlights cost savings, portability and unique digital features that are not possible with their print counterparts as potential benefits of e-textbooks (Sun *et al.*, 2012). In response to the possibility that e-textbooks could replace print texts as the primary means of textbook delivery in post-secondary education, libraries, bookstores, and publishers are

This research is made possible by the University of Windsor's Strategic Priorities Fund.

Library Hi Tech
Vol. 33 No. 1, 2015
pp. 65-82

0737-8831
DOI 10.1108/LHT-11-2014-0107

aggressively pursuing the possibilities of their roles in this market (Lyons and Hendrix, 2014; de Oliveira, 2012).

Using the Technology Acceptance Model (TAM) as a framework for analysis, the current study provides insight into the broader understanding of students' perceptions of e-textbooks' usefulness and ease of use as a guide to understand students' use of e-textbooks. The study reports on a pilot project of eleven university classes adopting e-textbooks by two e-textbooks publishers, Flat World Knowledge (FWK) and Nelson Education.

Literature review

Until recently, electronic book adoption in the academic context was limited to e-books available via the library to support student and faculty research (Berg *et al.*, 2010), however, universities are now starting to explore the electronic format for textbooks. Since the use of e-books is transitioning from an (optional) research tool to a (required) textbook, an even greater understanding of the way in which students use and accept electronic texts is necessary in order to ensure students have a positive and successful learning experience.

The corpus of research on the use of e-books reports numerous potential benefits of e-book adoption including: reduced costs, potential portability, accessibility on a variety of platforms, and the integration of features which are not possible in print books such as audio and video, in text linking, and full text searching (Internet2, 2012; Berg, *et al.*, 2010). Faculty and students have begun to take advantage of the potential benefits that e-books offer in an academic research context (Shelburne, 2009), however, over recently has the application of e-books began migrating to the textbook market (Blummer and Kenton, 2012). For publisher's, textbook sales are limited by students ability to find alternative ways of accessing their course readings (Lyons and Hendrix, 2014). Subscription pricing of e-textbooks at the institutional level can enable publishers to maximize buy in (CourseSmart, 2013).

The potential shortcomings of e-textbook use in higher education are also discussed widely in the literature. First, faculty members are not always comfortable with implementing many of the new features provided by e-textbooks such as note sharing, tracking student use, and quizzes (Internet2, 2012). Further, early studies suggested that students may not be ready to abandon print for electronic texts (Sheppard *et al.*, 2009). The hesitation toward adopting electronic texts is often attributed to readability issues in the electronic format. Previously published literature highlights differences in behavior when reading on a screen and reading in print (Robinson, 2011) as well as potential issues related to eye fatigue (Jeong, 2012). While readability continues to be perceived as a potential barrier, the emergence of new technological devices like the iPad and Kindle may have the potential to "sweep away any lingering doubts about whether students will actually embrace reading from a screen" (Chesser, 2011).

More specific concerns have been raised about the ability for all individuals to use e-textbooks effectively. The National Federation of the Blind raised concerns that the Internet2 e-textbook pilot involving five American institutions was "preventing blind and print-disabled students from fully participating" (Campus Technology, 2012). As a result, the University of Minnesota withdrew from program.

More recently, Foasberg (2014) published the results of a qualitative study of college students' reading habits with regard to print and electronic formats. The findings suggested that while students make use of both print and electronic sources,

students use the print format more frequently for long-form reading and tend to engage with print more deeply than electronic resources. These findings have important ramifications on e-textbook adoption. Students were far more likely to annotate print materials rather than electronic and students in the study expressed frustration that they could not interact with e-textbooks in the same was as they did with print. Overall, electronic books were used for selected academic purposes, but more often electronic books were used for shorter and non-academic reading (Foasberg, 2014). Foasberg clarifies:

> Despite the ever-increasing popularity of new ways of reading, the study participants read in a fairly traditional way. Most of them preferred to use print for long-form and academic reading, at least partly because they felt more comfortable annotating documents in a print environment. They read electronically a great deal, but this reading consisted primarily of brief, nonacademic materials […]. Their dislike of electronic textbooks was especially striking (Foasberg, p. 24).

Foasberg's results seem to indicate that students' preference for print for academic use will impede adoption of e-textbooks for academic purposes.

One factor influencing the adoption of e-textbooks highlighted by Foasberg (2014) is cost. The high price of print textbooks is challenging for students so unsurprisingly numerous authors have identified cost as a crucial consideration in e-textbook adoption. Textbooks can account for a large proportion of student educational expenditures and debt (Hilton *et al.*, 2014). Students actively work to minimize the impact that textbooks' high prices have on their often limited budgets by finding alternative ways to access the text, be it buying used, sharing, or even piracy (Lyons and Hendrix, 2014). While students would welcome a cost-savings, it is unclear if the electronic format truly has the potential to provide textbooks at a reduced cost. While there are multiple projects examining the potential for free or affordable e-textbooks for students (Baker *et al.*, 2009), many publishers are offering the electronic format for the same exorbitant price as the print textbooks. Further, students' ability to resell their textbooks is a source of revenue for students (Simba Information, 2012) and e-textbooks may prevent resale.

TAM

The factors influencing the acceptance and rejection of new technologies have been of interest to scholars for decades. One of the most popular models that attempt to capture the acceptance or rejection of technologies in the workplace is Davis's TAM (Davis *et al.*, 1989). The purpose of the TAM was to explain how users decide to accept and use a technology. The model in its initial and simplest form the model focussed on two primary factors:

(1) ease of use, defined as "the degree to which a person believes that using a particular system would be free from effort"; and

(2) perceived usefulness defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Venkatesh *et al.*, 2003, p. 448) (Figure 1).

