Don't Make Me Type: A Study of Students' Perceptions of Library Catalogues on Tablet Computers

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Abstract

The objective of this mixed methods pilot study was to ascertain university students' perceptions of online library catalogues using tablet computers, to determine how the participants used tablets and whether or not the NEOS consortium catalogue (NEOS) played an important role in the participants' academic research. The researcher recruited four students from the University of Alberta who were each asked to use NEOS to complete a series of simple timed usability tasks on a tablet computer of their choosing. The participants also answered a variety of semi-structured interview questions regarding their tablet usage, internet browsing habits, device preferences, general impressions of NEOS, and whether they were receptive to the idea of a mobile NEOS application. Overall, the students found the functionality and design of NEOS to be adequate. Typing, authentication, and scrolling through lists presented consistent usability problems while on a tablet. Only one participant was receptive to the idea of a NEOS application, while the other three participants said tablets were not conducive to conducting academic research and that they preferred using a web interface on a laptop or desktop computer instead.

Keywords

Tablet computers, iPads, touchscreen usability, information seeking, online library catalogues, interface design.

Introduction

The desire to carry the Internet in one's pocket has drastically changed our preconceived notions of website design. A plethora of research suggests that an increasing number of adults and teens access library catalogues via their tablet computer (Zickuhr and Rainie 1). This is consistent with changing internet usage patterns in general, which show that an increasing percentage of internet traffic comes from tablets (Walker Sands 2). No longer does the desktop computer reign supreme as one's gateway into the Internet. Unfortunately, many current library catalogues are not optimized for tablets or touch interfaces. The emergence of responsive web design,

which allows websites to resize to fit a variety of screen sizes, has made it easier to accommodate the explosion of mobile devices and adapt the web to this new mobile-centric environment. While the term could refer to any technology that is mobile (including laptops and portable music players), for the purposes of this study the term mobile devices is used to refer only to smartphones, tablets, and other devices with touchscreen inputs and Internet browsing capability. The objective of this pilot study was to investigate University of Alberta students' perceptions of the NEOS consortium catalogue (NEOS) when used on a tablet in an effort to determine which aspects of its design and functionality should be altered in order to optimize it for touchscreens and smaller tablet screen sizes. A secondary goal was to determine how the participants used tablets and whether or not NEOS played an important role in the participants' academic research, as this would inform librarians if a redesign of the catalogue was warranted. NEOS, a fairly old integrated catalogue, was born in 1994 as the result of collaboration between a consortium of government, hospital, and university libraries in the province of Alberta (NEOS Library Consortium).

This research study received ethics approval from the University of Alberta Ethics Review Board in the summer of 2013. The research was conducted during the fall semester (September through December) of 2013.

Literature Review

Statistical trends show a growth in tablet ownership in North America and increased usage of mobile devices globally. In 2014, 42% of adults eighteen and over in the United States owned a tablet computer compared to 34% in 2013 (Zickuhr and Rainie 1). Walker Sands, a marketing and search engine optimization company, stated in their quarterly "Mobile Traffic Report" that mobile devices accounted for 31.2% of total website traffic in Q1 2014, and Android tablets and iPads accounted for 19.8% of that mobile web traffic (Walker Sands 2). By comparison, mobile web traffic was estimated to be 23.9% in Q1 2012 (Walker Sands 2). Furthermore, in 2014, mobile traffic data usage grew by 69% (Cisco 4). The growth in both tablet ownership and mobile web traffic shows that these devices are important tools for accessing digital information.

There is a considerable amount of usability research on online library websites and catalogues (such as: Battleson, Booth, and Weintrop 189-98; Cockrell and Jayne 122-32), as it is an effective means of testing how well users access digital content and navigate the catalogue (Travis and Tay 24-8). Web usability is defined as the "quality attribute that assesses how easy user interfaces are to use" and also "refers to methods for improving ease-of-use during the design process" (Neilsen "Usability 101"). In a study comparing the University of East Anglia and Edinburgh University online library catalogues, Alhadreti et al. sought to discover if poorly designed library catalogues introduce navigational challenges for users and therefore result in a lowered success rate when searching for information (2). The authors found that "the ergonomic quality of the interface of such systems can have a tremendous effect on the amount of time, number of steps and quality of the obtained data, having substantial impact on the

users' performance" (Alhadreti et al. 2). Participants took over 45% longer to find information on the inferior Edinburgh University catalogue, and each task took approximately 59% more steps to be completed (Alhadreti et al. 4). Similarly to the pilot study presented in this paper, Alhadreti et al. used a "think out loud" method to identify these issues, whereby users verbalized problems as they were encountered (2). Hunter College Libraries implemented an iterative usability testing method to create a user-centered library website using twenty-two student participants (Becker and Yannotta 6). The authors found that the redesigned site was a vast improvement for users due to its clearer terminology and navigation system as well as its refreshed visual appeal (Becker and Yannotta 12-5). Both studies illustrate how usability testing and iterative design processes are essential for creating easy-to-use online library catalogues.

