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This study investigates how users interact with the mobile version of the University of North Carolina at Chapel Hill (UNC) library catalog and what users expect from it. Semi-structured interviews were conducted with twenty participants, and each participant was asked questions on their previous experience with the mobile version of UNC library catalog, their purposes of using it, their library search tasks conducted on it, and their future expectations from it. Results indicate that participants think the mobile library catalog is convenient under certain circumstances and they prefer to conduct simple and quick library search tasks on it. However, the study produces some results contradicting a few previous studies on mobile information needs and mobile information behaviors.

Headings:

Information behavior

Information retrieval

Library catalog

Library mobile website

Mobile device interface design

THE MOBILE VERSION OF THE UNIVERSITY OF NORTH CAROLINA AT
CHAPEL HILL LIBRARY CATALOG AND ITS USERS

by
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1. Introduction

The increased functionality of handheld and web-enabled devices enables users to conduct tasks on the mobile Internet that previously required traditional desktop or laptop computers. As the popularity and usage of these devices has grown, some pioneering libraries, both public and academic, have made their library websites available via mobile devices to their users. And a major component of these mobile library websites – which enables users to both browse and search their library holdings – is the mobile version of library.

Previous studies have investigated the need for library mobile services and have appraised the interface and usability of mobile library websites. However, only a few studies were on the mobile version of library catalogs and they focused mainly on the technical side of the story, such as implementation. Also, little is known about users' information behavior regarding the mobile library catalogs. This study aims to find out how users interact with mobile library catalogs and their rationale for doing so, in order to provide implications for optimizing mobile library catalogs.

The library of University of North Carolina at Chapel Hill (UNC) provides a mobile version of the library catalog (it is also referred as the mobile version of UNC library catalog, the mobile library catalog, and the mobile catalog below) to its smartphone users.

The current UNC mobile library catalog provides three interfaces to users. The first interface is the main search page, including a search box to type in search terms, a dropdown menu for “search by” options (search by keywords, title, journal title, author,

or subject), and a link to the beta version of the newly implemented “search via barcode scan” function. The second interface is the catalog results page, which is a ranked list of relevant library items after a user types in search terms and clicks the search button on the main search page, and each item’s full title and author are displayed on this page. The third interface is the exact item page after a user click a specific item on the second interface, which includes some more detailed information about this item besides author and title, such as publisher, notes, location (which library has the item), call number, availability (available or checked out), image of the book cover (if applicable), and a few functional links at the bottom of the page (e.g. email this item’s info, text this item’s info, bookmarkable link to this item, and see full page for this item). The three-interface mobile library catalog is a simplified version of the full web version of UNC library catalog (it is also referred as the full web version of library catalog, or the web library catalog below), and provides only part of information on specific items in comparison with the web library catalog. Also, and the UNC mobile library website has a different URL from the official website (www.lib.unc.edu/m).

This study builds on a preliminary log analysis study by Niu and Hemminger of the School of Information and Library Science at UNC. The investigator works closely with them, and will use qualitative method to examine users’ search behavior on the UNC mobile library catalog in the present study, which further supports their quantitative study.

The investigator proposes the following research questions:

1. How do users' interact with the UNC mobile library catalog? Do their search behaviors on the mobile library catalog differ from their behaviors on the full web version of library catalog?
2. Why do users use the UNC mobile library catalog? Do the features of handheld devices have an impact on users' search behaviors on the UNC mobile library catalog?
3. What library search tasks do users conduct on the UNC mobile library catalog? Do users prefer to conduct specific types of library search tasks on mobile devices?
4. What are the expectations of the users from the mobile library catalog? Do users expect more advanced functionality from the mobile library catalog or the overall UNC mobile library website?

2. Literature Review

The current study draws on several areas of literature in the field of information and library science, as well as works in the fields of information behavior and human-computer interaction (HCI). The investigator mainly reviews previous literature on four specific topics: information search behavior on mobile devices, information needs and information tasks on mobile devices, libraries going mobile, and improving mobile library catalogs.

2.1 Information search behavior on mobile devices

As the use of mobile phones to access the mobile Internet has increased, so have the number of studies examining users' information behavior on mobile devices, particularly their information search behavior. A researcher at Nokia Research Center conducted a two-round test of users who searched the Internet on Nokia mobile phones; he found users preferred keyword searches and were willing to type on their phones' keypads (Roto, 2006). Church, Smyth and Keane (2006) did a mobile search engine study that evaluated the interfaces of seven existing mobile search engines. They argued that the query-based search and ranked-list presentation of search results — borrowed from Web search — were not appropriate for mobile search, due to the mobile devices' input and display features. In the same year, a research group at Google carried out a large-scale log-based study based on over 1 million requests to Google's mobile search site. Among the patterns their query analysis revealed were that users' mobile search queries were likely to be short and they rarely used advanced search options (Kamvar & Baluja, 2006). These early attempts at exploring mobile search behaviors indicated that users tended to

search differently on mobile devices than on traditional computers, possibly due to the ease of input methods on the handheld devices and the context of searches.

A few later studies dived deeper. Church, Smyth, Cotter & Bradley (2007) broadened their research to people's mobile information access behavior, discovering that users preferred browsing over searching when accessing mobile information, frequently modified their queries during mobile searches, and used a relatively limited query vocabulary in comparison to standard Web searches. Google's Kamvar, Kellar, Patel & Xu (2009) explored behavioral differences resulting from using specific devices. The researchers began with the premise that high-end smartphones, such as the iPhone, should be studied separately from computers and other conventional mobile phones. They investigated iPhone users' search behaviors as a new category and found iPhone-based search patterns resembled computer-based searches more than conventional mobile phone (with keypads) searches. Marcial's dissertation literature review (2010) examined the issue with a broader scope of devices; based on her review, she concluded that screen size and input methods affected users' search behaviors on smartphone, tablets, and computers in various ways.

The studies presented in this section indicate that different-sized devices might have an impact on users' search behavior. In the current study, the investigator will try to validate whether the use of handheld devices alters people's search behaviors, when people search the mobile version of UNC library catalog.

2.2 Information needs and information tasks on mobile devices

Besides mobile information behavior, researchers have also investigated information needs and information tasks on mobile devices. Researchers examining these topics tend

to gather their data using the diary study, a longitude method that asks participants to keep a diary of their behaviors related to the researched subject matter. Most of these studies have generated informative qualitative results.

Sohn, Li, Griswold and Hollan's (2008) two-week diary study on mobile information needs revealed that users' mobile information needs were frequently prompted by conversation and location-based artifacts, and they usually decided at that time both whether to address the information need when it arose and when to address it (at the time, later, or not at all). Church and Smyth (2009) examined people's intent behind mobile information needs in their four-week diary study, and mainly analyzed the topics that users reported they were interested in and the impact of mobile contexts on user needs. The researchers found participants' mobile information needs included two main new categories — geographical needs and personal information management needs — and highlighted the strong impact of contexts, such as location and time, on user needs. They also identified the limitations of satisfying mobile information needs, such as small screen size and input capability.