Multiple revisions of the model have been proposed to the TAM, including the TAM2 and TAM3, however, the original TAM continues to dominate and be applied more than 25 years after its inception (Edmunds *et al.*, 2012; Shih *et al.*, 2011; Shroff *et al.*, 2011).

The TAM suggests that these two factors are key in determining the uptake of technology:

> The primary drivers for technology acceptance in TAM are perceived usefulness and perceived ease of use, and these two factors are recognized to have an effect on a person's attitude toward using the system (Davis, 1989).

TAM has been applied and validated in numerous settings and situations beyond the workplace, including in educational settings (Edmunds *et al.*, 2012; Shroff *et al.*, 2011). While the TAM provides researchers with the validated tools to apply scales to assign a quantitative prediction of the likelihood that a technology will be adopted, the current study uses the model only as a framework to frame the scope of the questions and the study.

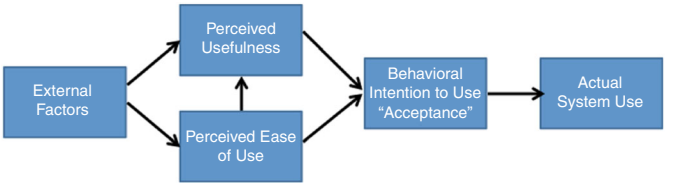
Context of research project

The current study captures a two-year pilot project at the University of Windsor which aimed to evaluate the feasibility of multiple models for provide students with access to e-textbooks. The multi-faceted pilot project is led by the library at the University of Windsor and is funded by the University's strategic initiatives fund which enabled us to provide a free e-textbook for each student enrolled in one of the participating classes. The complimentary textbook for students was an important element of our pilot as it allowed the researchers and students to focus on the usefulness and ease of use of the technology without being mired by the cost of the textbook. The current publishing models for textbooks are complicated and students have a variety of ways to access and engage with e-textbooks including digital purchases, short term rentals, and even more affordable access through negotiated licenses (Lyons and Hendrix, 2014).

The library's mandate was to build a pilot to provide complimentary textbooks to all students in classes that participated in the pilot. Both open access textbook providers as well as traditional commercial publishers were to be piloted, however, during the study the open access publisher transitioned away from a fully open model. Both publishing models were selected for the study because each format has both benefits and drawbacks. Open access is an attractive option for students who often struggle to manage the cost of textbooks, as well as the support of open access initiatives aligns with the library's core values. In contrast, traditional publishers can provide access to large libraries textbooks already in use by faculty members and do not require curricular change.

FWK

The pilot's initial open access partnership was with publisher, FWK. FWK provided web-based versions of the textbook were available for free online for all potential users.



Source: Adapted from Davis *et al.* (1989)

Figure 1.
Original technology acceptance model (TAM)

In addition to the free online version of the textbook, through funding for the pilot, all students in the course were provided with FWK's Digital All-Access Pass (the cost of 34.95Cdn was covered by the funding for the pilot). The Digital All-Access Pass provides users with the option of several downloadable textbook formats such as PDF, ePub, and Mobi files that can be read on digital readers (iPad, Kindle, and Nook) as well as access to supplemental learning materials made available by FWK such as quizzes and flashcards. During the course of the study, FWK departed from the model which provides free access to an online version of the textbook (Howard, 2012) and as a result can no longer be considered an open access textbook provider. Because student access to the textbooks and all-access pass was funded by the project, the transition of business models did not affect our study. Despite the transformation of FWK away from an open-access publisher, FWK remains an inexpensive alternative to traditional textbook publishers and the company has affirmed their commitment to affordable textbook provision.

In order to ensure students were not disadvantaged by limiting their access to only the electronic format, several options for print versions of the textbook were made available to students including printing capabilities for PDFs of individual chapters, purchase of the full print textbook through the university bookstore, and print-on-demand orders could be placed through FWK for the price of 20Cdn.

Nelson education

The library's commercial publishing partner was Nelson Education (Nelson) using the VitalSource e-textbook delivery platform. One of the key benefits of working with the Nelson was that faculty partners were very interested in participating in the pilot because Nelson has an extensive body of textbook titles. Some faculty members were already using Nelson titles that were available electronically and therefore were able to maintain their current textbook while participating in the pilot. Nelson allows users to access textbooks in three ways: online with a web browser, on a mobile device, or by downloading books for offline use to the VitalSource Bookshelf platform. Notes and highlights are automatically synced with user accounts and are visible no matter where they read from. The offline VitalSource Bookshelf does contain digital rights management (DRM) that requires you to redeem a code to read your book. The DRM prevents the book from being read outside of this platform on external formats like PDF. Users are also limited to printing ten pages at a time. Traditional print copies of the Nelson texts could be purchased at prices ranging from 100 to 180Cdn.

Through the pilot, the current study aimed to answer the following research questions:

RQ1. How do students perceive the ease of use of e-textbooks?

RQ2. How do students perceive the usefulness of e-textbooks?

RQ3. How do students' experiences with e-textbooks differ from print textbooks?

RQ4. What differences emerge, if any, when the two publishing platforms are compared?

RQ5. How does students' enthusiasm toward e-textbooks evolve from their initial introduction to their actual use?

Methods

Students included in the study were enrolled in one of 11 classes taking part in the pilot The classes included were in the areas of business, psychology, labor studies, and statistics (see Table I). The study took place across six semesters and included five unique courses. Given the funding received from the university's strategic priorities fund, we were able to provide all students in the pilot with a free e-textbook for their course. In total, students in 11 classes were recruited to the study. A total of 871 students were enrolled in the 11 classes (Table I). Recruitment was done during one of the final classes of the semester when researchers visited each class in person. At this time, the researcher provided students with printed copies of the Letters of Information, and an invitation to take part in the research. Students were provided time during the class to complete the online survey. The questionnaire included questions related to: demographic information; their perceived usefulness of the electronic format; their perceived ease of use of the e-textbooks; and their general habits with the textbook including how their experiences compare to print. The questionnaire contained both close-ended and open-ended questions and took an average of six minutes to complete. The current study received clearance from the University of Windsor's Research Ethics Board.