Though web usability methods were invented as a means for testing websites on desktop computers, the principles can be applied to library website usability testing on mobile devices. Based on their survey of a decade of web usability studies and best practices, Shitkova et al. constructed a list of mobile usability guidelines for building and testing mobile websites and applications, which they then applied in the mode.ling of two mobile applications (1607-10). These guidelines included aspects such as the arrangement of content on the screen, the layout of the navigation system, and the size of on-screen buttons (Shitkova et al. 1607). The authors concluded that "applying usability guidelines early in the design phase helps to eliminate a number of usability issues and, thus, reduces the cost for implementation and improvement" (Shitkova et al. 1613). Furthermore, the mobile guidelines they identified could theoretically be applied to a variety of testing scenarios (Shitkova et al. 1613).

In a study conducted at Dublin Business School, authors Hegarty and Wusteman carried out user testing with students on the EBSCOhost Mobile application. Reactions to EBSCOhost Mobile were positive, but the authors paid special attention to comments regarding the application's buttons and functions – stressing the importance of sufficiently sized touch targets and article selection highlighting, as these issues are more critical on small screen sizes (Hegarty and Wusteman 331). The usability issues identified on the EBSCOhost Mobile application reflect Shitkova et al.'s findings that the overall layout and on-screen button sizes (or touch targets) are imperative to a mobile application's usability. Similarly, in a study conducted at the University of Illinois Urbana-Champaign Library, researchers evaluated the information-seeking behaviour of students using a Wikipedia application on iPod Touch devices in order to find out how students use Wikipedia in an academic context (Hahn 276). The study results revealed a variety of research characteristics including "research efficiency, use of information into papers as a component of the research process, overall nature of information searched for, degree of satisfaction with results, and improving the Wikipedia app"
(Hahn 292). Students felt the Wikipedia application was easy to use and did not need to be changed, but some felt it was harder to navigate than the full desktop site, presumably due to the small screen size (Hahn 292).

Portland State University conducted a hybrid field/lab usability study to test its library's mobile website across a variety of mobile devices, including tablets, to see how it performed on multiple screen sizes. Twelve student participants used their own devices in a lab environment, while a document camera recorded their screen actions and hands when doing tasks such as finding the library hours, checking their account information, using chat, and navigating EBSCOhost (Pendell and Bowman 49). In general, the mobile site was highly praised. Some alterations were made as a result of the study, including changes to the navigation. Similar to the study conducted in this paper, Pendell and Bowman concluded that testing with the participants' own devices was very important, as they were able to witness website errors and problems, many of them device specific (52).

The literature also shows that university libraries often conduct needs-based assessments during the initial design stages of a mobile site. A survey conducted at Utah State University in 2011 was designed to learn more about student device usage habits in order for the library to determine the necessary resources required to create a mobile-friendly website. The authors found that "54% of undergraduates and 50% of graduate students use mobile technology for academic purposes" (Dresselhaus and Shrode 87). Nearly 40% of the student population owned a smartphone and used its Internet functionality daily, with 31.5% using a mobile device (such as the iPod Touch) for the same purpose (Dresselhaus and Shrode 88). However, only a small percentage (3.9% of undergraduate students and 5.4% of graduate students respectively) owned an iPad or e-book reader (Dresselhaus and Shrode 88). When students were asked how likely they were to use library materials if they were made easily accessible on a mobile device, 70.2% were likely to use a smartphone, 46.9% were likely to use an iPad, 45.9% were likely to use an e-book reader, and 63.2% were likely to use a different device (Dresselhaus and Shrode 90). Researchers at Kent State University held focus group sessions to determine what features students would want to see in a mobile version of the library website (Seeholzer and Salem 9). In their survey of undergraduate and graduate students, the researchers found that mobile database access (even if it is not optimized for mobile) was the most requested feature for beginning research projects, since participants identified that mobile devices were not utilized for in-depth study. Participants also wanted access to services such as course reserves, their item hold status, and "About Us" features including a building guide and a tutorial of the call number system (Seeholzer and Salem 9).

