Evidence Based Library and Information Practice

Research Article

Academic E-book Usability from the Student's Perspective

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Abstract

Objective – This article describes how librarians systematically compared different e-book platforms to identify which features and design impact usability and user satisfaction.

Methods – This study employed task-based usability testing, including the "think-aloud protocol." Students at the University of Colorado Boulder completed a series of typical tasks to compare the usability and measure user satisfaction with academic e-books. For each title, five students completed the tasks on three e-book platforms: the publisher platform and two aggregators. Thirty-five students evaluated seven titles on nine academic e-book platforms.

Results – This study identified each platform's strengths and weaknesses based on students' experiences and preferences. The usability tests indicated that students preferred Ebook Central over EBSCO and strongly preferred the aggregators over publisher platforms.

Conclusions – Librarians can use student expectations and preferences to guide e-book purchasing decisions. Preferences may vary by institution, but variations in e-book layout and functionality impact students' ability to successfully complete tasks and influences their affinity for or satisfaction with any given platform. Usability testing is a useful tool for gauging user expectations and identifying preferences for features, functionality, and layout.

Introduction

Librarians select materials based on a variety of criteria such as content, format, availability, and cost (Anson & Connell 2009; Roncevic 2013). It is assumed and expected that the content of a book does not vary because it is published in cloth or paperback. Electronic books challenge this expectation. While some e-books replicate the content and presentation of their print equivalents, others transform the initial work into something that hardly resembles the print version (Kichuk, 2015; Wiersma & Tovstiadi, 2017). Technical limitations and design choices on different e-book platforms create variations in the presentation, layout, and even content. These variations often go unnoticed because they are not obvious without direct comparison and evaluation.

In 2015, librarians at the University of Colorado Boulder tested thirty-four elements that are important to usability and the end-user experience and identified inconsistencies between e-book platforms, such as layout, navigation, metadata, and search results (Wiersma & Tovstiadi, 2017). This study builds on previous research by exploring some of those elements from the user's perspective. Students examined the same title on three different platforms and completed a series of tasks to compare the usability and measure user satisfaction with each platform. Through this study we gained a greater understanding of student expectations and preferences that can be used to guide e-book purchasing decisions.

Literature Review

E-Book Usability Issues Identified by Librarians

There is no shortage of articles in the literature admonishing the poor usability of academic e-book platforms. Bivens-Tatum (2014) described the various platforms as a "vast array of substandard choices," noting that restrictions on use often cause patrons to give up on using e-books (para. 3). Digital rights management (DRM) and restrictions on downloading, printing, and saving e-books for offline use or for future reference are frequently cited explanations for the low acceptance of the medium (Slater, 2010; Thomas & Chilton, 2016).

Library Journal's *E-book Usage in U.S. Academic Libraries* (2012) provided the librarian's standpoint about e-book usability. The survey

results revealed issues such as a "complex downloading process" and "difficult to read on screen/online" as some of the top barriers to e-book usage (p. 8). These issues persisted in the 2016 survey, alongside problems such as "platform not user friendly" and "can't read offline or download" (Library Journal, p. 47).

Mune and Agee (2015) developed a template for evaluating different platforms by function, including navigation, offline availability, and full-text searching. While their study focused on accessibility as related to users with print disabilities, they found that "Single publisher platforms (such as Gale, Palgrave, and Springer) appear to offer more features and have more flexibility overall compared to aggregators (such as ProQuest and ACLS Humanities) that include books from a variety of publishers in their collections" (p. 222).

Cataldo and Leonard (2015) compared 14 e-book platforms, and studied seven common features including format; user accounts; personal bookshelves; mobile accessibility; and the ability to annotate, download, and print. In addition to variation among platforms, they also found variation within aggregator platforms due to publisher restrictions. While user preferences may vary, they concluded that "It is crucial to understand the needs of your patrons, and more specifically on how the features, functionality and accessibility of the e-books meet those needs" (Conclusion section, para. 2).

One the largest studies, the JISC national e-books observatory project, analyzed e-book use in more than 120 universities in the United Kingdom and concluded that there was a strong need for e-book platforms that are designed with usability principles (2009). The call for consistent design is echoed throughout the literature (Hobbs & Klare, 2016; Muir & Hawes, 2013) as is the call for improved usability (Slater, 2010).

E-book Usability Issues Identified by Users

A number of usability studies have been conducted on academic e-book platforms. Carter, et al. (2013) used a survey to identify engineering students' attitudes towards and experiences with e-books, finding that students expressed a number of concerns, including issues with navigation, format, printing, and downloading.

Using the think-aloud method, Berg, Hoffman, and Dawson (2010) compared a set of e-books with the print counterparts. The researchers instructed 20 undergraduate participants to complete information retrieval tasks using both print and e-books. Students used different navigation and search strategies depending on format, and their expectations for e-book functionality were unmet.

