Smartphone Use on an Academic Library Website Featuring Responsive Web Design

Brian Rennick, Brigham Young University
Xin Wang, University of North Texas
Holt Zaugg, Brigham Young University
Vera Terekhova, Brigham Young University

Abstract
Responsive web design (RWD) allows a single website to support multiple screen sizes. By using a single-site approach instead of maintaining separate full-size and mobile websites, smartphones can access all website features instead of a subset. This study examined smartphone use of a new academic RWD library website to find out which features are used on small devices. An intriguing finding was that five of the top smartphone features (search bar, library hours, my account, room reservation, and floor maps) are all custom web applications that were written in-house and are fully integrated into the RWD. Conversely, several of the least used smartphone features (WorldCat, chat, and eReserve) are third-party applications. In addition, this study found that undergraduate students demonstrated more frequent use and interest in certain website features (e.g., renewal, room reservation, floor maps) than graduate students and faculty members.

1   Introduction

Academic libraries have several options to choose from when developing websites that support smartphones and other mobile devices. A common choice is for libraries to maintain two distinct websites, one for full-size browsers and another for mobile browsers. Another option is the creation of applications that are native to mobile platforms such as Apple iOS or Android. However, both of these approaches have two major drawbacks. First, these approaches require duplication of development effort such as supporting multiple sites or multiple application platforms and may require additional training for computer programmers. Second, creating a simplified mobile website or offering native mobile applications merely provides mobile users with a limited set of web features compared to their full-sized counterparts. To address these issues, a handful of academic libraries have adopted a third option employing a Responsive Web Design (RWD) technique that alters the user experience of a single website to accommodate different types of devices (e.g., smartphone, tablet, laptop/desktop). RWD is a relatively new technique emerging after the year 2010 (Rumsey, 2012). RWD employs Cascading Style Sheets to automatically change the layout of a web page based on the size of the browser viewing area. Instead of supporting multiple websites for different devices, a single, adaptable site is maintained. All of the website features are available on all devices.

In April 2014, Brigham Young University's Harold B. Lee Library (HBLL) launched a new RWD website (see Figures 1 and 2). The designers took a mobile first approach when designing the website because it is more challenging to design a full-featured website for a smaller screen than a large one.
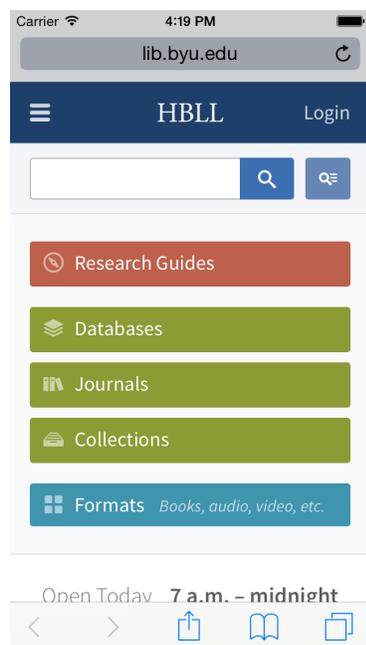
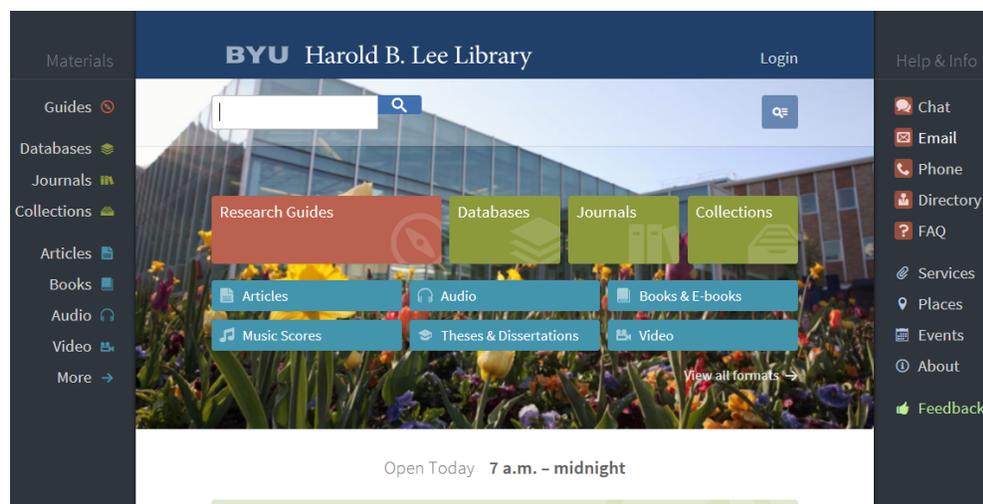Figure 1. An Example of the Homepage Display of the HBLL Website on a Smartphone

Figure 2. An Example of the Homepage Display of the HBLL Website on a Laptop

During the summer of 2014 the HBLL conducted a study regarding the use of smartphones on its full-featured, RWD website in order to better understand user expectations and preferences. This study focuses on answering three main questions:

- RQ1: Do library users access all website features via smartphone? Which web features are used most frequently and least frequently by smartphone?
- RQ2: Are there any associations between user types and the frequency of accessing website features via smart phones?
- RQ3: Are there any associations between user types and interest in using website features via smartphones?