While the literature demonstrates there are numerous studies assessing library websites for mobile devices generally, the literature is lacking in usability research that focuses specifically on tablets. Considering the popularity of tablets and their disposition towards productivity applications, there is value in conducting user-testing studies for tablets exclusively. That said, there have been related studies that document how students utilize tablets as academic tools – the secondary objective of this study. A group of Ryerson University librarians conducted a small study to discover how students integrated iPads into academic life (Eichenlaub et al. 18). Students were asked to blog weekly about their experience and librarians met with them monthly to review student

progress. Overall, students found the iPad to have better performance than a laptop – the iPad was more intuitive, lighter, and provided superior battery life. It improved their email and communication habits, and they often digitized course material and imported it into iBooks (Eichenlaub et al. 18). In fact, cloud storage (such as Dropbox) negated the need for on-board storage (which highlights cloud computing trends) and students essentially went paperless. Students were also given beta access to the library's Summon search tool, but most students found the iPad to be less conducive to research than a laptop (Eichenlaub et al. 19-21). The aforementioned studies present many guidelines and examples of how a library would conduct mobile usability testing on an online catalogue, but none have focused specifically on tablets, which is the focus of the research presented in this paper.

Methodology and Data Collection

Following the University of Alberta ethics approval, the participants for this study were recruited. Recruitment posters were placed on bulletin boards in the Rutherford Library, Cameron Library, and the Education building. However, all participants were recruited by word of mouth. The first participant was a student and friend of the researcher. After hearing about the research study through a conversation with the researcher, he expressed interest and he asked to participate in the study. The first participant put the researcher in contact with two other Education students who qualified to participate in the study, and these individuals subsequently became the second and third participants. The fourth participant was also recommended, this time by a former student from the School of Library and Information Studies. A total of four students from the University of Alberta were interviewed for this study – three graduate students and one undergraduate student, all from the Faculty of Education at the University of Alberta. The researcher's relationship with the first participant could potentially introduce some biases. However, it is pertinent to note that the first participant still fit the requirements for the study. Furthermore, in order to qualify as viable candidates, participants had to either own a tablet computer (such as an iPad or an Android device) or self-identify as being comfortable operating such devices. Participants had the option of using the researcher's device (a Google Nexus 7 Android tablet) or their own.

The decision to allow participants to use a device of their choosing was deliberate. Had the researcher provided only one control tablet for the participants to use, this might have introduced other complications and altered the data collected. For instance, had a participant been unfamiliar with the interface of the tablet's operating system, web browser, or screen size and screen ratio, this may have skewed results, as it might have taken longer for the participants to complete the required usability tasks. In order to ensure that participants were focused on the interface and functionality of NEOS, participants were given the option to use the tablet device with which they were most comfortable. Furthermore, each participant used the Chrome browser – on both Android and iOS – to navigate NEOS. It is important to note that had the participants used a wider variety of mobile browsers, it might have affected their perceptions towards NEOS' overall responsiveness.

Once the participants were contacted, the researcher set up interview meeting times. Participants were given the option to meet in a quiet and comfortable location of their choosing. Meeting locations included a study hall and an adjacent meeting room in the School of Library and Information Studies, the Education Technology Learning Commons, and a participant's private office. Each participant received an information letter and signed a consent form before participating. Participants were asked to perform seven simple usability tasks designed to simulate how the average user would navigate and use NEOS. Each individual was encouraged to talk about his or her experience and ask questions during the usability tasks. Participants had to conduct searches in NEOS, navigate to the item's bibliographic information, specify the library location, and enter their login credentials to place a hold on an item and view their account information.

The list of participant tasks was as follows:
1) Conduct a "New Search" using the search term *The Great Gatsby*.
2) From the results list, click on a title and view the item information.
3) Navigate back to the "New Search" section.
4) Conduct the same search (for *The Great Gatsby*), but specify the library location to University of Alberta, Rutherford Humanities & Social Sciences Library.
5) Select a title from the search results lists and view the item information.
6) Navigate to the "Place a Hold" page and place a hold on the item.
7) Navigate to the "My Account" section and enter credentials (library barcode and ...) to log in.
8) Navigate to the "Account Summary" and "Checkout" section of your account to view your library information.

It is important to note some limitations of this study. Participants did not conduct what would be considered "advanced searches." They were not asked to use any Boolean operators or any complex search techniques. Only basic free-text searching was used. Students were also not required to find a specific format or copy of *The Great Gatsby*, which may have impacted their evaluation of the catalogue. While the researcher did not take any notes during the usability tasks in an effort to keep participants at ease, the time it took for the participant to complete each task was recorded. In addition, all tablets used in this study were connected to the university's wireless network. As signal strength at each interview location varied, task completion times may have been affected.

Once each participant had completed all requested usability tasks, he or she was asked to answer a series of semi-structured interview questions (see Appendix). First, questions were asked about what types of devices they used – specifically, whether or not they owned a tablet, laptop, or desktop computer, and what kind. Second, participants were asked how much time they spent using a tablet per week, as well as how much time they spent browsing the Internet on both a tablet and traditional computer per week. Last, participants were asked a series of questions about NEOS itself – specifically whether they found it to be intuitive, how it functioned on a tablet (responsive or unresponsive), what aspects they liked or disliked, how it compared to

using other library catalogues on a tablet, and whether they would use a NEOS mobile application. Participants were also asked to provide any recommendations for improving the catalogue and general observations regarding their experience. Both the interviews and usability tasks were recorded using a digital recorder.