A mixed-methods study by Zhang, Niu, and Promann (2017) included a task-based usability test of 12 participants, including undergraduates, graduate students and faculty members. The user tests and follow-up survey call for improved consistency among e-book platforms since platforms that do not follow general web conventions appear to require more effort from the user.

O'Neill (2009) compared the usability of ebrary, EBL, and MyiLibrary using task-based methodology with 10 undergraduates and graduates. The study identified a number of common usability issues with e-books, including functionality such as printing and navigation. Muir and Hawes (2013) observed 14 undergraduate physics students interact with two e-books on the NetLibrary and MyiLibrary platforms. Their findings support previous studies by highlighting issues with navigation and searching. In addition, the researchers developed a set of desired e-book features based on user needs.

This study builds on the work of previous studies by examining a greater number and additional types of platforms and suggesting that librarians can use test results as evidence to inform selection and purchase decisions. Further, this study goes beyond determining whether e-book platform features exist, it evaluates how usable they are from the student perspective.

Aims

The aims of this study are to:

- Identify specific functionality and features that students prefer on e-book platforms
- Understand how differences in e-book platforms impact the user experience
- Describe how librarians can factor user experience into the selection of e-books

Methodology

Usability testing is a method of evaluating a product or service by testing it with a representative group of users. "The goal is to identify any usability problems, collect qualitative and quantitative data and determine the participant's satisfaction with the product" (U.S. Department of Health & Human Services, 2018). In this study, the authors observed students as a representative group of academic e-book users. After receiving IRB approval for human subjects research, they posted information about the study in an online campus newsletter and the library's social media channels and offered students a $10 Amazon gift card for completing the study. They recruited one doctoral, one masters, and three undergraduates to test each title. Although five students is a small sample of the entire student population, according to the Nielsen Norman Group, "test[ing] 5 users lets you find almost as many usability problems as you'd find using many more test participants" (Nielsen, 2012). This convenience sample of students was further limited to select students who had majors related to the subject of the sample title in order to replicate an authentic experience that an individual student might have with an e-book.

This study used "task-based usability," a technique where users complete typical tasks on a website while an observer records if and how they were able to accomplish the task. During the test, students completed tasks on three e-book platforms. The tasks mimicked behaviour that students might naturally exhibit while using an e-book, such as printing, downloading, searching within the book, and navigating to a specific page. For the tasks, see the Appendix. We observed their actions and noted whether, as well as how, they completed the tasks. Using the "think-aloud protocol," students were asked to verbalize their thoughts and expectations. This enabled the researchers to compare the actual results with students' expectations in order to measure user satisfaction with the product. The authors took notes about each test and recorded the audio and on screen navigation.

The authors used a convenience sample of e-books that were available on Ebook Central, EBSCO, and a publisher platform. The library acquired access to the sample titles on additional platforms as needed.

For each title, five students completed the tasks on three platforms: the publisher platform and two aggregators. The order in which the platforms were tested was randomized, in order to temper the potential bias of consistently testing one platform first or last, and students completed all of the tasks on one platform before moving onto the second and third.

After the tasks were completed on each platform, students ranked the platforms in order of preference, using physical printouts of the e-book landing pages as references. This gave students an opportunity to compare the platforms and provide additional feedback.

Results

In each usability test, the student completed a series of tasks on each of three platforms. Results from each of the tasks are described below. Altogether 35 students (21 undergraduates, 7 masters, 7 doctoral) tested sample titles on seven publisher (Brill, Cambridge, Duke, Oxford Scholarship Online, Springer, Science Direct, and Wiley) and two aggregator platforms (EBSCO and Ebook Central). At the end of the test, students were asked to rank the three platforms in order of preference. Sixty percent of students rated Ebook Central as their preferred platform, followed by EBSCO (26%) and individual publisher platforms (14%).

Task 1: Evaluating the Landing Page

The usability tests started on a landing page, which is typically the first page that a user sees when they click on a link to an e-book from a search engine, the library catalog, or a discovery layer. We asked students what they expected to see on this type of page and what information was most useful. Most students expected to see the basic bibliographic elements needed to cite a book (e.g., title, author, and publication information) as well as a brief summary or abstract. Some students expected an ISBN or DOI, which they indicated was helpful for citing a book or figuring out which edition they were using. While most platforms provide all of this information, the placement on the page and order in which it was presented varied.

Task 2: Evaluating the Bibliographic Information

When students were asked how they interpreted the bibliographic information (title/subtitle, authors, dates, keywords/subject headings) on the landing page it seems likely that students would accept the bibliographic information presented at face value and not question its accuracy. As they navigated between platforms, students understood each of these components individually but were puzzled when the information for the same book varied on different platforms. Some students pointed out discrepancies in the metadata for publication dates, subtitles, and author information when it varied by platform. These discrepancies would likely have gone unnoticed but were obvious when students were asked to identify and interpret this information on each platform.