2   Method

This preliminary study, as a part of a broader study about RWD of an academic library website, focused on analyzing and reporting the results through a comprehensive survey study. Before creating the survey, focus groups were conducted to determine which tasks library users performed on the HBLL website using mobile devices. The focus groups involved three groups of undergraduate students, one group of graduate students, and one group of faculty. Each group consisted of five to ten participants. Based on results from the focus groups, data from web statistics, and input from librarians, the assessment team was able to identify twenty (20) main website features/functions to be included on the survey.

A survey was created and sent to different library patrons. After removing those who indicated that they had not visited the new site, 706 valid responses from users were analyzed. The participants that completed the entire survey included 471 (66.7%) undergraduate students, 102 (14.4%) graduate students, and 133 (18.8%) faculty. Frequency of use for website features was measured on a scale of never, sometimes, or often. Interest in using website features was measured on a scale of low, medium, or high.

3   Results

3.1   RQ1: Do library users access all website features via smartphone? Which web features are used most frequently and least frequently by smartphone?

Figure 3 shows that library users used smartphones to access all twenty (20) key website features shown on the homepage of the HBLL website. The top five (5) most frequently used web features via smartphone are search bar, library hours, my account, room reservation, and floor maps. . The least frequently used web features are WorldCat, media equipment, chat, special collections, eReserve, and audio books.
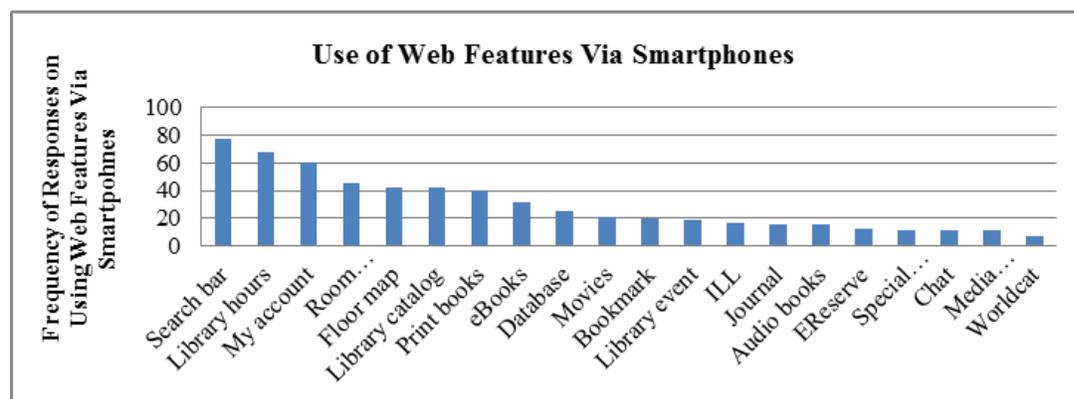

Figure 3. The Frequency of Responses on Using Web Features via Smartphone

3.2   RQ2: Are there any associations between user types and the frequency of accessing website features via smartphones?

To identify whether there are associations between user type and the frequency of using website features, multiple Chi-square analyses were applied. Significant relationships were identified between user type and three (3) web features: room reservation, library hours, and floor maps. The results indicated that undergraduate students were using more of these three web features than faculty members, followed by graduate students (see Figure 4).
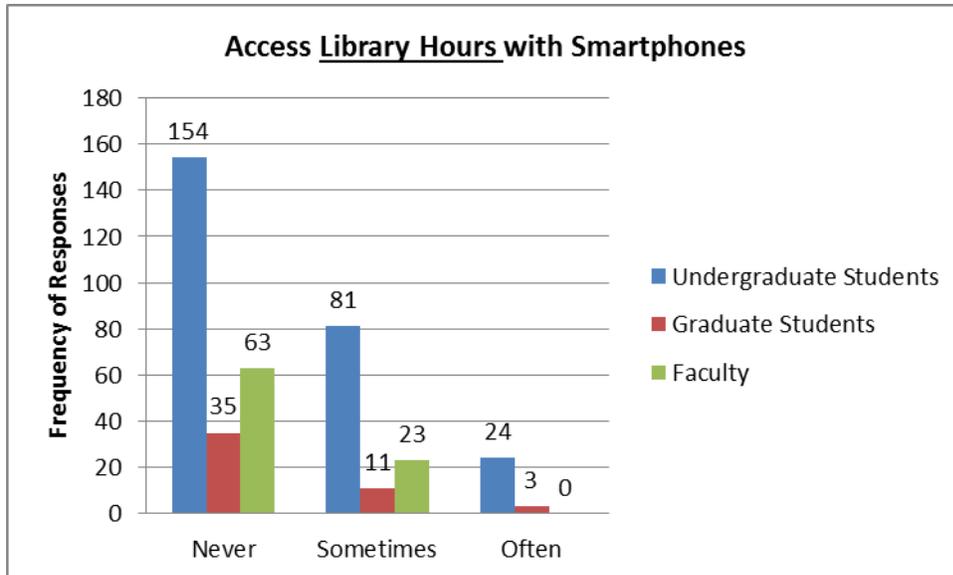
Figure 4. Accessing Information about Library Hours with Smartphones