Once the interviews were complete, the researcher began processing the collected data. All interviews were transcribed and each participant was given a pseudonym to protect his or her identity. Participants were given the gender-representative names Sonny, Cher, Hall, and Oates. Usability task times were put into an Excel spreadsheet and the average task completion times were calculated.

The primary framework upon which this study was analyzed was a qualitative coding method outlined by Johnny Saldaña in *The Coding Manual for Qualitative Researchers*, which is broken down into multiple steps. Sub-codes were assigned to each segment of relevant text from the interviews and compiled into codes. These codes were then grouped into code categories, which were in turn used to create overarching themes. The process requires the coding of a document multiple times, which improves consistency and reduces the probability that the coding of one interview will influence the next (Saldaña 9-17). Overall, this study could be classified as a mixed methods study, as some quantitative and qualitative methods were used.

Results and Findings

Usability Tasks

Below is a table that shows the number of seconds each participant took to complete each usability task as well as the average times it took the participants to complete each task.

Table 1
Task Completion Time

Tasks (seconds)	Sonny	Cher	Hall	Oates	Averages
1	9	39	7	17	18
2	5	9	5	7	6.5
3	4	3	5	4	4
4	41	42	27	20	32.5
5	4	3	6	3	4
6	49	31	29	45	38.5
7	37	19	30	36	30.5
Total	149	146	109	132	134

Tasks 1, 4, 6, and 7 took the most time for participants to complete. The participant Cher took considerably longer to complete the first task because a colleague interrupted her during the usability test. This interruption skewed the quantitative data, and it is another limitation of this study.

The first task required participants to conduct a "simple search" for the term *The Great Gatsby* in NEOS. Similarly, Task 4 asked the participants to conduct the exact same search, but specify the library location to the Rutherford Humanities and Social Sciences Library. Both of these tasks involved entering characters into the search field via a tablet's digital keyboard, indicating that text entry (especially when combined with specifying search limiters) is a considerably more time-consuming task. Tasks 6 and 7 also involved entering text, but differed insofar as they involved alphanumeric text. During Task 6, the participants were asked to navigate to the "Place a hold" section of NEOS and place a hold on any item from the search results list. Task 7 required participants to navigate to and view their account information. It is important to note it was irrelevant which item the participant chose to view. Searching for The Great Gatsby was only chosen because it was guaranteed to retrieve results from the NEOS catalogue. Both tasks required participants to log into their account using their student card barcodes and library PIN.

Logging in to view account information was something with which participants consistently expressed dissatisfaction. The University of Alberta assigns students two sets of login credentials. The first is the Campus Computing ID (CCID), which has a username (the first part of their university Gmail address) and a password (which they choose themselves). The second is their library account, which, as explained above, requires an entirely different set of login credentials.

Semi-structured Interviews

The bulk of the research data came from the four participant interviews. Thirty code categories were assigned to the interview data, and from those code categories the researcher grouped the data into three major themes. These themes cover participants' impressions of the catalogue interface and functionality, their Internet use device preferences, and how important NEOS was to their academic studies. Overall, the participants thought NEOS was a functional – if bare bones – catalogue that suffered from some usability issues and only played a marginal role in their coursework research.

Theme 1: Catalogue Design and Functionality

By far the most comprehensive theme, Theme 1 includes all data related to NEOS' features, design, overall structure, and organization. This theme included any mention of design, search features or limitations, categorization or labelling of the interface, navigation tools or buttons, intuitiveness or discoverability of the interface, user account authentication, and expectations brought by the participant, as well as the overall experience from the point of view of the participant. All of these points are being viewed through the lens of tablet users, although similar themes may have arisen had this study been conducted on desktops, laptops or smartphones.

The design of the NEOS interface was one aspect on which each participant commented. For the most part, NEOS' design would best be described as adequate.