A few studies have looked into users' reactions to their mobile information needs. Chua, Balkunje and Goh (2011) conducted a diary study to determine how users fulfilled their mobile information needs. They discovered contexts played an important role not only in forming mobile information needs but also in fulfilling these needs. A variety of factors — such as device limitations and network connectivity — affected users' success in fulfilling such needs.

Karlson, Iqbal, Meyers, Ramos, Lee and Tang (2010) carried out a screenshot study on smartphone users to investigate taskflow on mobile devices. They found users tended to

complete only part of some tasks on smartphones or saved certain tasks to complete on desktop or laptop computers later. They also discovered significant interruptions in mobile taskflows and tried to classify barriers to completing mobile tasks.

The studies on mobile information needs and mobile information tasks reviewed in this section identified the characteristics of information needs on mobile devices and obstacles to fulfilling such needs. The current study will examine users' information needs specific to the UNC mobile library catalog, how they address their needs in different contexts, and how they conduct information tasks.

2.3 Libraries going mobile

Some pioneering libraries have attempted to provide their library resources to users via mobile devices. Irwin (2011) presented a low-cost approach to make library websites mobile-friendly by using CSS, HTML and JavaScript, which allowed the mobile version to retain the features of the online public-access catalog. However, because users' search behavior on mobile devices tends to differ from their behavior on traditional computers, an online catalog's features may not satisfy users' mobile search needs. Therefore, some libraries went one step further and developed new interfaces and applications exclusively for the mobile version of the library catalog or library website. For example, Cornell University's library collaborated with students from the computer science department to create both the library's mobile site and iPhone application (Connolly, Cosgrave & Krkoska, 2010). When Kent State University's library offered a mobile site, university researchers conducted a focus group study to assess the site's usability regarding catalog and reference services; they concluded that the mobile site was a successful outreach approach for the library (Seeholzer & Salem, 2011). Also, Bridges, Rempel and Griggs

(2010) analyzed the trend of developing mobile versions of library websites and concluded that users need a fully-functioned mobile library website, including the library catalog and other library services.

These studies support the idea for libraries to provide their catalog and other library resources and services (working hours, floor plans, reference service, etc.) via mobile devices. The current study will examine whether users believe such the mobile services are necessary and helpful.

2.4 Improving mobile library catalogs

There are studies on optimizing mobile search engines and the web version of library catalog interfaces, which provide implications for improving mobile library catalogs.

Westlund, Gomez-Barroso, Compano, and Feijoo (2011) implemented an interview-based qualitative study to explore the logic behind users' mobile search behaviors; their goal was to find out users' needs for accessing the entire Internet rather than a subset of it via their mobile devices, and whether added-value mobile applications contributed to the success of mobile search tasks. Church and Smyth (2007) developed a framework to improve mobile search by enriching the contents of search results by topic and proposed that such content enrichment enabled users to search more efficiently on mobile devices. Carpineto, Mizzaro, Romano and Snidero (2009) evaluated prototypes that provided mobile search results with clustering, a technique with some success in desktop computer searches, and found clustered search results were a viable complementary approach to the traditional ranked-list results on mobile devices. These suggested techniques from the literature may also be beneficial when implemented in the mobile library catalog;

therefore, one of this study's aims will be to discern whether users want such features on the UNC mobile library catalog.

In terms of the web version of library catalog interface optimization, many recent studies put an emphasis on faceted search. Niu and Hemminger's (2010) log-based study of faceted catalogs from the Phoenix Public Library and the UNC library systems revealed that faceted browsing was an important feature accessed by users as they attempted to refine their search results. Ramdeen and Hemminger (2011) explored how facets affected users' catalog search behavior on two different UNC library catalog interfaces. They found users preferred the interface allowing both text-based and facet-based search, and the use of facets varied based on the users' different types of search tasks. Kules and Capra (2012) conducted an eye-tracking study in which participants searched on a library catalog interface that supported faceted-search; they discovered that users tended to use facets more during the decision-making stage of the search session.

The literature indicates that facets in library catalogs can be useful for library users. Since the UNC library already provides a faceted-search interface on the web version of its catalog, the current study will explore whether users want similar facet-based search tool on the mobile catalog as well.

3. Methodology

3.1 Goals of the study

The goals of the current study is trying to answer and gain a better understanding of the four research questions stated in the introduction part. Specifically, the study examines users' interaction with the mobile library catalog, users' purposes of using the mobile library catalog, users' library search tasks on the mobile library catalog, and users' expectation from the mobile library catalog.

3.2 Description of method

The investigator adopted an interview method in this study. Semi-structured interviews were conducted for this study with UNC undergraduate and graduate students who had previous experience using the UNC mobile library catalog. The rationale for a semi-structured interview study is explained below:

1. The investigator expects to reach relatively experienced users of UNC's mobile library catalog, and an interview study enables the researcher to reach the targeted group better than with a questionnaire survey study.
2. This study mainly focuses on users' interactions with and their opinions of the mobile catalog. The interview method enables the investigator to collect detailed data of users' experiences and opinions, and explore the intentions underlying users' behaviors.
3. This is an exploratory study on a little-studied topic. Semi-structured interviews provide the investigator with flexibility to expand the interview parameters when participants bring up interesting points, while maintaining consistency across interviews by using the same set of interview questions.

3.3 Population and sampling technique

The investigator chose UNC undergraduate and graduate students as the target population for this study, because they were frequent users of library resources for both academic and non-academic purposes, and were expected to have a high level of ownership of smartphones.

Participants were recruited by emails (see Appendix B) sent to several UNC mailing lists and by tear-off flyers (see Appendix C) posted in UNC's Davis library and the undergraduate library. Both the email and the flyer stated eligibility criteria that the study was looking for participants who 1) had access to a smartphone they used on a regular basis, 2) had experience using the UNC mobile library catalog, 3) were at least eighteen years old, and 4) were fluent in speaking and writing English. Also, the flyer and the email also stated that each participant would receive \$10 for taking the time to participate in this study.

There were 26 potential participants responding to the investigator by email or phone, and the investigator screened the potential participants by the time they responded. Also, the investigator sent a follow-up email with detailed information about the interview study to confirm they met the eligibility criteria. Eventually, 20 participants were selected by their satisfaction of the eligibility criteria and by the time they responded to the investigator. No efforts were made to control demographic markers such as gender, race, age, etc.

The twenty participants were from various departments of the university, with fifteen undergraduate students and five graduate students. The gender distribution was somewhat uneven, with seven male students and thirteen female students. Another demographic marker the investigator collected was the frequency of using mobile devices for apps or

web interactions. It turned out most participants frequently used their smartphones for apps or web interactions. Eighteen participants reported they used smartphones for the Internet many times per day, one participant few times per day, and one participant few times per week. This partially indicated that the targeted population was appropriate for this study.