Results

Characteristics of respondents

Of the 871 students enrolled across the 11 classes, the total response rate was 48 percent ($n = 416$). Full information about the individual classes, textbooks, and response rate is available in Table I. Demographic data provided by the student was evaluated to ensure that the respondents accurately reflected the student population of the courses (see Table II).

Discipline	Section/ classes	Platform	Textbook title	No. enrolled	No. of respondents (%)
Business (Business)	6	FWK	*Information Systems: A Manager's Guide to Harnessing Technology*	255	175 (69)
Psychology (Social Sciences)	2	Nelson	*Abnormal Child Psychology*, 5th ed.	267	119 (44)
Labor Studies (Social Sciences)	1	Nelson	*Work, Industry, and Canadian Society*, 6th ed.	91	26 (26)
Gen Social Sciences (Social Sciences)	1	Nelson	*Statistics Unplugged*, 4th ed.	201	59 (30)
Business (Business)	1	Nelson	*Entrepreneurship: Theory, Process and Practice*, 9th ed.	57	37 (64)

Table I.
Courses, textbooks, and response rate

Age of respondents	Year of program (%)	Sex (%)
Range = 19-50 years	Year 1 = 9	Male 40
Mean = 22.5 years	Year 2 = 46	Female 60
Mode = 21 years	Year 3 = 26	
	Year 4 = 16	
	Not applicable = 3	

Table II.
Respondent demographics

In order to gain an understanding of students' general comfort with technology, respondents were asked to indicate their level of comfort with computer technologies as comfortable (1), somewhat comfortable (2), or not at all comfortable (3). The overall mean level of comfort was 1.35, with the majority (68.3 percent) of students reporting being comfortable with technology. < 5 percent of individuals reported being not at all comfortable with technology. The level of comfort of students' from the two faculties (Business and Social Science) were compared using a χ^2 analysis. Students in the Faculty of Business were significantly more likely to report a lower level of comfort with technology than those in the Faculty of Social Sciences $\chi^2(2, n = 412) = 0.248$, $p = 0.00$ (Table III).

Students were also asked to indicate on what type of device that they were most likely to access the e-textbooks. The vast majority (72.4 percent, $n = 301$) of respondents indicated that they were most likely to access the textbook on a personal laptop. Tablet or home desktop computers were the next most popular type of device to access the textbook (10.3 and 12.9 percent, respectively). A very small number of students accessed the textbook primarily on a e-reader or lab/library computer (four students and two students, respectively). The results were very similar between the two faculties, with the exception that a slightly larger percentage of students (16.6 percent) from the Faculty of Social Sciences primarily accessed the textbook on a tablet than those from Business (7 percent).

Factors influencing purchase of textbooks

In order to better understand the factors influencing the likelihood that students would purchase a textbook for their classes, students were asked to rate the importance of six factors (Table IV) from 1 (not at all important) to 4 (very important). Results indicate that the most important factor influencing students purchase of textbooks was the requirement by the professor (mean = 3.36, SD = 7.09), followed closely by the cost of the textbook (mean = 3.20, SD = 0.898). The least important factors influencing students' decision to purchase were the reputation and perception of the textbook among peers (mean = 2.26, SD = 0.901) and the potential value for resale (mean = 2.43, SD = 9.95). χ^2 analysis was done to determine if the level of importance of these factors influencing the purchase of textbooks transcended the two faculties. The only factor that varied with statistical significance was the importance of the textbook being required by the professor. Students from the Social Sciences were significantly more likely to rate the importance of a textbook being required by a professor as more important than business students $\chi^2(3, n = 116) = 0.297$, $p = 0.00$.

Ease of use

The ease of use of textbooks across the two platforms was evaluated in relation to four main factors: the ability to install, access, navigate and read online. Students were asked to rate the ease of use of four features of the e-textbook from very difficult (1) to very easy (4):

Please rate your level of comfort with computer technologies	All respondents (% *n*)	Respondents from Faculty of Business (% *n*)	Respondents from Faculty of Social Sciences (% *n*)
Comfortable	68.3 (24)	52.0 (91)	80.1 (193)
Somewhat comfortable	26.4 (110)	36.6 (64)	19.1 (46)
Not at all comfortable	4.3 (18)	9.1 (16)	0.8 (2)

Table III.
Reported level of comfort with technology

	Combined	Social Sciences	Business
Requirement of professor			
Not at all important (%)	0.7	0	1.4
Somewhat important (%)	11.4	5.0	17.5
Important (%)	39.3	32.8	45.5
Very important (%)	48.5	62.2	35.5
Mean	3.36	3.57	3.15
Cost of textbook			
Not at all important (%)	5.3	5.0	5.7
Somewhat important (%)	16.3	14.9	17.5
Important (%)	31.8	29.4	34.1
Very important (%)	46.6	50.7	42.7
Mean	3.20	3.26	3.14
Textbook			
Not at all important (%)	21.6	24.9	18.5
Reputation			
Somewhat important (%)	39.8	39.3	40.3
Important (%)	29.4	28.4	30.3
Very important (%)	9.2	7.5	10.9
Mean	2.26	2.18	2.34
Potential for future use			
Not at all important (%)	13.1	10.0	16.1
Somewhat important (%)	37.1	39.3	35.1
Important (%)	31.6	32.3	30.8
Very important (%)	18.2	18.4	18.0
Mean	2.55	2.59	2.51
Interest in subject			
Not at all important (%)	14.6	16.9	12.3
Somewhat important (%)	35.4	31.3	39.3
Important (%)	35.2	35.3	35.1
Very important (%)	14.8	16.4	13.3
Mean	2.50	2.51	2.49
Potential for resale value			
Not at all important (%)	20.6	21.4	19.9
Somewhat important (%)	32.5	35.8	29.4
Important (%)	30.3	26.9	33.6
Very important (%)	16.5	15.9	17.1
Mean	2.43	2.37	2.48

Table IV.
Factors influencing students likelihood to purchase textbooks

ability to install (Table V). Overall, the students responded that the e-textbook was easy to use. Across the two platforms and across each of the four attributes, at least 80 percent of the respondents indicated the features were easy or very easy. The ability to read the text online was rated most difficult with students (18 percent of respondents) reporting that reading the text online was either difficult or very difficult.