The participants found the design to be clean, basic, and not visually distracting. Sonny best summarized the design as "not too visually appealing, but it works." On multiple occasions the participants noted the interface was dated or plain. Oates commented that NEOS' design is very different than the other websites or search interfaces he uses, particularly on the iPad. He felt the buttons in the top menu bar, as well as the "Go Back" and "Logout" buttons, were particularly problematic because they were not obviously clickable on a tablet (see *Figure 1*). Oates recognized that the menu buttons could be clicked to perform actions, based on the button labelling and his previous experience with the catalogue, but he felt other tablet users might not know to click these buttons because they lack the shadowing and concave shape that signals the user to select them on a touchscreen.
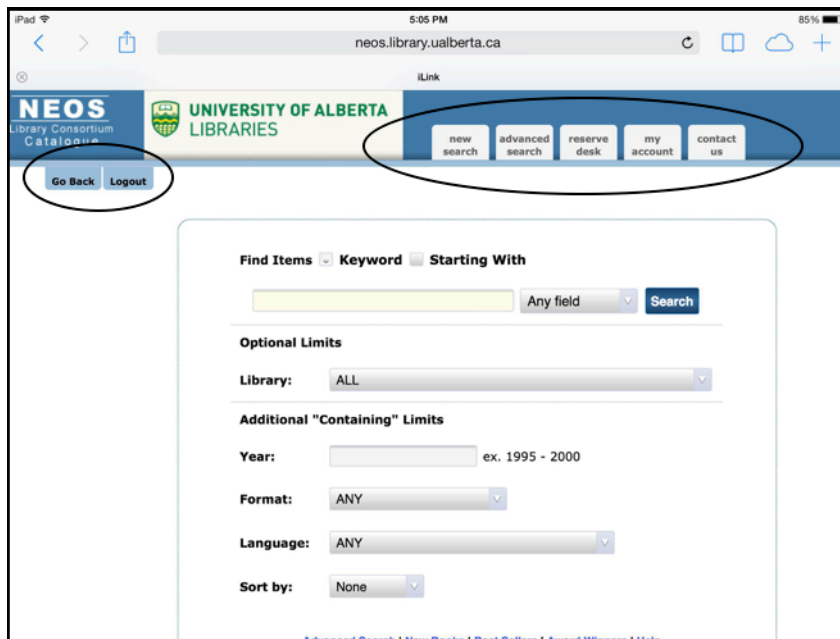
Figure 1. "NEOS 'New Search' screen on iPad," NEOS Library Consortium, 2003. Screenshot. April 2014.

Another aspect of NEOS that did not translate well to a tablet was scrolling through lists. While none of the users had complaints or scrolling issues when navigating the search results list, limiting the search to a specific library posed a problem. The NEOS consortium includes many libraries across Alberta, and therefore the list of libraries is comprehensive (see *Figure 2*). It is also alphabetical, meaning all of the University of Alberta's libraries are near the bottom. Oates noted that scrolling through this list was not ideal, even though he understood it was difficult to avoid. He suggested that results should be prioritized based on the institutional affiliation.
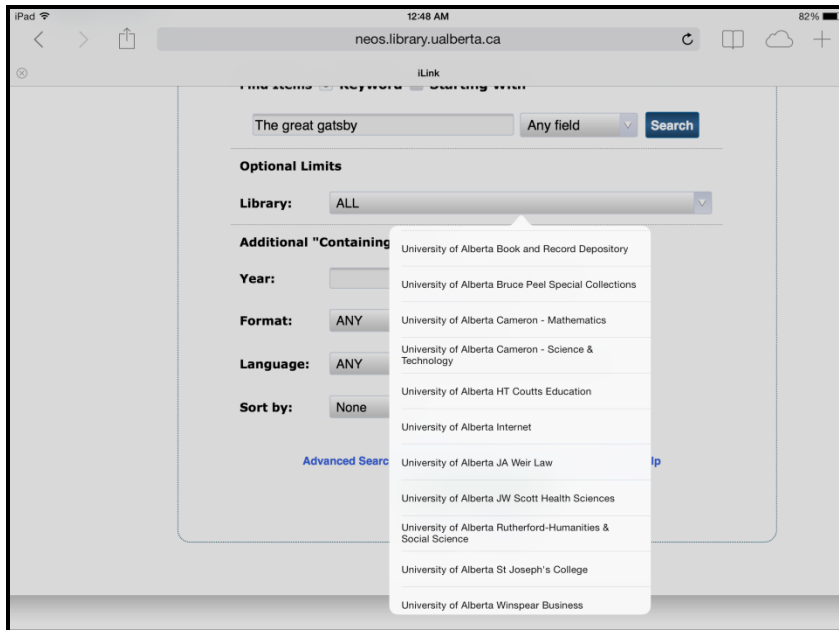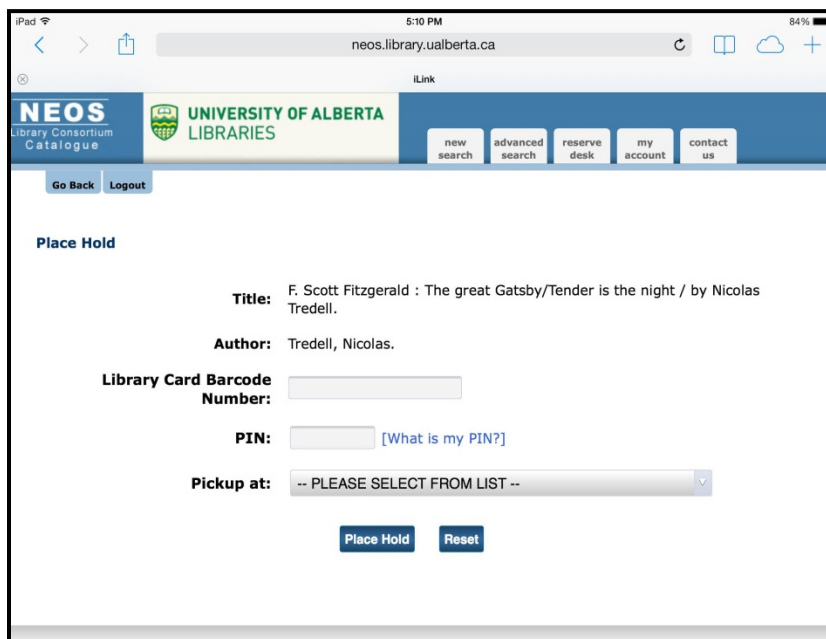
Figure 2. "NEOS library list on iPad," NEOS Library Consortium, 2003. Screenshot. April 2014.