3.4 Study procedure

After confirming potential participants' eligibility and providing detailed information about the study to them, the investigator set up a mutually available time with each participant to meet for the interview. Potential participants' individual questions about the interview process were addressed in follow-up emails. The twenty interviews were conducted in a quiet but open place on the UNC campus, and all interviews were audio-recorded by the investigator for transcription. Participants were encouraged but not required to bring their smartphones, but the investigator brought an Android smartphone to every interview in case that participants wanted to look at the mobile library catalog to call up their memories.

When the participant arrived, the investigator explained the most important facts of the study and participants were given an informed consent form (see Appendix D) to read and sign. The consent form addressed that nature and details of the study, and what the participant could expect from participating. Each participant signed the consent form after careful reviewing.

The lengths of the interviews ranged from 22 minutes to 36 minutes, and most participants brought their smartphones with them and showed them to the investigator

during the interview. After the interview, the participants were compensated \$10 for taking the time to participate.

3.5 Interview questions

A list of standard interview questions was used as the guidelines for all twenty interviews and is attached in Appendix A. The interview questions were developed according to the four research questions and the literature review above. Then three pilot interviews were conducted with three graduate students at the School of Information and Library Science of the UNC, and the interview questions were further modified according to the feedback from the pilot interviews. Also, a copy of the interview questions was given to each participant to help them understand the interview process.

The interview questions were divided into four parts. The first part was a few demographic questions to gain a better understanding of participants' background. The second part included questions on participants' previous experience using the mobile library catalog, asking them to describe their successful and unsuccessful experiences. The third part of the questions attempted to investigate participants' purpose of using the mobile library catalog and their preference to conduct different library search tasks. In this part, the definitions of three types of library search tasks (known item search, subject search, and exploratory search) were explained to the participants with examples to ensure they understand. Also, one question in this part addressing the library search tasks versus devices was printed out as form for participants to fill for their convenience. The fourth part of the interview were questions on optimization of the mobile library catalog, exploring participants' information needs and expectations from the mobile catalog and even the overall mobile library website. Furthermore, during the interviews, follow-up

questions on the “search by” choices on the main search page, the “search by barcode scan” function, and the faceted-search options were asked as well.

3.6 Data analysis

Notes were taken by the investigator during the interviews, but only for key points or key concepts participants mention, and they were used to assist the transcription of audio-recordings after the interviews. All interviews were transcribed mainly using paraphrased transcription methods, but some important comments of the participants were transcribed as exactly they were expressed, which was expected to demonstrate the individual differences from participant to participant. After all transcriptions done, the investigator adopted an inductive way to code the data contained in the transcriptions. The detailed data analysis methods for questions in different parts of the interview are described below. Answers for the demographic questions were collected to reflect the characteristics of the targeted population, which was described in the population and sampling techniques section above. If a larger sample was surveyed, the data would be useful to examine potential differences in responses that may be caused by these demographic factors. For questions on users’ experience with the mobile library catalog, the investigator aimed to collect scenarios of participants’ previous search experiences. The data were used to generalize and categorize their search behaviors, and concepts of phrases were drawn from participants’ answers to facilitate categorization of their interactions. For questions on users’ purposes of using the mobile library catalog the investigator recorded the participants’ reasons of using the mobile library catalog and break them down into key concepts (nouns or phrases), and then coded each participant’s answers into these concepts for analysis. Also, the answers for questions on library search tasks

versus devices were statistically analyzed and translated in tables. The data in this section was analyzed to determine why users use the mobile library catalog, what search tasks users prefer to complete on it, and the impact of contexts on users' search behaviors on the mobile library catalog.

For the questions on optimization of the mobile library catalog, the investigator collected participants' opinions on the advantage and disadvantages of the current mobile library catalog and their suggestions for future improvements. The data analysis in this part addressed the information needs of the users with the mobile catalog, and attempted to answer the research question whether users expect more advanced functionality from the mobile library catalog or the overall mobile library website.

4. Results

4.1 Users' interactions with the mobile library catalog

4.1.1 Common interactions

When asking participants' most common interactions with the mobile library catalog, the investigator encouraged them to provide one or more examples of their previous experience. Based on the transcriptions of participants' answers to this question, three key concepts reflecting users' common interactions were noted: looking up the availability of books, looking up the location of books, and searching for journal articles. In their answers, eight participants mentioned they looked up the availability of books, and the concept of availability. Availability could be broken into two sub-concepts, whether the library has the book and whether the book is checked out. For location, another set of eight participants remarked they looked up the location of books, and their answers contained expressions like call number, floor, stack, and which library has the book. Although six participants mentioned availability only while a different set of six participants mentioned location only in their exact answers, the investigator believed the two concepts were closely related to each other during users' real interactions. As the general library search task goes, a user needs to find whether the library has the book first in order to see the location or call number. And a user is likely to look up the location of an available book if he/she wants to check it out. Part of location is which library contains the book, as well as where in the library. Overall, the two concepts of availability and the location of books could be considered under the broader concept of accessibility.

Five participants stated that they searched for journal articles on the mobile library catalog. Based on the examples they gave, two participants were searching articles they

exactly knew, which were the required readings for their classes, and the other three participants noted they were searching for articles on specific topics to see if there were any. One participant remarked she actually read the article that she found with the mobile library catalog on her phone. The results indicated that users' search behaviors varied in nature for journal articles on the mobile library catalog.

4.1.2 Success rate

A set of questions addressed the success rate of participants' search experiences on the mobile library catalog, and the word "success" in this question was clarified to the participants as whether they easily found the resources they wanted on the mobile library catalog. The investigator provided a five-point Likert scale to the participants in order to measure their success rate when searching (almost every time (5), most of the times (4), about half of the times (3), some of the times (2), and almost never (1)). It turned out the twenty participants had an average success rate of 4.55, and more than half of them (thirteen) reported they easily found the resources they want almost every time, indicating users generally were successful when conducting searches on the mobile library catalog.

Then the investigator encouraged participants to describe one or more of their previous successful or unsuccessful experiences, and to comment on features of the mobile library catalog they think contributed to their success or caused their failure.

Most successful examples participants reported were searches on specific items, such as books and DVDs, and many of them commented the fact that the mobile catalog interface is intuitive, straightforward and simple, which contributed to their successful search

experiences. However, one participant reflected deeper on her successful experience, saying:

“I was pretty successful, but that answer should be tempered with the fact that I would only perform simpler kind of search on my phone.”

Though participants’ were mostly successful in their mobile library catalog searches, a couple of unsuccessful of unsatisfactory examples were provided. Two participants reported when the item they looked for was not in the first a few result listings on the search result page, they had to scroll down the page further and it usually took a long time to locate the item’s listing. Another two participants remarked that it was not easy to search for journal articles on the mobile library catalog, and one of them said:

“Sometimes when I’m searching for articles, just the fact that only the journal title you can search (by), that can make it more difficult sometimes.”