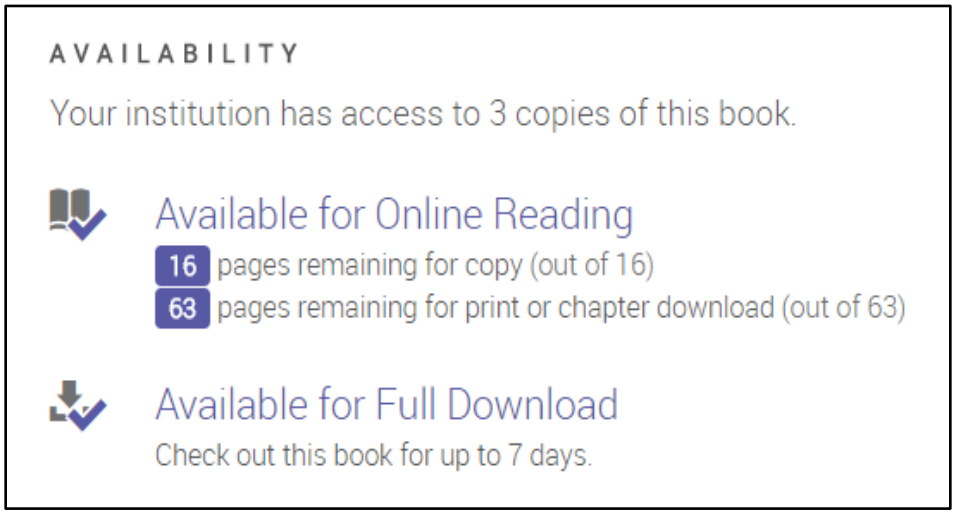

Figure 1
Availability on ProQuest Ebook Central.

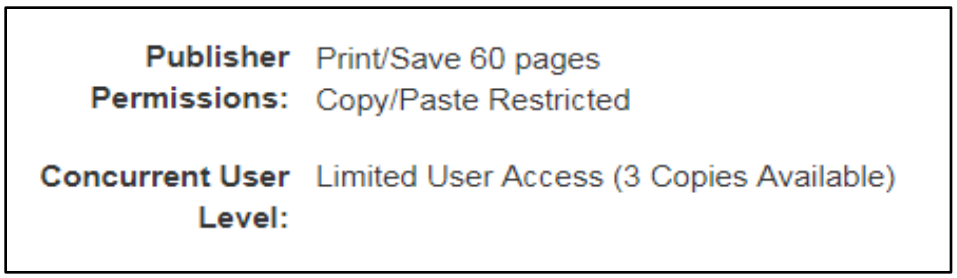

Figure 2
Concurrent user level on EBSCO.

Some of the students noticed the subject terms but were not impressed unless they were hyperlinked and more descriptive than just repeating words in the title of the book. Most students were unfamiliar with library jargon like "LC Subject Headings," but they generally understood that keywords and categories were meant to describe the book. Some users indicated that they would skim through a summary or book description to help them decide if it was appropriate for their research, but most people assumed that if they ended up on this page, it was because they already knew that they needed this book.

Students wanted information about the availability of the book, but almost all of them misinterpreted the information that described the permitted number of simultaneous users or the number of copies. For example, Ebook Central and EBSCO included information about availability based on the type of license that the library purchased (see Figures 1 and 2).

While a librarian might interpret that "access to 3 copies of this book" refers to a license that allows three users to access the e-book simultaneously, many students misinterpreted the number of available online copies as the number of print copies they could find in the library. This was particularly misleading because our library typically does not purchase books in multiple formats, and so it is very unlikely that we would have both an e-book and print copy, much less multiple print copies.

Task 3: Finding and Using Citation Tools

Next, we asked students to interact with some of the information on the landing page. We asked them how to cite the book using any available tools or information, using the prompt: "You need to cite this book for your paper. How would you use this page to do that?" A native citation generating tool is one of the features that is referenced as being a benefit or expected feature of e-books (Cassidy, 2012). Many students noticed the native citation generator immediately. Some of the students were introduced to the native citation generator while interacting with the first of three platforms, then learned to look for a similar tool on subsequent platforms. Although a majority of the students were able to find the citation tools easily on the aggregator platforms, consistent naming and use of icons between platforms would improve usability.