3.3   **RQ3: Are there any associations between user types and the interest in using website features via smartphones?**

To investigate whether there are associations between user type and interest in using website features, multiple Chi-square analyses were applied. Significant relationships were identified between user type and three (3) web features: renew, room reservation, and library hours. The results indicated that undergraduate students showed higher interest in accessing renew, room reservation, and library hours with smartphones than expected. Graduate students only showed higher interest in accessing the room reservation service via smartphones than expected. Faculty indicated lower interest in using all three web features than expected. Room reservation is a special case for faculty, however, because they are not permitted to reserve study rooms. Figure 5 shows users' interest in the renew service with smartphones.
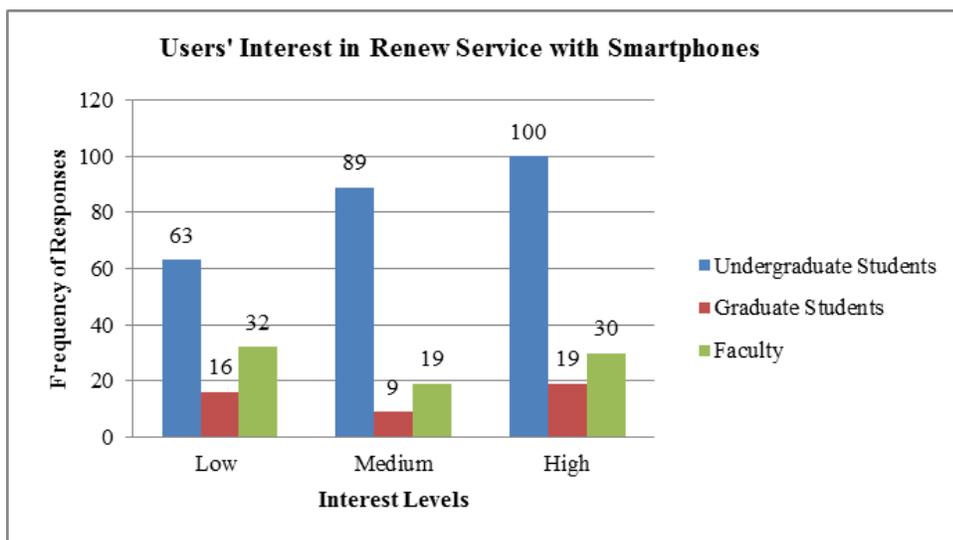

Figure 5. Users' Interest in Accessing Renew Services with Smartphones

4   Discussions & Conclusions

This study examined how different types of library users access twenty (20) key website features on Brigham Young University's library website with smartphones. Based on the results at this preliminary stage, this study found that library users were interested in using mobile devices such as smartphones for accessing a variety of website features that related to library contents, services, and operational information. Top features of interest were the catalog, library hours, users' accounts, study room reservations, and floor maps. An Oregon State University survey conducted during 2012 and 2013 collected information about the top reasons for visiting the library's mobile site (Bridges and Rempel, 2013). Top reasons for mobile use included library hours, find a book, research a topic, reserve a study room, and find an available computer. Dresselhaus and Shrode (2012) surveyed students at Utah State University to discover how often mobile devices were used. The survey identified student interest in using mobile devices for accessing library resources. Top features of interest were the catalog, finding articles, and study room reservations. Thus, a part of the findings of this study were basically aligned with those previous studies and confirmed that in a RWD website, smartphone users made similar attempts to access website features that provide readily available information requiring fewer actions (such as typing and clicking). Based on our findings, library users made fewer attempts to access content-related services, even though website features such as databases, e-books, audio books, and movies were available on the RWD website.

An interesting finding of this study is that five of the top smartphone features (search bar, library hours, my account, room reservation, and floor maps) are all custom web applications that were written in-house and are fully integrated into the RWD. Conversely, several of the least used smartphone features (WorldCat, chat, and eReserve) are third-party applications. A feature of interest, book renewal, is fully integrated into the site despite being a third-party application; an application programming interface provided by the vendor is employed in order to make full integration possible. Schmidt (2013) claims that RWD in the library world falls short of expectations because of poor transitions between responsive websites and third-party tools. This study provided empirical evidence for such a concern. Further investigation into the least used features should take place in order to determine ways to improve integration with the rest of the website. Other academic libraries should also take into account potential integration problems with their own sites.

Another important finding of this study is that undergraduate students demonstrated more frequent use and interest in certain website features (e.g., renew, room reservation, floor maps) than graduate students and faculty members. Since undergraduate students comprise the largest group of users of the academic library website, the design and development team should carefully consider the placement of these important features on the website in order to meet user expectations.

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Table of Figures