Also, three participants reported some technical issues on their mobile library catalog searches, such as the page crashed, the page did not display, and the interaction speed was slow when using the phone for searching the mobile catalog.

4.1.3 “Search by” options

The main search page of the UNC mobile library catalog offers a search bar that allows users to select one of five “search by” options, and they are keywords (the default option), title, journal title, author, and subject. One follow-up question of the interview asked whether participants consciously modified the “search by” options during their searches. It was not surprising to see nineteen out of twenty participants reported they had used the default keywords option. Also, nine and eight participants remarked the intentionally chose the title option and the author option, respectively. Only two

participants admitted that they used the journal title option, and other two participants mentioned that they tried the subject option.

The results on the “search by” options question demonstrated that most users’ were likely to use the default keywords option, but a number of users did realize they had access to a few advanced search options on the mobile library catalog and consciously tried other “search by” options.

4.1.4 Resource types

When asking the question that what type of resources participants used the mobile library catalog to search for, the investigator offers three choices for participants to choose from, books, journal articles, and media (DVDs, CD, etc.). Nineteen participants reported they searched for books on the mobile library catalog before, seven participants for journal articles, and five participants for various kinds of media resources. The only participant who didn’t search for books said she only used the mobile library catalog once to search for journal articles to write a course papers, and she didn’t got the chance to search for a book.

The results show that most users had a preference to search for books based on their previous experiences with the mobile library catalog, but still some users would like to use it to search for journal articles or media.

4.1.5 Functional links

On the third interface (the exact item page) of the mobile library catalog, there are four functional links at the bottom portion of the page and they are (1) email this item’s info, (2) text this item’s info (3) bookmark the link to this item, and (4) see full page for this item. When asked whether they had used those links or not, most participants said they

hadn't, and even a few participants stated that they didn't know about these functional links because they had never scrolled down to the bottom portion of an item page.

Despite the low use rate of the functional links, nineteen out of twenty participants expressed that they believed having these functions available would be helpful in their future mobile catalog searches.

4.1.6 Barcode scan functions

One the main search page of the UNC mobile library catalog, there is a button of "search via barcode scan", which links to the beta version of the barcode scan function. This function allows users to scan the barcode (ISBN) of a random book with their smartphone and then finds whether there is a copy of the book on the UNC library's holdings.

Currently, in order to make this function work, users have to download and install an external scanner app, which allows the mobile library catalog to manipulate the cameras on smartphones.

When asked the question about their experience using the barcode scan function, fifteen out of twenty participants said they had never used this function. Then two follow-up questions were asked for the fifteen participants, why they did not use it and what discouraged them to use it. It was somewhat surprising for the investigator to know many participants did not how the barcode scan function work. Seven of them expressed their confusion about when to use the function, so the investigator explained this function in detail to them. It turned out a few participants misunderstood this function to some extent, for instance, one participant remarked:

"When I first saw it, I was thinking you can only use it with books in our library...but if you can use it with other books like in a bookstore, I would be more likely to use it knowing that you can use it for a wider range. I guess I just

didn't understand. I was thinking I would go to the library and scan something, but it doesn't make sense to me now. I guess maybe clarification is helpful.”

For the five participants who had tried the barcode scan function, their success rate was very low. Only one participant said she successfully conducted a search by barcode scan but the library did not have the book she scanned. Another participant gave up trying when she found she needed to download the scanner to make the function work. And the other three participants reported various technical issues when they tried to use the barcode scanning function.

Though participants lacked experience with the barcode scan function and some of their experiences were unsatisfactory, 95% percent of the participants (nineteen out of twenty) showed interest in this function, expressed they were willing to use it in future if the library made it more accessible and easier to use. Having it better integrated (not requiring a separate plugin) would likely make this more frequently used function.

4.2 Users' purposes of using the mobile library catalog

4.2.1 Reasons to use the mobile library catalog

The investigator coded the reasons participants use the mobile library catalog into four major concepts, ease of use of the device, functional replacement, accessibility/mobility, and urgency. Then each interview transcription was analyzed by the four concepts, and each participant's answer was put into one or more of these concepts. The frequency of each concept mentioned was demonstrated in Table 1 below.

Concepts	Ease of use of the device	Functional replacement	Accessibility or mobility	Urgency
Frequency	8 times	3 times	17 times	5 times

Table 1: Concepts of reasons to use the mobile library catalog

Ease of use of the device is referred to the convenience and easiness of using smartphones. Participants' comments such as "It's just convenient to use my phone" and "I always bring my smartphone with me and it's so much easier to make quick searches on it" were categorized under this concept.

Functional replacement means participants used the mobile library catalog as a replacement of other functional tools such as notebooks or sticky notes. The three participants who mentioned this concept all said, they brought their smartphones with them when finding a book they wanted to check out in the library stacks, so that did not need to write down the call number of the book. One participant even used the camera on her smartphone to replace the function of a note, as she said:

"What I like about it is when I go to the item page, sometimes I just took a screenshot and saved it as a picture, otherwise I had to write it (the call number) down in order to find the book."

Accessibility/mobility referred to the fact that users could access the mobile library catalog anywhere due to the mobile nature of the device. One interesting finding is that there were two kinds of situations regarding accessibility mentioned by the participants. The first situation was when participants were away from computers and the smartphone was the primary device at the time (e.g. on a bus, without a laptop), so they search the library catalog via their mobile devices. The second situation was when they did have access to computers but they believed using smartphones was easier than using computers, just as one participant commented:

"...Of course, I always have my laptop with me when I'm in a library and there are computers there you can log on to use, but using my phone is easier, being mobile."

The concept urgency means there is a time frame for a library search task and a user needs to get results immediately. Five participants remarked they prefer to use the mobile library catalog when they needed the search results right away, as one of them stated:

“I needed research for an English paper, but I forgot about the paper till the last second, and all I had was my phone with me. I was running out of time and it was an emergency for me, my emergency resource... I didn’t have access to computers because I was at work.”

4.2.2 Reasons not to use the mobile library catalog

The investigator asked the participants whether they had experience that they chose not to use the mobile library catalog to conduct a search, but waited until they had access to a computer later and then did the search. If the participant’s answer was yes, then the investigator asked why they chose not to use the mobile catalog. Their answers were coded into one of more of the following three concepts, complexity of the search task, limitation of the device, and no urgency. The frequency of each concept mentioned by participants is in Table 2 below.

Concepts	Complexity of the search task	Limitations of the device	No urgency
Frequency	16 times	10 times	1 time

Table 2: Concepts of reasons not to use the mobile library catalog

80 percent of the participants admitted that the complexity of the search task had an impact on their decision whether to use the mobile library catalog or not. And they reported they would use a laptop or desktop computer to conduct complicated searches such as researching on literature on general topics. One participant commented:

“Anytime when I think when I have to perform multiple searches, or type in a lot of information to get what I want...like if there’s a textbook I’m looking for has lots of different editions, or if I want to look up research materials for a paper without anything in mind.”