NEOS' plain design does have benefits. Despite a few inherent drawbacks (such as text input and scrolling), the participants felt that NEOS' user experience was roughly the same between a traditional computer and a tablet, particularly on larger mobile screens. Viewing menus, search boxes, and items posed little difficulty, and there did not appear to be any major learning curves even when a participant had not used NEOS on a tablet before. All of the participants felt that NEOS was responsive to their actions – namely, clicking on-screen buttons and scrolling through menus functioned as expected. The consensus between all four participants was that NEOS could use a visual update. This was excellent news for NEOS, since most of the suggested modifications to its functionality would only require front-end design alterations. With the exception of Hall, all the participants felt that NEOS' search functionality and retrieval of results was satisfactory. Nevertheless, one negative aspect of NEOS surfaced consistently during the usability testing and the interviews.

Entering text on a tablet was not an ideal experience. While typing searches did not put off participants, they greatly disliked placing holds on items and viewing their account information. Both of these tasks required users to enter their login credentials – their library barcode and PIN (see *Figures 3* and *4*). Participants were asked to bring their student cards prior to participating in the study. Oates pointed out that typing numbers on an iPad (his device of choice) was slow and cumbersome compared to a computer keyboard. Toggling between letters and numbers when typing on a tablet requires the user to press an option key whenever they need to switch between sets of characters. This correlates with the quantitative data from Tasks 6 and 7 (see *table 1*), as all these usability tasks took considerably longer to complete. Participants continually expressed their desire to login to their library accounts using the University of Alberta's CCID system, as it is a credential they had memorized. NEOS required participants to input

their library barcode and PIN twice during the usability test – once when they placed a hold on an item and again when the participant viewed his or her account information. For this reason, all participants desired a one-time login. Moreover, Sonny felt that typing any account information should not be necessary as the cameras on mobile devices could easily scan students' card information and input that data into the login fields.

The library barcode authentication system is persistent across all devices that access NEOS (including desktops, tablets, and phones), but it is relevant to tablets insofar that these devices could be important research tools. One of the objectives of this study was to ascertain whether tablets are used as research tools at a university level. Unlike a smartphone, a tablet could reasonably be perceived as a superior productivity device, as its larger display makes it more conducive for catalogue searching and word processing. If tablets are more likely to be used for research purposes than, for instance, a smartphone, a library catalogue should be optimized for tablets. Furthermore, NEOS is the only catalogue system that requires the library barcode authentication system, while most other web applications at University of Alberta use the CCID authentication method. The latter is easy for the participants, and because they use CCID authentication regularly there is an expectation that accessing one's library account information or placing a hold on an item from the NEOS catalogue should be equally straightforward. Requiring students to authenticate using the more complicated library barcode method is problematic, as it could dissuade those students who use tablets as productivity tools from using NEOS altogether.

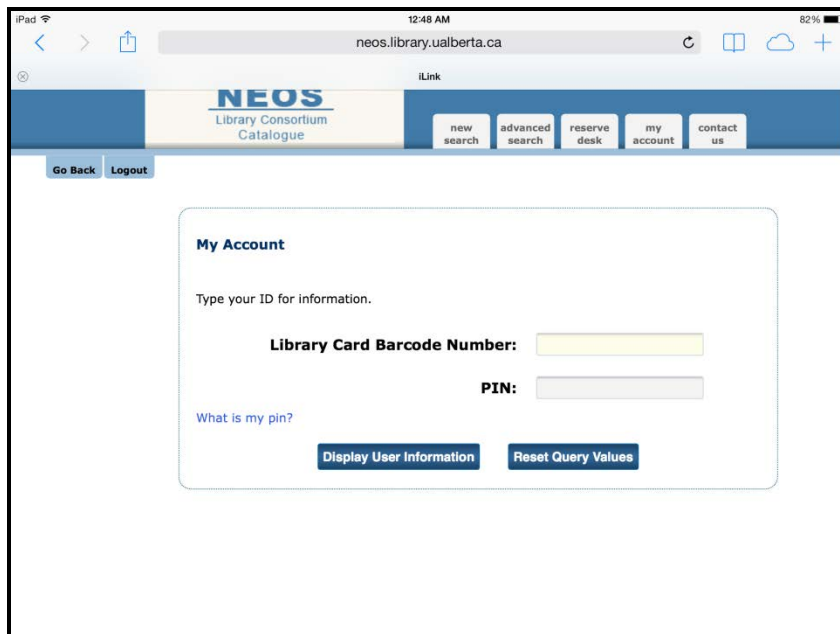Figure 3. "NEOS 'Place Hold' page on iPad," NEOS Library Consortium, 2003. Screenshot. April 2014.