In order to understand platform differences, the ability to navigate, to access, to read online, and to install/set were compared across the two platforms. There was no significant difference between the two platforms for the ability to navigate or the ability install/set up, however, the ability to access the textbook was rated significantly lower in the FWK textbook than the Nelson textbook $\chi^2(3, n = 402) = 16.07, p = 0.00$.

	Combined	Flat World Knowledge	Nelson
Ability to access			
Very difficult (%)	0.5	1.2	0
Difficult (%)	5.5	8.1	3.5
Easy (%)	59.2	65.3	54.6
Very easy (%)	34.8	25.4	41.9*
Mean	3.28	3.15	3.38
Ability to install			
Very difficult (%)	1.0	1.2	0.9
Difficult (%)	7.0	5.8	7.9
Easy (%)	58.7	63.0	55.5
Very easy (%)	33.3	30.1	35.8
Mean	3.24	3.22	3.14
Ability to navigate through e-textbook			
Very difficult (%)	1.2	0.6	1.7
Difficult (%)	10.4	11.5	9.6
Easy (%)	59.4	63.8	55.5
Very easy (%)	29.3	24.1	33.2
Mean	3.16	3.11	2.34
Ability to read online			
Very difficult (%)	2.7	2.3	3.1
Difficult (%)	15.9	17.9	14.4
Easy (%)	54.2	59.0	50.7
Very easy (%)	27.1	20.8	31.9
Mean	3.06	2.98	2.51

Table V.
Ease of access of electronic textbook

Further, although a chi square test failed to show significance at 0.05 ($p = 0.08$), a p value of > 0.05 but < 0.1 indicates that there might be low presumption against the null hypothesis, meaning that there may be an association, but the study was underpowered to detect it and may warrant further investigation.

Usefulness

FWK. Students using the FWK text were asked to rate the usefulness of the various functions of their e-textbooks including note taking, highlighting, search function, and embedded links. Nearly half of the students did not use the highlighting, note taking, and embedded link functions (Table VI). However, the majority of those that did use these functions reported that they were useful of very useful. The ability to search within the text for specific words or phrases, instead of relying on an index or table of contents, was rated as the most useful feature with 66.1 percent of students rating the search feature as either useful or very useful.

Nelson. In contrast to the FWK students who were asked to rate the usefulness of the functions from not useful to useful, students using the Nelson Education textbook were asked to compare the usefulness the digital format against their previous experiences in print in relation to the four functions: note taking, highlighting, and finding content [1]. Students were asked to consider their experience with note taking, highlighting and finding content in print books and indicate whether the e-textbook was more useful than print textbooks, less useful than print textbooks, or if they felt there was no difference between the two formats (Figure 2). For both note taking and highlighting,

		(%)
Note taking	Did not use	51.1
	Not useful	5.2
	Somewhat useful	10.9
	Useful	24.1
	Very useful	8.6
Highlighting	Did not use	45.4
	Not useful	5.2
	Somewhat useful	11.5
	Useful	25.3
	Very useful	12.6
Finding content (search)	Did not use	17.8
	Not useful	3.4
	Somewhat useful	12.6
	Useful	31.0
	Very useful	35.1
Embedded links	Did not use	43.7
	Not useful	4.6
	Somewhat useful	23.0
	Useful	19.0
	Very useful	9.8

Table VI.
Usefulness of electronic textbook features

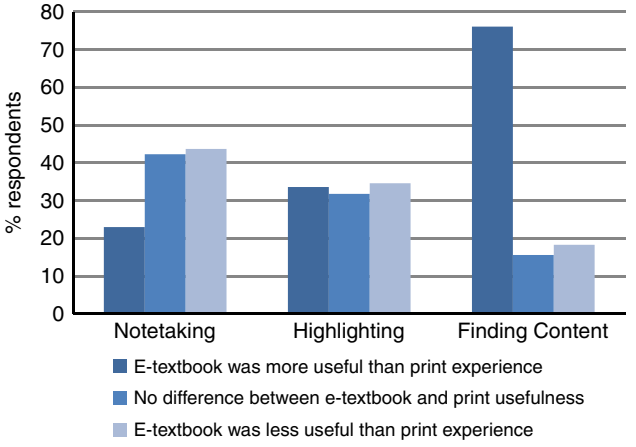


Figure 2.
Usefulness of functions in Nelson electronic textbook compared to print

students were relatively evenly split across the three groups. In contrast, the e-textbooks was overwhelmingly favoured (76.1 percent) over print textbooks in its ability to assist with finding content. While table of contents and indices can be helpful to connect students with content, the ability to full text search within the digital text was reported to be overwhelmingly better favoured by students.