Half of the participants mentioned the limitations the device discouraged them from using the mobile library catalog in some circumstances. The limitations include the small screen size, the difficulty to input without a physical keyboard, and limited functionality of smartphones. Desktop or laptop computers usually have larger screens, physical keyboards and more advanced software, which are more appropriate for certain kinds of search tasks. For instance, one participant said:

“If I search for something that has six or seven possible results, I will use my laptop, it’s easier for me make notes, to see whether it is checked out...more apps on laptops I can make use of.”

The concept of no urgency is opposite to the concept of urgency described above. One participant mentioned it as a factor of not using the mobile library catalog, saying:

“I only use the mobile device when there’s a sense of urgency, when like I have a deadline or time frame in mind or really need a particular book...If it’s not that emergent, I just wait to use my computer.”

4.2.3 Library search tasks on the mobile library catalog

When analyzing what library search tasks participants conducted on the mobile library catalog, the investigator explained three types of library search tasks (known item search, subject search, and exploratory search) to every participant to make sure they fully understood (See definitions in Appendix A) the three terms.

Library search tasks	Known item search	Subject search	Exploratory search
Number of participants	19	9	3

Table 3: Library search tasks conducted on the mobile library catalog

The data in Table 3 demonstrated that most participants (nineteen) had conducted known item search, nine participants had conducted subject search, which only three participants reported they had done exploratory search on the mobile library catalog.

The investigator believed the result of library search tasks on mobile library catalog somehow resonated with the findings on reasons why participants use or not use the mobile library catalog described above. The results in these sections indicated participants had the tendency to conduct simple and quick search tasks on the mobile library catalog such as known item search or some types of subject search, and they were less likely to conduct complicated library search tasks such as exploratory search on their mobile devices. This may further indicate that the mobile library catalog is convenient and easy for simple and quick search tasks, but not so helpful when conducting complex search tasks.

4.2.4 Library search tasks versus devices

A question on library search tasks versus devices was printed out as two tables for participants to fill during the interview, with the purpose to gain a better understanding of different devices' impact on library search tasks. Three questions on three types of library search tasks were asked for laptop/desktop computers and smartphones:

(Q1) How easy is it to do the task on this device?

(Q2) Is the library catalog interface helpful for completing the task on this device?

(Q3) How frequently you do each type of task on this device?

The investigator designed three simple answers for each question that allowed participants to choose from, and the answers were descending in degrees. The result of this question was like a matrix, which is showed in Table 4 and Table 5 below.

Library search tasks		Q1: How easy is it to do each task on laptops/desktops?			Q2: Is the library catalog interface helpful for completing each task on laptops/desktops?			Q3: How frequently you do each type of task on laptops/desktops?		
		Very	Some what	Not	Very	Some what	Not	Frequently	Some times	Almost never
Known item search	Number of participants	20	0	0	20	0	0	10	9	1
	Percentage	100 %	0%	0%	100 %	0%	0%	50%	45%	5%
Subject search	Number of participants	17	3	0	10	10	0	9	10	1
	Percentage	85%	15%	0%	50%	50%	0%	45%	50%	5%
Exploratory search	Number of participants	13	6	1	7	12	1	6	7	7
	Percentage	65%	30%	5%	35%	60%	5%	30%	35%	35%

Table 4: Library search tasks on laptop/desktop computers

Library search tasks		Q1: How easy is it to do each task on smartphones?			Q2: Is the library catalog interface helpful for completing each task on smartphones?			Q3: How frequently you do each type of task on smartphones?		
		Very	Some what	Not	Very	Some what	Not	Frequently	Some times	Almost never
Known item search	Number of participants	16	4	0	12	8	0	6	14	0
	Percentage	80%	20%	0%	60%	40%	0%	30%	70%	0%
Subject search	Number of participants	1	13	6	1	16	3	2	4	14
	Percentage	5%	65%	30%	%	50%	0%	10%	20%	70%

Exploratory search	Number of participants	2	3	15	0	9	11	1	1	18
	Percentage	10%	15%	65%	0%	45%	55%	5%	5%	90%

Table 5: Library search tasks on smartphones

After analyzing the data shown in Table 4 and Table 5, the following findings can be concluded for the twenty participants.

(1) When comparing all three questions Table 4 with Table 5, it was evident to see the overall degree of answers in Table 4 is higher than that in Table 5 for all three questions.

In other words, for all three types of library search tasks, participants generally believed it was easier to conduct them on computers than on smartphones, the interface of the library catalog was more helpful on computers in comparison with that on smartphones, and they conduct library search tasks more frequently on computers than on smartphones. This indicated that the overall functionality of the full web version library catalog outweighed the mobile library catalog, and participants generally were more likely to conduct their library search tasks on computers than on smartphones.

(2) When analyzing Q1 and Q2 in both tables, it was obvious that known item search was the easiest task, followed by subject search, and the exploratory search was the most difficult task, no matter they were conducted on computers or smartphones. Also, the helpfulness of interfaces on both versions of library catalog decreased from known item search to subject search and then to exploratory search. This was probably because of the nature of the three types of library search tasks.

(3) The result of Q3 in Table 5 showed that participant conducted known item search most frequently, followed by subject search, and seldom conduct exploratory search on the mobile library catalog. Considered together the result of Q1 and Q2 in the same table

together, the finding restated the implication drawn in the previous section that users prefer to conduct easier search tasks such as known item search on the mobile library catalog.

4.3 The mobile library catalog optimization

4.3.1 Pros and Cons of the current interfaces

As described in the introduction section, the current UNC mobile library catalog has three interfaces, and they are the main search page, the results page, and the item page. The investigator encouraged participants to make comments on pros and cons of any of the three interfaces, and the result is stated below.

Participants' comments on the main search page were mostly positive. The most frequent adjectives referred to this page were intuitive, simple, and straightforward, and most participants remarked they liked this page. Only a few minor cons were mentioned about the main search page. One participant said the size of search bar and buttons on this page could be adjusted for better visual comfort, and another participant remarked he would like a few more advanced search options besides the "search by" options on this page, such as publication date range.

The second interface, the page of a ranked list of results, was the most problematic interface among the three. Though a few participants said they like the way this page displayed, but more comments were on the drawbacks. Firstly, four participants remarked the layout of the result page was not easy to read, as one comment said:

"The second interface is a little cluttered...it's a lot of texts sometimes...things like that when the title and the author run into the same line is kind of confusing...maybe it could start at different lines and it would be easier"

Secondly, three participants stated that the information on the result page was not enough for them to evaluate whether the results were useful to them, and sometimes they had to go to the exact item page to decide the usefulness of an item. A few participants would like to see more information about items displayed on this page, such as images of book cover, and location of the item.

Thirdly, three participants commented on the way the results were ranked and expressed their needs to customize the ranking of the results. One participant said she would like the “sort by” function on the full web version of library catalog to be implemented on the mobile library catalog.