We encountered two kinds of native citation generating tools, which may account for some of the inconsistency in labeling the tool. In one type (cite), the citation is displayed on demand in one of several citation styles for the user to copy and paste as needed. The other variety (export) is a downloadable file for use with a bibliographic management tool such as EndNote, Zotero, BibTeX, or RefWorks. Some of the platforms included both kinds of tools. The platforms that offered one generally offered the download version, although sometimes they provided a plain text download option, which could then be opened in a tool like Notepad and

Table 1
Finding Citation Tools

Platform	Found Citation Tools Easily	Found After Some Time/ With Some Difficulty	Did Not Find
Brill (n=5)	20% (1)	20% (1)	60% (3)
Cambridge (n=5)	60% (3)	20% (1)	20% (1)
Duke (n=5)	40% (2)	-	60% (3)
Ebook Central (n=33)*	58% (19)	9% (3)	33% (11)
EBSCO (n=32)*	56% (18)	3% (1)	41% (13)
Oxford Scholarship Online (n=4)*	25% (1)	25% (1)	50% (2)
Science Direct (n=5)	20% (1)	40% (2)	40% (2)
Springer (n=5)	-	-	100% (5)
Wiley (n=5)	-	40% (2)	60% (3)

*Data was not available for some students.

then copied and pasted. Students reacted much more positively to the versions that showed the citation without having to open another program or download any files, even when the style they commonly used was not on the list.

In completing this task, students mentioned a variety of other tools for creating or managing citations. Popular programs included Easybib, Citation Machine, Knight Cite, Mendeley, and Zotero. In several cases, the students explained that they would Google either the title or the ISBN number along with "cite." Whether they would use the native tool or another means, many students in this study also mentioned the importance of including all the elements needed to cite manually the e-book on the landing page.

Task 4: Navigating to a Specific Chapter or Page Number

Next, the students were asked to navigate to a specific chapter and page number. This task was designed to observe how students preferred to navigate through an e-book (e.g., using linked table of contents, searching, or scrolling) and if they were able to find the correct page. The majority of students (69%) found the correct page easily. Most students used the linked table of contents from the landing page or in the navigation pane of an e-book reader, but they were frustrated when it was not linked in the PDF versions. Many students also used the page number box to "jump" to a specific page when that feature was available.

Table 2
Success Navigating to a Specific Page

Platform	Found Appropriate Page Easily	Found with Some Difficulty	Did Not Find
Brill (n=5)	-	100% (5)	-
Cambridge (n=5)	40% (2)	60% (3)	-
Duke (n=5)	80% (4)	20% (1)	-
Ebook Central (n=32)*	72% (23)	22% (7)	6% (2)
EBSCO (n=31)*	74% (23)	23% (7)	3% (1)
Oxford Scholarship Online (n=4)*	75% (3)	25% (1)	-
Science Direct (n=5)	100% (5)	-	-
Springer (n=5)	60% (3)	40% (2)	-
Wiley (n=4)*	75% (3)	25% (1)	-

*Data was not available for some students.

Some students scrolled within the reader to find a specific page. Sometimes scrolling was preferable to jumping from page to page, and other times it was necessary because the e-book did not include page numbers. Some downloaded the entire book and navigated within the downloaded file. For some platforms, it was necessary for students to go back to the landing page and then open the PDF of the correct chapter. A few students noted that page numbers that were displayed in the PDF reader did not always match the page number printed on the page. If they struggled to find the correct page, students often used creative solutions to find it. Although frustrating, students seemed to tolerate these inconsistencies if they had experienced them before.

Students also struggled to find the appropriate page when the platform did not display page numbers, such as the EPUB version of e-books in Ebook Central and EBSCO. If students are unable to locate a specific page in an e-book this might prevent them from successfully completing an assigned reading, locating a cited reference, or creating a citation. Platform design played a major role in students' ability to complete this task, and they preferred platforms that included linked tables of contents, the ability to "jump" from page to another, and clearly displayed page numbers.

Task 5: Finding and Using Annotation Tools

Next, we invited students to interact with the text by employing available annotation features. We asked students, "As you are reading, you want to take notes for your class. Would you do that here in the e-book? If so, how?" At the time of testing, annotation tools such as highlighting and note taking were only available on the aggregator platforms.

We rated the ease with which our testers found the annotation tools on a scale of 1 to 3, with 3 being "found easily" and 1 being "did not find." Students had an easier time finding annotation tools in Ebook Central than EBSCO, with 63% (23) finding the tools easily in Ebook Central (n=32) compared to 11% (4) in EBSCO (n=32). This may be due to the placement of the "My Notes" link in EBSCO or to the multiple ways of accessing the tools in Ebook Central (see Figures 3 and 4).

The annotation tools within the Ebook Central platform were easy for our users to find and use, especially the highlighting tool. Ebook Central situated its annotation tool icons (highlight, add note, and bookmark) in the toolbar at the top of the reading pane (see Figure 4). Additionally, when a user selected a section of text within the reading pane, a popup emerged with options for copying or highlighting the selection as well as an option to add a note.

The annotation tools in the aggregators led to popups about creating an account. Due to the way the task scenarios were ordered, this may have been the user's first encounter with the need to create an account on the platform in order to fully use the available tools. Students were quick to close the popup window, often without a pause to read closely. One student said about creating accounts in Ebook Central, "Unless I was really desperate for what they had in here, I would probably see if I could find it on any other source that didn't require me to sign up." This sentiment was echoed in various ways across many of the tests.