Level of use of the e-textbook compared to print

Participants were asked to compare their level of use of the e-textbook to their previous use of print textbooks. Across both platforms, 42.4 percent reported using the electronic less than print textbooks in the past and only 19.1 percent reported their level of use of the e-textbooks as more than their previous print textbooks. Figure 3 shows

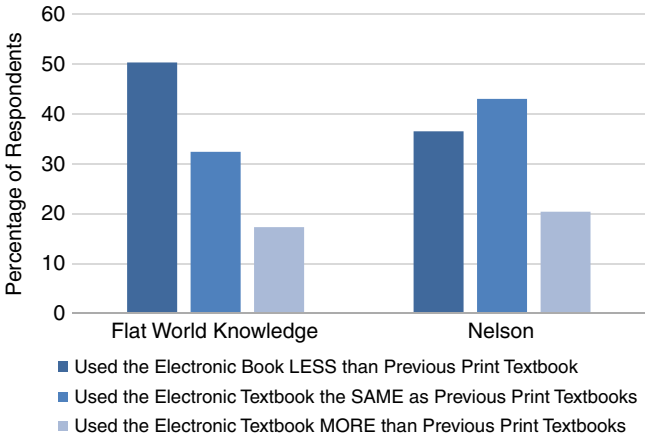


Figure 3.
Comparison of use of electronic textbook again previous print textbooks

the reported level of use of the e-textbooks in each platform compared to their previous print textbooks. A χ^2 test indicates that significantly more people reported a higher use of e-textbooks compared to print when using the Nelson textbook than the FWK textbook $\chi^2(2, n = 403) = 0.14$, $p = 0.02$.

It should be noted that while only three people relied on university desktop computers (in library or campus computer labs), it is worth noting that all three of these individuals indicated that they used the textbook less than print textbooks. Although the number is small, it is important to recognize that not all students have access to personal computers and that it is important that new textbook technologies are accessible and convenient for all students.

Using the print options

The two e-textbooks publishers gave students options for reading the textbook content in a printed format.

FWK. Students using the FWK textbooks were given two options for obtaining print copies of the textbook content:

(1) purchasing a full print copy of the text from the bookstore for a nominal charge of 20Cdn; or

(2) printing specific sections from the online text (unlimited pages).

Of the 173 respondents to this question, 149 students (86 percent) did not purchase a print copy of the text. For the 24 students who purchased the print version, the top three reasons for making the purchase were: a general preference for print, difficulty reading and studying from e-textbook, and general preference to have access to both formats. Of the 24 respondents who purchased the print material, three quarters used the print copy rarely ($n = 16$) or never ($n = 3$).

FWK also gave students the ability to print chapters of the textbook from the digital format. Less than half (43 percent, $n = 52$) of the respondents ever took advantage of this feature, and only 12 indicated they used this option often ($n = 7$) or always ($n = 5$).

Nelson. The users of the Nelson textbooks were also provided with two options for obtaining print copies in the Nelson textbook:

(1) purchasing the print textbook for standard textbook pricing ($100-180); or

(2) printing specific sections of the online text, however, printing was limited to ten pages at a time.

Of the 232 respondents to this question only 26 (10.4 percent) purchased a print copy of the textbook. Further, of the 26 who purchased the print textbook, 11 respondents indicated that they were not aware of the digital option at the time of purchase. Otherwise the top 3 reasons for purchasing a print copy of the textbook were the same three identified by students using the FWK textbook: a general preference for print, difficult reading/studying from the e-textbook, and a preference to have access to both formats.

In addition users could print off sections of the textbook, but were restricted to printing ten pages at a time. Of the 228 respondents to this question, 170 reported never printing out content from the electronic version (74.6 percent) while 33 reported doing so rarely (14.5 percent).

Students across both platforms were asked in what situations they found it most useful to read the textbook in printed format. Respondents across both platforms identified the same three situations where the print formats were most useful: note taking, reading when studying for exams, and completing their assigned readings.

Change in level of enthusiasm

While students responded positively to many of the features and attributes of the electronic books, students did wane in enthusiasm from the start to the end of the pilot. Participants were asked to reflect back on their level of enthusiasm for e-textbooks when they found out that their textbook was available as an e-textbook and rate their enthusiasm on a scale from: not enthusiastic (1) to very enthusiastic (4). Participants were also then to indicate their level of enthusiasm for e-textbooks (on the same scale) following their experience of using the textbook for the semester. In all, 27 per cent of respondents ($n = 48$) reported a decrease of one, two, or three rating points (21.0, 5.4, and 1.0 percent, respectively) and only a small minority of participants (12 percent) reported an increase in enthusiasm. The mean level of enthusiasm when students found at that their textbook was available in electronic format was 3.13, while the mean level of enthusiasm after their experience dropped to 2.92. A paired t-test of the data were conducted to compare respondents' level of enthusiasm at the end of the pilot compared to their reported level of enthusiasm when they first heard that they had access to the e-textbooks. There was a significant difference in the scores for enthusiasm following the pilot ($M = 2.92$, SD = 0.923) and the scores for enthusiasm at the onset ($M = 3.13$, SD = 0.911) of the pilot $t(410) = 5.383$, $p = 0.00$. This test indicates that there was a statistically significant drop in enthusiasm when students reflected back on their level of enthusiasm at the beginning of the pilot and considered their level of enthusiasm at the end of the pilot.

To determine whether or not this significant drop in enthusiasm was experienced on individual platforms, the same analysis was repeated for individual platforms. Across both individual platforms, respondents indicated the same drop in enthusiasm. For the FWK textbooks, the mean score for enthusiasm following the pilot ($M = 2.83$, SD = 0.906) was significantly lower than the mean score for enthusiasm at the onset ($M = 3.00$, SD = 0.844) of the pilot $t(175) = 3.173$, $p = 0.002$. For the Nelson Education textbooks, a paired t-test indicated that the mean score for enthusiasm following the pilot ($M = 2.99$, SD = 0.931) was significantly lower than the mean score for enthusiasm at the onset ($M = 3.23$, SD = 0.919) of the pilot $t(234) = 4.347$, $p = 0.00$. This indicates

that students experiencing a significant drop in their level of enthusiasm from the start of the pilot to the end of the pilot, independent of platform (Figures 3-5).