The third interface (the item page) was appreciated by several participants for the concise information on the page and its visual comfort. Particularly, three participants said the image of book cover on the page was intuitive and helpful. However, a few cons were mentioned regarding the item page. Firstly, a few participants remarked that the item page did not contain enough information they wanted for their search tasks, and they would like to see book summary, chapter list, and subject headings on this page.

Secondly, two participants commented on the layout of the functional links. They thought the links were really helpful, but their position on the page discouraged users to use them, just as one participant said:

“I never noticed you could text it to yourself, maybe it could be clearer. I think probably it’s the location (of the links), it’s something I don’t think I would scroll down there because I don’t have a reason to if I already seen the title and the information about where it is located.”

Furthermore, a few comments were made regarding to the overall interface, not the individual pages. Three participants expressed concerns on font size, with two of them though it was too small and one of them felt it was too big. Another participant said she

would like to do the “swipe” action on the mobile catalog, which was in use on many commercial mobile websites, and she commented:

“The con is I can’t swipe it open or swipe it back, and I have to click the button to get back (to the previous page).”

Overall, participants’ comments reflected they liked certain features of the mobile library catalog interface, but believed improvements could be made to optimize the interface.

4.3.2 Improving current functions

Participants showed interest in improving the mobile library catalog on functions that the UNC library currently offered. The current functions described in this section include not only the functionality already on the mobile library catalog, but also functions on the full web version of catalog.

The primary function the investigator was interested in was the faceted search function that the full web library catalog already provided. A few questions on this topic were asked during the interview. When asked whether the faceted search function was necessary or helpful to be implemented on the mobile library catalog, eighteen out of twenty participants said the faceted search would be very helpful. The remaining two participants said no because they had concerns about the current mobile catalog interface being cluttered by facets and they liked the way it was. Another follow-up question was to ask which facets were the most helpful if implemented on the mobile library catalog. Each of the eighteen participants who would like to see the faceted search on the mobile library catalog provided the most helpful facets to them, and format, availability, subject and location were the four most useful facets according to the participants. The frequency of each facet mentioned as helpful by participants is showed in Table 6.

Facets	Availability	Format	Language	Location	Publication year	Subject
Frequency	12 times	15 times	2 times	8 times	4 times	7 times

Table 6: The most helpful facets and their frequencies

A few other functions that the web library catalog offered were expected by some participants on the mobile library catalog. Five participants expressed their needs to access their own library account on the smartphone, so that they could reserve books, request interlibrary loan, and view what items they had checked out and their due dates. Also, three participants mentioned they would like to pull up ebooks and journal articles on the mobile library catalog, as well as to access some e-resources and literature databases that required identity verification (ONYEN). And one participant expected to send printing jobs to the printers in the library from her smartphone, which was possible via the web library catalog.

A few participants stated their expectations for improvement and optimization of the existing barcode scan function. Several participants said it was necessary to add a tutorial or an instruction for the barcode scan function, allowing users understood how it worked and how to use it. One participant would like the barcode scan offer more advanced functionality such as exporting citation for the scanned item.

The findings in this section indicated a need for implementing many features or functions of the web library catalog on the mobile library catalog, as well as improving the current available functions such as the barcode scan.

4.3.3 Future expectations

The last question asked in the interviews was a blue sky question that encouraged participants to dream what they wanted from the UNC mobile library catalog or even the

overall mobile library website. Participants' answers demonstrated their expectation for various advanced technology on the mobile library catalog.

Two participants expressed their hope for some kind of voice recognition or even artificial intelligence function on the mobile catalog, so that they could say out their searches instead of typing on a touch screen. One of them commented:

“I want to be able to, like standing at a statue in a memorial hall, and say it out ‘find me the holdings related to this statue’”

Three participants said they would like the mobile library catalog provides useful links to resources about the item on the Internet, and they wanted the library resources being connected to the whole Internet, like a real semantic web. As one of them said:

“It would be better if you can't find an item in our library, it could provide me some links to the student store or Amazon, some external links to useful resources.”

Four participants remarked that it usually took them more time than they expected to find a book in the library stacks when they had the call number of the book. Therefore, they wish there was a function like in-library GPS, which could direct them in the library to find the item they were looking for. As one participant remarked:

“I would like to pull up a map of the library on my phone, and it tells me where the book is located, like in-library GPS that shows me which stack I need to walk to.”

Three other participants showed their interest of being able to check real-time library information on their smartphone, particular for the computers and study rooms in the library, so they could make the most of the library facilities available at that time, as one of them said:

“Sometimes during the day when I'm on campus, it would be nice to use my smartphone to know how many and which computers are available, and also for

study rooms...so I don't have to walk around the whole library looking for a study room."

Furthermore, there were four participants mentioned their wish for the self-checkout function on their smartphone. They would like to check out a book from library via their own smartphones by the barcode scan or some other techniques, as one of them stated:

"I think I would like to check a book out on my phone. I don't know if that make sense, if you have the book and your OneCard, you scan the barcode and your OneCard, and then you save the trip to the information desk."

The future expectations of the participants described above reflected their need for more advanced functionality from the mobile library catalog or even the overall mobile library websites.

5. Discussion

This study aimed to gain better understanding of the UNC mobile library catalog and its users, and to shed light on the little-studied four research questions stated in the introduction part. Several themes can be drawn from the results part above, and they are discussed in depth as follow.

5.1 Information search behavior

Overall, the findings of participants' interaction with the UNC mobile library catalog supported the idea that users' information search behaviors tend to be different on mobile devices from traditional computers, which was emphasized by many previous studies on mobile information search behavior.

One interesting fact is that the current study produces slightly different results from a few previous studies. For example, Kamvar and Baluja (2006) discovered users' search terms on mobile Google search tended to be shorter and they rarely used advanced search options. But this study showed that some users of the UNC mobile library catalog consciously selected the advanced "search by" option when searching and a few of them even expected more advanced search options from the mobile catalog. One possible reason for the different results is the different settings of the two studies, since mobile Google users tend to be the general public, while the UNC mobile library catalog users are in an academic setting. Therefore, the investigator believes that users from different settings or backgrounds may behave differently in their mobile search behaviors, and this would be an interesting topic for future studies.

Church and et al. (2007)'s study found users preferred browsing over searching in mobile information access and frequently modified their search terms. However, the current

study found a few users of the mobile library catalog did not like browsing through the result page and thought the scrolling was tedious, instead, they were more likely to conduct simple and easy search tasks on the mobile library catalog, which was an obvious searching behavior. The investigator cannot explain what factors result in such different findings at this point, but it definitely could be a research question for future exploration.

5.2 Underlying purposes and mobile information needs

The current study revealed some of the underlying purposes why users chose to use the mobile library catalog, such as the ease of use of the device, the accessibility/mobility, the need for functional replacement, and the urgency of the search tasks. And such findings lent support to Sohn et al. (2008)'s and Chua (2011)'s studies, on the influence of context on mobile information needs. This study confirmed that contexts, such as geographical locations, urgency of the task and the devices available, did affect users' decision to address their information needs on their mobile devices.