Students had pre-existing habits and strong preferences for note-taking that influenced their response to this question. Many students said that they would prefer to download the PDF and highlight or annotate within the PDF file or on a printed copy of the file. Some of the alternative note-taking options students noted included a physical notebook, Evernote, Google Keep, Mendeley, a Word document, or text files. They expressed some interest in the tools, particularly the highlight tool found in Ebook Central; however, very few of the students we tested (17%) affirmed that they would likely use the annotation tools, expressing concern about the long-term availability of the notes they take or having to create an account to take or keep notes. Although commonly indicated as an important feature, some studies report that students may not take advantage of these tools (JISC, 2009; Muir & Hawes, 2013).

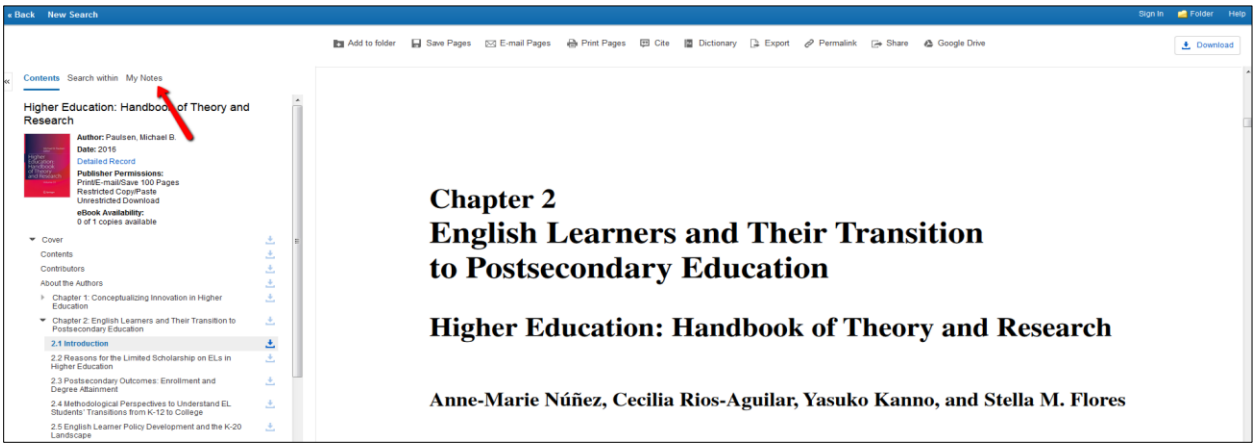

Figure 3
"My Notes" link in EBSCO.

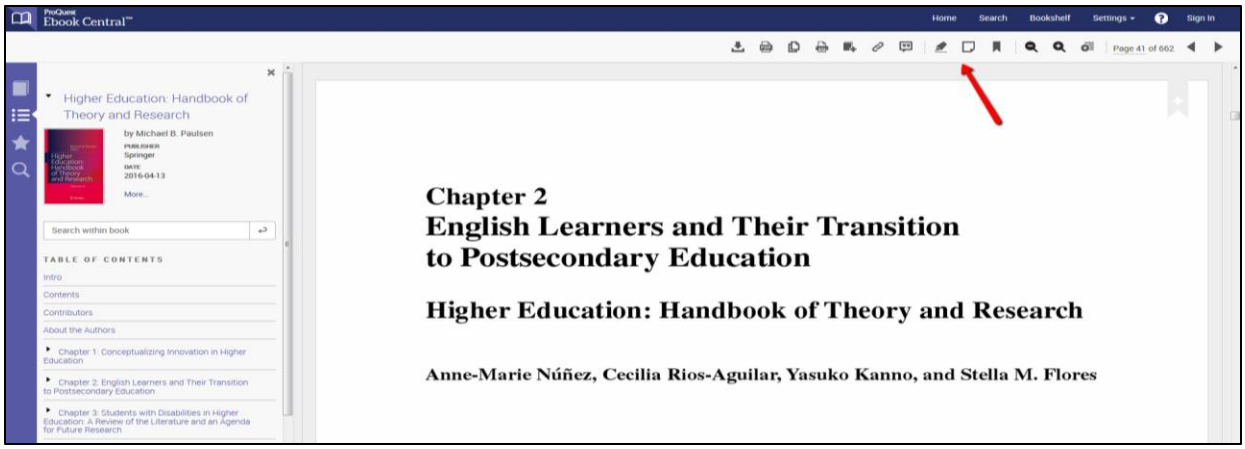

Figure 4
Annotation tools in Ebook Central.