Limitations

While this study revealed many useful findings, there are limitations embedded in the study design that must be recognized. First, the findings of this study are based on students reporting and recollection of the use of the e-textbooks and not direct observation. Second, it is not possible to determine whether differences in student experiences between the platforms could be attributed also to disciplinary differences. The differences in the textbook platform are also split along disciplinary lines. Specifically, all social sciences students used Nelson textbooks, while all but one class of business students used FWK. Thus, we were only able to report on disciplinary differences unrelated to specific experiences to the use of the textbook.

Discussion

According to TAM, perceived ease of use, perceived usefulness and external factors contribute to the users' attitude toward using, the intention to use and ultimately the

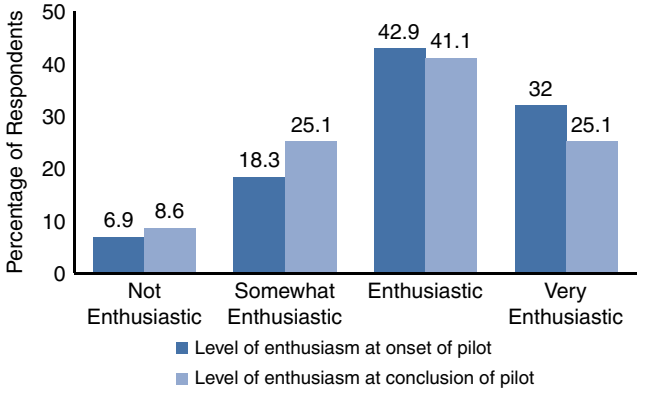


Figure 4.
Level of enthusiasm at onset and conclusion of e-textbook pilot – Flat World Knowledge Textbooks

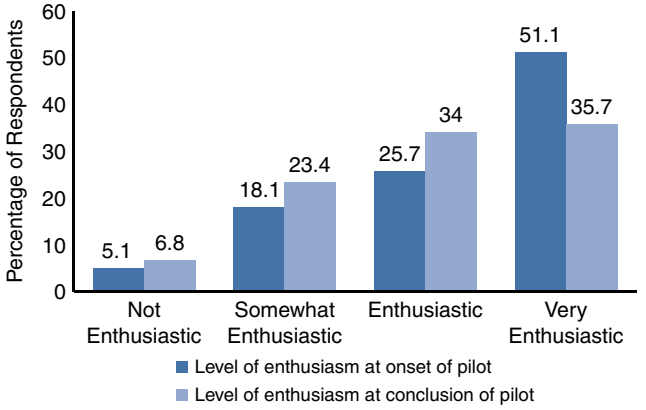


Figure 5.
Level of enthusiasm at onset and conclusion of e-textbook pilot – Nelson Textbooks

actual use of technology. Our survey used the TAM to inform what elements of student experience we should investigate to better understand actual use behavior by students.

The perceived ease of use across of e-textbooks from FWK and Nelson Education was high with at least 80 percent of the respondents reporting that the textbooks' ability to install access, navigate, and read online was easy or very easy. Not surprisingly, the ability to read online was rated the lowest. The challenge of reading online is a commonly cited deficit of e-textbooks (Bennett and Landoni, 2005; Foasberg, 2011; Johnson and Buck, 2014; Kang *et al.*, 2009). Although our research failed to show that Nelson was statistically less easy to read online, the research does suggest that further investigation is warranted. A review of the open comments suggest that the challenges of reading online centered around the platform's layout, session time-outs, and the limitations on exporting to an external format like PDF. The struggle with readability continues to confirm previous research that some users find it more difficult to read electronic formats compared to print.

While the ease of use was rated similarly across platforms, the ability to access the textbook was rated significantly lower in the case of FWK than the Nelson. Initial access to the FWK textbook did require users to undergo additional steps to redeem their access code as a result of professors using different versions of the textbook with individual customizations for their sections. This finding reinforces students' desire for streamlined and simple access to electronic resources (Kline and Williams, 2008).

The usefulness of e-textbooks' highlighting, note taking and searching features were positively evaluated. While not all students made use of these functions, the majority of students who did make use of these features reported that they were useful or very useful. In addition, users of both the FWK and Nelson textbooks gave very positive reviews to searching in e-textbooks.

When students are provided with the e-textbooks they appear to be willing and able to easily make use of the content and functions. Students' ability and acceptance or willingness to make use e-textbooks is also evidenced by the low uptake of print options by students. Despite the fact that print versions of the textbooks were available in variety of ways, either through economical purchasing or printing sections of the book, the vast majority of students in this study chose not to take advantage of these print alternatives. However, it is very concerning that almost half of all respondents reported using the e-textbooks less than they used previous print textbook. In consideration that overall the usefulness and ease of use is rated highly, more investigation into what contributes to the decrease in students' use must be done.

In addition to ease of use and usefulness, TAM also recognizes the role of external factors on technology adoption. Cost has been identified as a key external factor in students' e-textbooks adoptions (Chulkov and VanAlstine, 2013, 2014; Terpend *et al.*, 2014). In the current study, the pilot was able to provide students with a free e-textbooks, and therefore cost was removed as a factor. While this allowed the study to focus on ease of use and usefulness, it is important that this is a key issue for students. Cost was the second most important factor influencing students' likelihood to purchase a textbook (following requirement by professor). In the open comments of the survey, maintaining the textbook at a low or no cost was an overwhelming theme. As such, if textbook costs were more affordable than print, acceptance and uptake of e-textbook may great increase. Our study evaluated both an affordable, previous open, textbook provider as well as a costly traditional publisher. Students' experiences with the two

different textbook publishers did not greatly vary. In fact, while FWK's ability to access was rated more difficult, the ability to read trended toward being easier in the FWK textbooks. The evaluation of usefulness between the textbooks was very similar. The benefit to using a commercial publisher is the breadth of options that faculty are able to access which align their current curriculum, however, our study suggests that students' experiences are not that different when using a less commercial, less flashy, and less expensive options.