Figure 4. "NEOS 'My Account' login page on iPad," NEOS Library Consortium, 2003. Screenshot. April 2014.

Theme 2: Participants' Device Usage Habits and Preferences

While there certainly is some crossover with the previous section, the second theme captures how the participants use their tablets on a daily basis, what devices they preferred to use (e.g. a tablet versus a traditional computer), and whether or not they were receptive to the idea of a mobile application for NEOS. In this theme, the researcher wanted to establish whether or not the participants actively used tablets for catalogue searches.

With the exception of Oates, all other participants did not use a tablet as their primary device. Sonny preferred to use the device for quick reference, web searching, watching videos, and for obtaining transit directions on Google Maps. Cher preferred to use her laptop for most activities, but mentioned she liked using her iPad for games and web browsing when travelling. Not surprisingly, typing was her biggest complaint with the iPad and most of the time she preferred to use a laptop's keyboard. Hall typically left his iPad at home, and preferred to use his MacBook for academics. Oates was the obvious outlier. He almost exclusively used his iPad at school, and he spent the majority of his time browsing the web and using Google Drive. He stated that he spends very little of his time on his laptop or desktop. Furthermore, Oates noted he preferred using NEOS with his iPad, as he found it easier to look up sources quickly and to physically carry the iPad to the library stacks to retrieve materials. For him, the iPad functioned as both a research tool and a notepad.

The researcher asked each participant if they would use an Android or iOS NEOS application if it were available. The primary reason for asking this question was to determine if using a tablet application would be preferable to an optimized web

interface, as it would inform the library where it should allocate its resources. Responses were mixed. Cher noted that having an application could be useful, but she was unconvinced she would use it regularly. She felt tablets were more suitable for "quick searches" and if she needed to conduct any detailed research she would default to her laptop. Oates explained there was no motivation for him to download an application that was only capable of connecting to NEOS and he preferred using the catalogue's web interface. Sonny was least responsive to a mobile application due to his previous experience. He argued that on mobile applications "it's harder to navigate, it provides less information, and [sic] doesn't have the same functionality" which makes it "a poor, watered-down version of the full experience." Hall expressed a keen interest in a NEOS application and felt exploring such avenues would be a net benefit and that apps create a more "seamless" experience because they are simpler and more accessible. He felt that an application would reduce potential barriers to NEOS (presumably the navigation path a user must take to find it) and might potentially increase its overall usage among students at the university. He explained that a desktop application or browser extension, such as in Firefox or Chrome, could also create the same type of seamless access to NEOS. All participants preferred to use their tablet in landscape mode. Sonny switched from portrait to landscape early on during the usability tasks, while each of the other participants began by using the tablet in landscape. This orientation preference is likely due to the fact that holding a tablet in landscape better replicates the experience on a traditional computer monitor and entering text on an expanded keyboard facilitates typing.

Theme 3: Information-seeking Behaviour

The final theme encompasses all data where users explained how they sought information, how familiar they were with NEOS, what aspects of NEOS they used most often, what types of research strategies they employed, and what other library catalogues they used. In many respects, the data relating to this theme has less to do with how NEOS performs on a tablet, but highlights whether or not NEOS played a substantial role in each participant's information-seeking habits and general research. NEOS' value as a research tool, from the perspective of the participants, is important when determining if a redesign of the catalogue interface would be a good investment. There is some overlap between this theme and the previous two, insofar that NEOS' features did play a role in determining how often some of the participants accessed NEOS.