In addition, Church and Smyth (2009) identified two kinds of new information needs regarding to mobile devices, the geographical need and personal information management need, which was also supported by findings of the current study. The results showed that some users of the UNC mobile library catalog really cared about the of a specific book location (which library had it) because they were in a certain library and only wanted books in that library, which is apparently a need prompted by their geographic locations. Also, a few participants expressed their wish to download and manage their own digital copies of journal articles from the library on their smartphones, which can be considered as a kind of personal information management need.

Therefore, the investigator deems that the mobile information needs will still be a worthwhile area to be further examined, no matter under the general web search setting or the library search settings.

5.3 Information tasks

On the topic of information tasks on mobile devices, there were a few previous studies on taskflows, but many other aspects of the topic were little studied.

However, the current study produced some valuable results in terms of library search tasks versus devices. The most interesting finding was that users preferred to conduct simple and quick library search tasks such as known item search on the mobile library catalog, but would like conduct more complicated searches such as exploratory search on laptop or desktop computers. And one possible reason for that was the functional difference between smartphones and computers. Also, the findings indicated many participants consciously chose their devices (smartphones or computers) to address their various information needs, which required different kinds of library search tasks to achieve.

Furthermore, the results showed that participants generally thought the web library catalog was equipped with advanced functions and easier to address all kinds of search tasks than the mobile library catalog, and most of them conducted all three types of library search tasks more frequently on the web library catalog than on the mobile library catalog. This reflects that the web library catalog is still the primary version of library catalog for most participants, and the mobile catalog is probably considered as the supplement or extension of the web library catalog.

As more and more people are equipped with multiple web-enabled devices (computers, tablets, and smartphones) in modern society, the information tasks on different-sized of devices should be a promising area for future investigation.

5.4 Users' expectations and implications for optimization

The findings of the current study confirmed the statement that users expected to have more advanced features and functions from the UNC mobile library catalog.

The most important fact the investigator wants to emphasize is the large number of issues found with the second interface (the result page). In fact, how to best display the search results has been a constant discussion in the information retrieval community, and different opinions were presented regarding this topic. Church et al. (2006) reported from their study that ranked list presentation of search results, which was borrowed from web search engines, might not be the best way to display search results on mobile devices. And the findings of the current study supported their statement to some extent. Because participants reported more frustrating experience from the results page than the other two pages, which might lead us to rethink the ideal way to represent search results on smartphones, considering the size and functionality of the device. As a result, the investigator believes the search result presentation would be a valuable and practical topic for future researches.

Moreover, the participants of this study provided valuable feedback for the optimization of the mobile library catalog. They remarked on the current interfaces and pointed out what should be modified and improved, and they also expressed their wish to implement some features or functions of the web library catalog to the mobile library catalog, such as faceted search options, library account services and so on. In addition, they imagined

some of the state-of-art functions with the respect of the mobile library website, such as voice recognition, in-library GPS or real-time library information updates. The feedback from the participants offers helpful implications for optimizing the UNC mobile library catalog and even the whole mobile library website, as well as for other libraries that wish to improve their mobile library website.

6. Conclusion

The current study explored four research questions, how users interacted with the mobile version of library catalog, why users used it, what library search tasks they conducted on it, and what more did they expect from it. The findings of the study helped us to better understand these research questions and provided valuable implications on optimization of mobile library catalogs and mobile library websites. Potentially, the study would be helpful for the research areas of mobile information behavior, mobile information retrieval, and mobile interface design.

However, the sample size in the current study was relatively small, including only twenty participants from a homogenous population of students, and should not be used to produce general conclusions on several broader topics such as mobile information behavior and mobile information needs. Therefore, the investigator believes future researches on larger and more diverse populations, and on specific topics of mobile library catalog, are necessary.

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Appendix A

Interview Questions

Part 1 Demographic questions

Your gender: M/F

Your age group: 18-30/31-45/46-60/Above 60

Your identity: Undergraduate student/Graduate student

How frequently do you use your smartphone for apps or web interactions?

[Many times per day/few times per day/few times per week]

What smartphone do you have? iPhone_____ Android _____

Part 2: Experience with the mobile library catalog

1. Describe and walk me through the most common interaction(s) you have with mobile library catalog.
2. How often were you successful in your mobile library catalog search? (Almost every time/ Most times/About half of the times/ Some of the times/Almost never)
3. Please describe one or more **successful experiences** with the mobile library catalog. What features of the mobile catalog do you think help you succeed?
4. Did you have any kinds of **unsuccessful experience** (failure to find what you want, technical issues, etc.) with the mobile library catalog? If yes, please describe the experience and the factors you think caused the failure. If you gave up on trying something, why did you give up?
5. Have you ever used the **barcode scan function** of the mobile catalog? If yes, please describe one of your experiences and tell me your opinion about it. If not, please indicate what discourage you from using it.

Part 3: Purpose of using the mobile library catalog

1. Think about times you've used the mobile device to search the library catalog. Why did you use it? What motivated you to use it? What were the circumstances?
2. Think about times you choose **NOT** to use the mobile version of library catalog, but save the task later when you have access to a computer. Why didn't you use it? What was your motivation? What were the circumstances?

There are three main types of Library Search Tasks:

Known item search: you know information about an item (author, title, or publisher, etc.) and search for its detailed information. For example, you want to find out the availability and location of a textbook, *Fundamentals of Database Management Systems*, by Mark L. Gillenson.

Subject search: you search for relevant resources on a particular subject or topic. For example, you want to find critiques on Emily Dickinson's poetry for a course paper.

Exploratory search: You search for information on topic(s) that are more broadly or fuzzily defined than subject searches. Searches might be complex in nature, or require identification of multiple resources. For instance, you search for reasons why Robert Mugabe is not a good leader for the Zimbabwe people.

3. Which of these types of searches have you conducted using the mobile interface? Are there types of searches you would not try to do using a mobile phone?
4. Help us understand which of the search task types described above (know item search, subject searches, and exploratory searches) are effective on mobile devices in comparison with other types of devices, for web based interactions to the library catalog. (This question will be printed out as a form for participants to fill.)
5. Sometimes we're more likely to search for specific types of resources on different devices or specific contexts. **Are there specific types of resources** that you are more likely to use the mobile library catalog to search for? (Books, journal articles, media)

Part 4: Optimization of the mobile catalog

1. In your opinion, what are the pros/cons of the current interface? What types of search tasks are easily addressed, what are difficult?
2. If you haven't already explained why, please indicate what factors make using the mobile interface difficult (not helpful, not easy, or you don't use it) as you indicated in your answers above. For instance, because it takes too longer, it doesn't have a physical keyboard, or it's too cumbersome, etc.
3. Do you think the faceted-search options on the full web version of library catalog are necessary or helpful to be implemented on the mobile library catalog? If yes, can you tell me which facets are the most helpful to you?
4. Imagine that your mobile device (smartphone) was capable of anything. If it was, what kinds of things would you use it for with respect to the library? What information or contents about the library do you want mobilely available?