In spite of the overall positive findings of many features of the textbook, the drop in enthusiasm throughout the duration of the pilot is intriguing and requires more investigation. The drop in enthusiasm may be attributed to the high expectations for e-textbooks. While overall the students rated the ease of use and usefulness as positive, the e-books may not have met the initial expectations for the technology. When adopting new technologies we have become accustomed to seamless experiences with products to simplify procedures. E-textbooks are competing with its predecessor product, print textbooks, which are extremely comfortable and familiar to users. E-textbooks may complicate the simple procedure of opening and reading a textbook (Kline and Williams, 2008). While students may not readily recognize it, the reading experience can be more difficult, and interacting with the textbook in more complex ways does require some learning on the user's part.

Previous research has focussed on and highlighted students' preference as a measure of acceptance of e-textbooks and has not delved into what the TAM labels actual use when given the e-textbook for use. The current study highlights that while research suggests that students prefer for print over electronic in some contexts, provided with an e-textbook and the option to take advantage of print alternatives, students rarely acted on that preference by seeking out alternative print options.

Suggestions for future research

While this study gives a snapshot of the experiences of students using e-textbooks, it also highlights the need for further research on both e-textbook usage, as well as the e-textbook publishing environment.

Given the recognized limitations of our study, future research is needed expanding the disciplines of study, as well as expanding the platforms for electronic books in order to better understand the potential differences across platforms, disciplines and courses.

Our pilot was particularly interested in exploring open-access options in the textbook market. FWK ceased providing open access to their textbook library during our pilot, however, other open-textbook initiatives are being explored such as the provincial open textbook initiative in British Columbia (Broughton, 2013). The current research indicates that student experiences with more affordable options is very comparable and supports further research and pilots to assess the feasibility of these models. Affordable or open textbooks have the potential to ease the burden on students in a difficult financial climate. Further, our results for ease of use and usefulness indicated that student are quite positive about e-textbooks but the challenges that did arise may be attributed in part to the tight control necessary for DRM. As such, further assessment the impact of DRM on student experience would be beneficial.

Further, much of the research into the e-textbooks has focussed on preference, rather than actual behavior and use. By examining actual use, it is possible that reported preference and actual use may diverge, perhaps due in part to external factors.

Conclusion

The e-textbooks environment is changing rapidly and university and colleges are aggressively exploring e-textbooks as a primary format for textbook delivery. The current research suggests that while e-textbooks may not be meeting the high expectations of students, student's preference for certain features of print textbooks is limited in determining their actual use behavior when provided with textbooks in electronic format. Given the central role that textbooks play in students' post-secondary education learning experience, we must continue to study how this new technology impacts their experience and strive to be advocates for better e-textbooks that can truly fulfill the promise that many see in this growing arena.

Note

1. The Nelson/VitalSource platform does not provide embedded links.

References

Baker, J., Thierstein, J., Fletcher, K., Kaur, M. and Emmons, J. (2009), "Open textbook proof-of-concept via Connexions", *The International Review of Research in Open and Distributed Learning*, Vol. 10 No. 5, available at: www.irrodl.org/index.php/irrodl/article/viewArticle/633 (accessed February 2, 2015).

Bennett, L. and Landoni, M. (2005), "E-books in academic libraries", *The Electronic Library*, Vol. 23 No. 2, pp. 9-16.

Berg, S.A., Hoffmann, K. and Dawson, D. (2010), "Not on the same page: undergraduates' information retrieval in electronic and print books", *The Journal of Academic Librarianship*, Vol. 36 No. 6, pp. 518-525.

Blummer, B. and Kenton, J. (2012), "Best practices for integrating e-books in academic libraries: a literature review from 2005 to present", *Collection Management*, Vol. 37 No. 2, pp. 65-97.

Broughton, C. (2013), "Open textbooks: learning from our WA neighbours", BC Campus Opened, available at: http://open.bccampus.ca/2013/02/18/open-textbooks-learning-from-our-wa-neighbours (accessed February 11, 2015).

Campus Technology (2012), "National Federation of the Blind takes on e-text pilots", available at: http://campustechnology.com/Articles/2012/10/02/National-Federation-of-the-Blind-Takes-On-EText-Pilots.aspx?Page=1 (accessed January 8, 2015).

Chesser, W.D. (2011), "The e-textbook revolution", in Polanka, S. (Ed.), *The No Shelf Required Guide to E-Book Purchasing*, ALA TechSource, Chicago, IL, pp. 28-40.

Chulkov, D.V. and VanAlstine, J. (2013), "College student choice among electronic and printed textbook options", *Journal of Education for Business*, Vol. 88 No. 4, pp. 216-222.

Chulkov, D.V. and VanAlstine, J. (2014), "The impact of multiple textbook format availability in business education", *Journal of Applied Research in Higher Education*, Vol. 6 No. 1, pp. 176-186.

CourseSmart (2013), "CourseSmart Fall 2013 research project", available at: www.coursesmart.com/go/fall2013research (accessed January 8, 2015).

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989), "User acceptance of computer technology: a comparison of two theoretical models", *Management Science*, Vol. 35 No. 8, pp. 982-1003.

de Oliveira, S.M. (2012), "E-textbooks usage by students at Andrews university: a study of attitudes, perceptions, and behaviors", *Library Management*, Vol. 33 No. 3, pp. 536-560.

Edmunds, R., Thorpe, M. and Conole, G. (2012), "Student attitudes towards and use of ICT in course study, work and social activity: a technology acceptance model approach", *British Journal of Educational Technology*, Vol. 43 No. 1, pp. 71-84.

Foasberg, N.M. (2011), "Adoption of e-book readers among college students: a survey", *Information Technology and Libraries*, Vol. 30 No. 3, pp. 108-128.