Task 6: Searching and Evaluating Results

Next, we asked students to find information on a specific topic within the e-book. We didn't want to lead them to use the search tool, rather we wanted to understand how they naturally looked for content in e-books. Previous studies found that students use multiple navigation strategies to locate information in e-books, such as searching, navigating the table of contents or index, or scrolling through pages (Muir & Hawes, 2013). In our study, most students employed multiple search strategies throughout the test but generally used more on the first platform and fewer on the last platform. On the first platform they tested, 63% of students responded to this question by searching for the topic within the book, either using CTRL+F (12 students) or the e-reader searching tools (10 students). Thirteen students started with either the index or the table of contents (TOC). Of those who started with the index or TOC on the first platform, on subsequent platforms all 13 students started by searching instead of using the index. All students were asked to use the search feature even if that was not their first choice for finding information within the e-book.

A surprising number of students tried keyboard shortcuts instead of the search box on the platform. Over half (54%) of students used CTRL+F to search for a term in the book at least once during the testing, but they experienced varying levels of success. Generally, students employed different search strategies on subsequent platforms based on the results from the first platform. If CTRL+F did not work on the first platform, students might continue to try it on subsequent platforms, but they also tried other search mechanisms.

By the third platform, the majority of students (63%) used only one strategy: searching through the e-book's reader tool or using CTRL+F. They may have done this because they realized that the librarians would ask them to search as part of the test, or they may have done this because they realized that searching was more efficient and effective than other strategies.

The fact that students modified their information-seeking strategy from the first platform to the last platform suggests that they learned as they interacted with e-books. On the first platform, students exhibited a wider range of information seeking behaviour and often took more time to look for tools or complete tasks than on subsequent platforms. For example, many students did not consider searching for a

term in the first e-book, but by the last platform, nearly every student opted to search within the e-book rather than try a different strategy, such as using the table of contents or the index.

Table 3
How Students Would Find Specific Information in a Book

Strategy	**Number of Students/Sample Size**
CTRL+F (keyboard shortcut)	19/35
Looking in the Index	11/35
Looking in other parts of the book (Chapter titles, preface, etc.)	3/35
Looking in the Table of Contents	11/35
Searching using the platform or reader's search tool*	35/35

*Librarians prompted students to search if the students did not search on their own.

How many search results did you expect?

Along with the task of searching within the e-book using the platform's search feature, we asked students to evaluate the following: how many search results they expected, how the results were ranked, and what they expected to see if they clicked on a result. Many students guessed or had an idea of how many results to expect based on the number of results from previously tested platforms. Some students (16) indicated some expectation that the number of results should be similar across all platforms, indicating on the second or third platform an expectation that the number of results be similar to the number they encountered on the previous platform(s).

It was difficult for some students to estimate how many search results to expect if the subject matter of the book was outside of their field. The authors attempted to have students test a sample title related to their academic discipline, but it was difficult to offer an exact match for each major. Of the 11 students who mentioned being unsure of how many results they expected or said that they had no expectation, five attributed this to their lack of subject knowledge.

How do you think these search results are ranked? Why is this one (point to top one) first?

A majority (74%) of students expressed uncertainty or confusion about how the results were displayed or ranked on at least one of the platforms. This is understandable considering the wide range of search results they encountered during the tests. E-book platforms tend to display search results at the chapter, page, or keyword level. Students seemed to understand that keyword-level search results listed each time a keyword appeared in the text. Keyword results were overwhelming when the search term appeared more than a few times in the text and the students had to scroll through dozens of results.

Chapter-level results were confusing because the search term was not always highlighted or included in the search results, so it was difficult to understand why each result was a good match. Most students appreciated when the search results displayed a snippet of text that surrounded their search term and ideally also highlighted or bolded their search term. This helped them quickly identify the keyword and provided helpful context to determine the best match(es). Students were also frustrated if after navigating to the appropriate chapter, their search term was not indicated within the text.

Students were also confused by some of the default sorting options. Most students (63%) expected or believed that search results would be displayed in the order in which they appear in the book. Some students (26%) were able to figure out relevance ranking, but many were confused when results were not displayed in "chronological" or "page number order". Students were confused when a platform displayed a list of pages or chapters out of order in order to represent relevance.

Ebook Central had the most intuitive display because search results were grouped within each chapter and relevance was indicated by a bar graph that clearly represented term frequency. At the time of testing, EBSCO's platform did not provide an overall number of keyword results nor did it give another option for sorting results, which made it very difficult for users to interpret which results were most relevant.

Where do you expect to go when you click on this search result?

Most students expected that their search term(s) would be highlighted in the results (74%) and that clicking on a result would link them to the part of the page, or at least the page in general, where that term appeared (60%).

Task 7: Printing, Saving, and Downloading

A surprising number of students (40%) tried to use keyboard or mouse shortcuts, such as Ctrl+P or right-clicking, to print, save, or download. The majority of these students tried these strategies on the first platform and abandoned after they didn't work. Unfortunately, these types of commands do not work on the majority of platforms. Based on our findings, e-book platforms should consider making their sites responsive to these commands. At the very least, the platform could respond to a keyboard shortcut by moving the user's cursor to the appropriate icon or link on the website. This would not only improve the user experience for many users who just prefer to use shortcuts, but it may also improve usability for students using screen readers or other assistive technology.