Form for Part 3 Question 4

Help us understand which of the search task types described above (known item searches, subject searches, and exploratory searches) are effective on mobile devices in comparison with other types of devices for web based interactions to the library catalog.

Laptop/desktop computers

Library related tasks	Q1: How <u>easy</u> is it to do each task on laptops/desktops?			Q2: Is the library catalog <u>interface</u> <u>helpful</u> for completing each task on laptops/desktops?			Q3: How <u>frequently</u> you do these types of tasks on laptops/desktops?		
Known item searches	Very	Some what	Not	Very	Somew hat	Not	Frequ ently	Some times	Almost never
Subject searches	Very	Some what	Not	Very	Somew hat	Not	Frequ ently	Some times	Almost never
Explorator y searches	Very	Some what	Not	Very	Somew hat	Not	Frequ ently	Some times	Almost never

Smartphones

Library related tasks	Q1: How <u>easy</u> is it to do each task on smartphones?			Q2: Is the library catalog <u>interface</u> <u>helpful</u> for completing each task on smartphones?			Q3: How <u>frequently</u> you do these types of tasks on smartphones?		
Known item searches	Very	Some what	Not	Very	Some what	Not	Frequ ently	Some times	Almost never
Subject searches	Very	Some what	Not	Very	Some what	Not	Frequ ently	Some times	Almost never
Explorator y searches	Very	Some what	Not	Very	Some what	Not	Frequ ently	Some times	Almost never

Appendix B

Email title

Participants wanted for an interview study on the mobile version of UNC library catalog

Email contents

Hi all,

My name is Yuanyuan Feng, a master's student at the School of Information and Library Science of University of North Carolina – Chapel Hill. My master's paper focuses on optimization of the interface of the mobile version of UNC library catalog, and I am looking for participants for an interview study (UNC IRB# 13-0099).

I am looking for those who:

- Have access to a smartphone they use on a regular basis.
- Have experience with the mobile version of UNC library catalog via smartphone.
- Are at least 18 years old and fluent in speaking and writing English.

If you are interested in sharing your experience with the UNC mobile library catalog and would like to participate in my study, please contact me. Your participation involves one interview session lasting about 20 to 30 minutes and you will receive \$10 for participating in the study.

You can contact me at yfeng@live.unc.edu and we can discuss your possible participation, but you are not obligated to participate by contacting me. All e-mails are private.

Thank you for your time!

Best regards,

Yuanyuan Feng
2013' MS in Information Science
School of Information and Library Science

[illegible]

Appendix D

University of North Carolina-Chapel Hill Consent to Participate in a Study

Consent Form Version Date: 01/30/13

Title of Study: How Do Users Interact with the Mobile Version of UNC Library Catalog?

Principal Investigator: Yuanyuan Feng

Faculty Advisor: Bradley M. Hemminger

UNC-Chapel Hill Department: School of Information and Library Science

UNC-Chapel Hill Phone number: 919-962-8366

Study Contact Email Address: yfeng@live.unc.edu

Study Contact telephone number: 919-599-6068

This study is part of the principal investigator's work for UNC course INLS 992, "Master's Paper". The purpose for undertaking the study is to collect research data to support the investigator's master's paper.

What are some general things you should know about studies?

You are being asked to take part in a study. To join the study is voluntary.

You may refuse to join, or you may withdraw your consent to be in the study, for any reason and without penalty.

You will receive a \$10 stipend for participating in the study. There are no anticipated risks to participating in the study.

Details about this study are discussed below. It is important that you understand this information so that you can make an informed choice about being in this study.

You will be given a copy of this consent form. You should ask the researchers named above any questions you have about this study at any time.

What is the purpose of this study?

The purpose of this study is to investigate how users interact with the mobile version of UNC library catalog and generate implications for optimization. The investigator intends to recruit participants who are users of the mobile version of library catalog of UNC libraries.

Are there any reasons you should NOT be in this study?

You should NOT be in this study if:

- You are younger than 18 years old.
- You do not have a smartphone.
- You have not accessed the UNC library catalog via smartphone.
- You are not fluent in speaking and writing English.

How many people will take part in this study?

If you decide to be in this study, you will be one of approximately 20 people in this study.

How long will your part in this study last?

Participation will consist of a single session that will last about 20 to 30 minutes.

What will happen if you take part in the study?

If you agree to participate, we will arrange a mutually agreeable time and place to interview you about your experiences with and thoughts about the mobile version of the UNC library catalog. During the interview, you will be asked to fill out a form of one interview question, since the question is easier done by this way. The forms will be destroyed after the analysis of the data on them. The interview will be recorded, and the recordings are transcribed for our research analysis. After the analysis is completed, the recordings will be deleted permanently.

For any reason, you may choose not to answer any question that is part of the study.

What are the possible risks or discomforts involved from being in this study?

The risks in this study to be no more than those encountered in everyday life. There may be uncommon or previously unknown risks. You should report any problems to the researcher.

How will your privacy be protected?

Your name and personal information will be used when we setup the interview and when you receive payment, and your information will not be recorded or associated with your responses. Your study data will be associated instead with a numeric identifier. The data collected will be stored on our secured computer. After the analysis for this project is completed, we will delete the originally collected data.

Participants will not be identified by name in any report or publication about this study. Although every effort will be made to keep research records private, there may be times when federal or state law requires the disclosure of such records, including personal information. This is very unlikely, but if disclosure is ever required, UNC-Chapel Hill will take steps allowable by law to protect the privacy of personal information. In some cases, your information in this research study could be reviewed by representatives of the University, research sponsors, or government agencies for purposes such as quality control or safety.

What if you want to stop before your part in the study is complete?

You can withdraw from this study at any time, without penalty. The investigators also have the right to stop your participation at any time. This could be because you have had

an unexpected reaction, or have failed to follow instructions, or because the entire study has been stopped.

Will you receive anything for being in this study?

You will receive a stipend of \$10 for participating in the study.

What if you are a UNC student?

You may choose not to be in the study or to stop being in the study before it is over at any time. This will not affect your class standing or grades at UNC-Chapel Hill. You will not be offered or receive any special consideration if you take part in this study.

What if you have questions about this study?

You have the right to ask any questions you may have about this study. If you have questions about the study (including payments, complaints, concerns), or if a study-related injury occurs, you should contact the investigator or the faculty advisor listed on the first page of this form.

Title of Study:

How Users Interact with the Mobile Version of UNC Library Catalog?

Principal Investigator: Yuanyuan Feng

Faculty Advisor: Bradley M. Hemminger

Participant's Agreement:

I have read the information provided above. I have asked all the questions I have at this time. I meet the qualifications for the study. I voluntarily agree to participate in this research study.

Signature of Research Participant

Date

Printed Name of Research Participant

Signature of the Researcher Obtaining Consent

Date

Printed Name of the Researcher Obtaining Consent