In general, NEOS did not play a consistent role in any of the participants' academic lives. Not surprisingly, NEOS was only consulted when a participant needed to conduct research for an assignment. This does not mean, however, that NEOS is not a relevant resource. Sonny expressed his appreciation for NEOS' features (especially its ability to connect to a wide variety of libraries), and he consulted it often when conducting research for an assignment. Oates admitted he had only used NEOS once or twice in the present semester, but that he had made ample use of it in the previous year. Cher had a similar reaction, stating that she defaulted to NEOS when conducting research because her impression was that it was a better catalogue and was strengthened by the

University of Alberta's large collection; she also felt the university's librarians had promoted it well. Only Hall claimed he used NEOS only on the rare occasions when he was looking for a particular book. Most of the time he preferred to use the University's integrated discovery service. His preference reflected his information-seeking behaviour, since he generally required current journal articles, not books. This makes sense as the NEOS catalogue only indexes periodical volumes not individual journal articles. Hall also explained that NEOS' limited feature set was more apparent to him after being exposed to other online catalogues. It is difficult to say whether or not the participants' information-seeking behaviour is representative of the broader university population, since all were students from the Faculty of Education.

Discussion and Conclusion

Though this study was a small-scale usability evaluation involving four participants, the results reveal some insights into how university students expect online library catalogues to function on a tablet computer. In an ideal situation, a small sample size of participants is tested (Neilson "Why You Only Need"), persistent issues regarding the software, website, or interface are "fixed," and the study is repeated using a different set of questions and a new group of participants. Improving websites and applications is an iterative process (Neilson "Why You Only Need"). Nevertheless, there are some general themes from this study that could be explored in future research.

It seems clear that design is not necessarily a determining factor in a user's perception of an online library catalogue. While participants did make several references to NEOS' relatively bland design, there did not seem to be any indication that it deterred them from using it. If anything, NEOS' simplicity was generally praised. It just did not inspire a "wow" factor from the participants. This is not surprising considering the catalogue's age. The explosion of mobile applications for both Android and iOS – as well as extensions for the Firefox and Chrome browsers – has raised the bar considerably with regard to mobile design consistency. Developers for these platforms are given ample tools and guidelines to create their products, which means there is a high degree of consistency between applications. If this level of consistency is something tablet owners expect, then most web applications (like NEOS) are bound to look dated when compared to mobile applications.

Furthermore, it may be beneficial to repeat this study with different participant groups. There was an undertone during the interviews that while each participant had used NEOS, they did not regularly take advantage of its advanced features. This is not to suggest the participants were unaware of or unable to operate NEOS' advanced features. For instance, Oates mentioned he had never made use of the "chat" function for reference purposes, and he did not feel the need to view other libraries' collections.

Certain aspects of NEOS' performance on a tablet were universally criticized, yet remedying these issues is difficult. Clearly, text entry and authentication was a persistent (and arguably expected) point of frustration. Yet, there is little that can be done to improve text and data entry, as it is simply a reality of the current technology.

Allowing students to login via their CCID would improve authentication issues. Tablet screen size constraints were also a shortcoming. Dramatically increasing screen size would likely negate a tablet's greatest benefits – portability and battery life. Unfortunately, these are all limitations of current tablet design, and it is likely that these limitations affect all library catalogue interfaces. Further research on NEOS, or other online library catalogues, could focus on the search and access of different material formats, as each format might impact participants' evaluation of a catalogue. Furthermore, similar studies using a different tablet screen sizes and mobile browsers might bring to light some more fundamental usability problems on certain devices.

Finally, it is possible the participants had different expectations of tablets than they had of laptops and desktops. Three out of four participants did not often use their tablets for academic work. Instead, they functioned more as companion devices for entertainment, casual browsing, gaming, and navigation. Does NEOS warrant a redesign if the participants do not appear to use tablets as research tools? It is possible that NEOS is in fact adequate and does not need to be optimized for touchscreens. However, more usability testing and interviews would need to be conducted to determine this fact. It is also possible a redesign might actually bolster students' usage of the catalogue on tablets, but only if some of its core problems are addressed.

Acknowledgements

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Appendix: Semi-Structured Interview Questions

Device questions:

Do you own a tablet computer (such as an iPad or Android device)?   YES   or   NO

If the answer is "yes," ask the following questions:

How many hours would you say you spend on your tablet each day?
How many hours do you spend browsing the Internet on a tablet each day?

Ask the following questions if the answer is "yes" or "no."

Do you own a laptop of desktop computer?
Is your computer an Apple Macintosh or a Windows based machine?
How many hours to do you spend browsing the Internet each day?
How many times do you access the NEOS catalogue per week?
Do you prefer to access the NEOS catalogue via a tablet computer or a laptop/desktop computer? Why?

Questions regarding NEOS Catalogue:

Describe your overall experience using the NEOS catalogue using a tablet computer (for example: is it intuitive or unintuitive?)
Do you find NEOS responsive to your actions when using a tablet computer?
What features or aspects of the NEOS catalogue do you like?
What features or aspects of the NEOS catalogue do you dislike?
How would you compare your experience using the NEOS catalogue to other online library catalogues, using a tablet computer? (For example: Edmonton Public Library)
Would you use a NEOS iPad or Android "app" if it were available?
Do you have any other suggestions or improvements that could be made to the NEOS catalogue to make it easier to navigate using a tablet computer?