Eventually, almost all students (97%) utilized the e-book reader or PDF printing icons. When asked what they expected to see when downloading the book, most students expected a PDF. Many students remarked positively when the PDF contained a citation, and they particularly appreciated the ability to select the citation style before downloading the PDF.

It was helpful when actions such as printing, downloading, and saving functioned similarly across the platform or, ideally, mimicked functionality on other websites. If a student figured out one process, then it was easier for them to master other processes. Although the outcomes are similar, students were confused when platforms used unclear terminology such as an option to print a "section" rather than a chapter, and they were frustrated by warnings about "exceeding your print allowance" when attempting to download a chapter. Our observations indicated that it is important to present information about printing or download limits at the point of need instead of just listing that information on the landing page. Users need this information within the context of performing an action or when it limits their ability to take action, but otherwise this information is superfluous and confusing.

Both aggregators required students to login or create an account in order to download the entire book, whereas the publisher platforms did not. When prompted to log in by the aggregator sites, most students summarily ignored the pop-up notification and tried to find other ways to print or download the book. A few students tried to subvert the DRM on the aggregators by taking screenshots or saying that they would go to "other sites" or ways of accessing this e-book, even though they understood that it was unethical and illegal to do so.

Table 4
Students Expressing Difficulty Finding Print Options by Platform

Platform	**Percent Expressing Difficulty**
Brill (n=4)*	25% (1)
Cambridge (n=5)	20% (1)
Duke (n=5)	0% (0)
Ebook Central (n=31)*	6.4% (2)
EBSCO (n=33)*	12% (4)
Oxford Scholarship Online (n=5)	40% (2)
Science Direct (n=5)	60% (3)
Springer (n=5)	20% (1)
Wiley (n=4)*	25% (1)

*Data was not available for some students.

Table 5
Students Expressing Difficulty Finding Download/Offline Reading Options by Platform

Platform	**Percent Expressing Difficulty**
Brill (n=5)	20% (1)
Cambridge (n=3)*	33% (1)
Duke (n=5)	80% (4)
Ebook Central (n=31)*	45% (14)
EBSCO (n=32)*	31% (10)
Oxford Scholarship Online (n=5)	20% (1)
Science Direct (n=5)	0% (0)
Springer (n=5)	0% (0)
Wiley (n=4)*	25% (1)

*Data was not available for some students.

Table 6
Of the Three Tested, Which Platform is Your First Preference?

Platform	Number of Students
Brill (n=5)	0
Cambridge (n=5)	1
Duke (n=5)	0
Ebook Central (n=35)	22
EBSCO (n=35)	8
Oxford Scholarship Online (n=5)	1
Science Direct (n=5)	1
Springer (n=5)	1
Wiley (n=5)	1

Task 8: Which Platform Would You Prefer to Use?

The final task asked students to rank the platforms in order of preference, using physical printouts of the e-book landing pages as a reference. Of the students studied, 60% rated Ebook Central as their preferred platform, followed by EBSCO (26%) and individual publisher platforms (14%). Some of the characteristics that distinguished Ebook Central were the intuitive layout of the search results including the bar graph that indicated whereand how many search results were included in each chapter and the clearly visible icons and menus that made it easy to accomplish tasks such as printing and downloading.

In general, students preferred the platforms that offered full-text searching, identified the number of search results, highlighted search terms within the results, and presented search results in an intuitive order (either relevancy or the order in which they appear in the book). They also preferred platforms that allowed them to easily highlight in multiple colors. Students had mixed opinions about the reading pane layout of most aggregators but seemed to prefer the toolbars in both aggregators because the icons clearly identified the tools that students needed most (e.g., printing and downloading). They also expressed varying opinions about platforms that prompted them to login or create an account in order to print, download, or save content.

Discussion

In addition to learning about students' preferences for features and functionality, we also learned that they are quick to blame themselves when things do not work as expected. Regardless of whether it was a system error or user error, many students assumed that lack of functionality was somehow related to their limited knowledge about the subject of the book or unfamiliarity with the platform. On the other hand, when a platform was more intuitive to use, students were happy to demonstrate how to use the site and seemed more assertive in their comments. This was perhaps the strongest evidence that platform design impacts user experience and that librarians need to understand how platforms vary in order to purchase content on platforms that optimize user experience.

Study Limitations and Recommendations for Further Research

Although the usability testing revealed local user preferences, the results are not generalizable to all students. The convenience sample of students who participated in the study may not represent our larger student population in terms of previous e-book experience or fields of study. The majority of students in the convenience sample were from STEM (science, technology, engineering, or math) majors, and we recognize that these

students might use e-books differently than other disciplines. We also know that many of the participants had some experience with e-books prior to the study. We collected information regarding prior e-book use in a pre-screening survey but were unable to use this information because the pre-screening survey did not include a consent form. Both areas would be interesting areas for further research.