Foasberg, N.M. (2014), "Student reading practices in print and electronic media", *College and Research Libraries*, Vol. 75 No. 5, pp. 705-723.

Hilton, J. III, Robinson, T.J., Wiley, D. and Ackerman, J.D. (2014), "Cost-savings achieved in two semesters through the adoption of open educational resources", *The International Review of Research in Open and Distance Learning*, Vol. 15 No. 2, available at: www.irrodl.org/index.php/irrodl/article/view/1700 (accessed February 11, 2015).

Howard, J. (2012), "Flat world knowledge to drop free access to textbooks", *The Chronicle of Higher Education*, available at: http://chronicle.com/blogs/wiredcampus/flat-worldknowledge-to-drop-free-access-to-textbooks/40780 (accessed January 15, 2013).

Internet2 (2012), "eTextbook spring 2012 pilot: final project report", available at: www.internet2.edu/media/medialibrary/2013/10/07/eText-Spring-2012-Pilot-Report.pdf (accessed October 30, 2014).

Jeong, H. (2012), "A comparison of the influence of electronic books and paper books on reading comprehension, eye fatigue, and perception", *The Electronic Library*, Vol. 30 No. 3, pp. 390-408.

Johnson, G.M. and Buck, G.H. (2014), "Electronic books versus paper books: pre-service teacher preference for university and recreation reading", *International Journal of Humanities, Social Sciences and Education*, Vol. 1 No. 8, pp. 13-22.

Kang, Y.Y., Wang, M.J.J. and Lin, R. (2009), "Usability evaluation of e-books", *Displays*, Vol. 30 No. 2, pp. 49-52.

Kline, E. and Williams, B. (2008), "Managing users' expectations of e-books", *The Acquisitions Librarian*, Vol. 19 Nos 3-4, pp. 409-415.

Lyons, C. and Hendrix, D. (2014), "Textbook affordability: is there a role for the library", *The Serials Librarian*, Vol. 66 Nos 1-4, pp. 262-267.

Robinson, S. (2011), "Student use of a free online textbook", *Academy of Educational Leadership Journal*, Vol. 15 No. 3, pp. 1-10.

Shelburne, W.A. (2009), "E-book usage in an academic library: user attitudes and behaviors", *Library Collections, Acquisitions, and Technical Services*, Vol. 33 Nos 2-3, pp. 59-72.

Sheppard, J.A., Grace, J.L. and Koch, E.J. (2009), "Evaluating the electronic textbook: is it time to dispense with the paper text?", *Teaching of Psychology*, Vol. 35 No. 1, pp. 2-5.

Shih, B.Y., Shih, C.H., Li, C.C., Chen, T.H., Chen, Y.H. and Chen, C.Y. (2011), "Elementary school students acceptance of lego NXT: the technology acceptance model, a preliminary investigation", *International Journal of Physical Sciences*, Vol. 6 No. 22, pp. 5054-5063.

Shroff, R.H., Deneen, C.D. and Ng, E.M. (2011), "Analysis of the technology acceptance model in examining students' behavioural intention to use an e-portfolio system", *Australasian Journal of Educational Technology*, Vol. 27 No. 4, pp. 600-618.

Simba Information (2012), *etextbooks and Multimedia in Higher Education 2012*, The Market Publishers Ltd., Rockville, MD, available at: www.simbainformation.com/eTextbooks-Multimedia-Higher-7114152/ (accessed April 3, 2013).

Sun, J., Flores, J. and Tanguma, J. (2012), "E-textbooks and students' learning experiences", *Decision Sciences Journal of Innovative Education*, Vol. 10 No. 1, pp. 63-77.

Terpend, R., Gattiker, T.F. and Lowe, S.E. (2014), "Electronic textbooks: antecedents of students' adoption and learning outcomes", *Decision Sciences Journal of Innovative Education*, Vol. 12 No. 2, pp. 149-173.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003), "User acceptance of information technology: toward a unified view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425-478.

Further reading

Allen, N. (2009), "High tech textbooks: a snapshot of student opinions", The Student PIRGs, available at: www.washpirgstudents.org/sites/student/files/resources/high-tech-textbooks.pdf (accessed February 11, 2015).

Hilton, J. III and Wiley, D.A. (2010), "A sustainable future for open textbooks? The flat world knowledge story", *First Monday*, Vol. 15 No. 8, available at: http://firstmonday.org/ojs/index.php/fm/article/view/2800/2578 (accessed February 11, 2015).

Parsons, K.M. (2014), "What are they thinking? Dental assisting students' feelings about e-books", *TechTrends*, Vol. 58 No. 2, pp. 78-86.

Reynolds, R. (2011), "Have digital textbooks reached the tipping point in higher education?", working paper, Xplana, available at: http://info.xplana.com/report/pdf/Xplana_Whitepaper_2011.pdf (accessed February 11, 2015).

Woody, W.D., Daniel, D.B. and Baker, C.A. (2010), "E-books or textbooks: students prefer textbooks", *Computers and Education*, Vol. 55 No. 3, pp. 945-948.

About the authors

David James Johnston is an Information Services Librarian and Scholarly Communications Coordinator at the University of Windsor. His research interests include digital publishing and emerging methods of scholarly communication. David James Johnston is the corresponding author and can be contacted at: djohnst@uwindsor.ca

Selinda Adelle Berg is a Librarian at the University of Windsor and concurrently she is completing her PhD in Library and Information Studies at the Western University. Her research interests include the development of professional identity in library and information, as well as health care, professionals.

Karen Pillon is the Head of Access Services at the University of Windsor. Her main research explores the relationship between decision making and empowerment at service points.

Mita Williams is a User Experience Librarian at the University of Windsor. Her research interests includes the exploration of location-based search and services.