There are many ways to identify usability problems and measure user satisfaction. This study used the think-aloud protocol and task-based usability. While these techniques are designed to produce qualitative and quantitative data, there are limitations and room for error in their application. For example, task-based usability is predicated on an observer leading the user through a script of predefined tasks, but it is difficult not to deviate from the script in order to follow the subject's flow of information seeking behavior. The study was also limited by the tasks that we asked students to complete. We tried to create tasks that mimic what we thought was typical student behavior, and that may have skewed our results. For example, we did not ask students to download the entire e-book, although if we had, we hypothesize that fewer students would prefer the aggregator platforms. Likewise, the testing environment was based on a false need for information. Students may have behaved or answered differently if the need was real and attached to an outcome that mattered to them, such as a grade on an assignment.

The think-aloud protocol also has certain limitations. Some students respond more naturally to verbal communication; others might have given us different answers if they were asked to respond in writing. Some students may also have been influenced by the perceived "power dynamics" of a faculty librarian and student relationship. This was mitigated by the consent form and the script that assured students that this wasn't "a test of your knowledge, and there are no right or wrong answers." However, their responses might have been skewed towards what they thought the librarian wanted to hear.

Finally, the students' ranking of e-book platforms was limited to the platforms that they examined. Because more students examined the aggregators than the publisher platforms, the results regarding the aggregators are arguably more valid. If students had been asked to test a different publisher platform, it may have changed their opinion relative to the aggregators that they tested. However, since most books are only available on a publisher and one or more aggregator platforms and not different publisher platforms, the comparison between publisher and aggregator platforms remains the most relevant finding rather than comparing one publisher platform to another.

Conclusion

There are relatively small differences between major e-book aggregators in terms of cost, content, and coverage. As such, user feedback about their preferred platform was critical to selecting a default option for the library's approval plan and demand driven e-book programs. This study identified strengths and weaknesses of academic e-book platforms based on students' experiences and preferences. These characteristics can be used alongside other factors such as pricing and accessibility when selecting a title that is available on more than one platform.

The results of the usability tests in this study indicated a preference for Ebook Central over EBSCO and a strong preference for the aggregators over publisher platforms. We expected that students would prefer the publisher platforms because those platforms rarely impose limits on printing and downloading. Students in this study, however, struggled to navigate the publisher platforms and the overall perception was that they are not as easy to use as aggregators with clearly defined menus and icons. This suggests that students value usability and are even willing to

accept some printing and downloading restrictions in exchange for an intuitive, user-friendly platform. Although students will find a way to access the materials they need, all e-book providers should follow usability design principles that serve the needs of students.

This study explored students' information seeking behaviour on e-book platforms and identified features and functionality that students prefer on these platforms. It confirmed the results of many previous studies that found that usability issues influence user perceptions and success rates using e-books. Until we are able to build completely intuitive resources, having a better understanding of user expectations will help us select books on the platforms that best meets user expectations.

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Appendix

Usability Tasks

1) Task 1: Evaluating the E-Book Landing Page (landing page, title bibliographic info, native reader)
    a) Have you ever seen this webpage before?
    b) What information do you expect to see here?
        i) What information is most helpful?

2) Task 2: Evaluating the Bibliographic Information
    a) Did you notice this date? What does this date mean to you? (any date on landing page; publication or otherwise)
    b) Why do you think these names are here (point to authors, editors, etc. names)?
    c) Did you notice these? (point to subject terms). What do these mean to you?

3) Task 3: Finding and Using Citation Tools
    a) You need to cite this book for your paper. How would you use this page to do that?

4) Task 4: Navigating to a Specific Chapter or Page Number
    a) How would you start reading the e-book from this page?
    b) What do you expect to see when you click on this (read e-book, open e-book, etc.;)?
    c) Your professor told you to start reading at chapter ##. It starts on page ##. Starting from this page, how would you do that?

5) Task 5: Finding and Using Annotation Tools
    a) (after they navigate) As you're reading, you want to take notes for your class. Would you do that here in the e-book? If so, how?

6) Task 6: Searching and Evaluating Results
    a) You need to find information on _____ in this book. How would you do that? [If searching is not their first response, prompt them to search within the book]
    b) [Note how many results]
    c) How many search results did you expect?
    d) How do you think these search results are ranked? Why is this one (point to top one) first?
    e) Which search results are more useful?
    f) Where do you expect to go when you click on this search result?

7) Task 7: Printing, Saving, and Downloading
    a) You want to print this page to read later. How would you do that?
    b) You want to save this chapter to read later. How would you do that?
        a. What would you expect to see if you downloaded the book?

8) Task 8: Which Platform Would You Prefer to Use?
    a) Now that you have seen 3 different versions of this book, which would you prefer to use? [the student will be given three print-outs; one showing a screenshot of each landing page of the e-books that they used during the testing.]
    b) Rank the versions in order of preference.