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THE UNIVERSITY OF NEBRASKA AT OMAHA'S CRISS LIBRARY
MOBILE RESOURCES: A STUDY OF USER'S PREFERENCES

by

Teonne A. Wright

A THESIS

Presented to the Faculty of
The Graduate College at the University of Nebraska
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Under the Supervision of Professor Stacy James

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THE UNIVERSITY OF NEBRASKA AT OMAHA'S CRISS LIBRARY
MOBILE RESOURCES: A STUDY OF USER'S PREFERENCES

Teonne Antoinette Wright, M.A.

University of Nebraska, 2011

Adviser: Stacy James

In March of 2010 the University of Nebraska at Omaha Dr. C.C. and Mabel L. Criss Library launched mCriss, the library mobile website to support the educational objectives of on-campus and distance students as well as the research goals of UNO faculty and staff. The study investigators conducted an online survey of UNO students, faculty, staff, alumni and UNO Library Friends ages 19 and older. The purpose of this study was to collect data on UNO community member use of mobile devices and UNO Criss Library mobile services, to determine if participants: are aware of the different aspects of the Library mobile initiative; use Criss Library mobile resources; are interested in other library mobile services and (if so) identify which resources/services are of interest; and determine participant perceptions of library mobile resources/services. The study found that the modal users of the Criss Library mobile website are Caucasian, female, undergraduate students between the age of 19 to 25 in the social sciences. The results also shows that 66 percent have Internet access on their mobile phone, but only 24 percent have used a mobile device to access UNO Library mobile resources. Library catalog and library hours are the top resources used on a mobile device.

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DEDICATION

This thesis is dedicated to my children Eliza and Austin; you can do all things through Christ Jesus who gives strength. The largest task can be accomplished if it is done one step at a time, so let your steps be ordered by the Lord, He will take you all the way.

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I owe my loving thanks to my husband Jeffrey, he has been my pillar of strength and a constant source of support – emotional, moral and of course financial – during my graduate years, and this thesis would certainly not have existed without him. My children Eliza and Austin, they have sacrificed a lot due to my educational pursuits and research, I thank them. Without the encouragement and understanding of my family, it would have been impossible for me to finish this work. My special gratitude is due to my parents, my brother, my sisters and their families for their loving support. My loving thanks are due to Bishop Dr. Nelson G. Turner and the Greater Bethel Temple family your prayers were much appreciated.

TABLE OF CONTENTS**Chapter One: Introduction**

Introduction	1
Rationale	2
Statement of Purpose	4

Chapter Two: Literature Review

Review of Literature	5
Diffusion of Innovations	6
Uses & Gratification Theory	7
Opt-In Methods	8
Google Analytics Report	10

Chapter Three: Methodology

Methodology	13
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Chapter Four: Findings and Results

Demographic Information	17
Use of the UNO Library Mobile Website, mCriss	20
Quick Response (QR) Codes	24
UNO Text-a-Librarian Service	25
Results and Interpretations	28

Chapter Five: Conclusion and Discussion

Discussion	41
Limitation	45
Future Research	46
Bibliography:	37
Appendices:	42

LIST OF MULTIMEDIA OBJECTS

Figure 1: Survey Announcement	Page 15
Figure 2: mCriss Visitor's Mobile Device Display Sizes	Page 17
Figure 3: mCriss Visitor's Mobile Device Types	Page 18
Figure H1: Announcements or notices * time spent social networking	Page 29
Table H1: Announcements or notices * time spent social networking	Page 30
Figure H2: UNO Library mobile resources accessed * UNO Affiliation	Page 31
Table H2: UNO Library mobile resources accessed * UNO Affiliation	Page 32
Figure H3: Time spent accessing UNO coursework or lectures * Gender	Page 33
Table H3: Time spent accessing UNO coursework or lectures * Gender	Page 34
Figure H4a: Announcements or notices * Age	Page 35
Figure H4b: Overdue book notices via SMS text messaging * Age	Page 36
Table H4: Overdue book notices via SMS text messaging * Age	Page 36
Figure H5a: Future use plans * Academic Discipline/Field of Study	Page 37
Figure H5b: I plan to use mCriss * academic discipline or field of study	Page 38
Table H5: I plan to use mCriss * academic discipline or field of study	Page 38
Appendix A: Institutional Review Board Approval	Page 50
Appendix C: Adult Informed Consent Form	Page 60
Appendix D: Demographic Characteristics	Page 62
Appendix E: African American and Latinos lead Whites in their use of mobile data applications	Page 63

Chapter One: Introduction

Introduction

The convergence of mobile technology, the Internet and PC are a reality. Mobile devices have changed the way we communicate and our ability to stay connected. Educators and university library systems are exploring and reshaping the way they disseminate information, using mobile devices to connect with the public and efficiently deliver information and services to the world. In light of the advancements in mobile technologies, the University of Nebraska at Omaha (UNO) Dr. C.C. and Mabel L. Criss Library (Criss Library) is exploring opportunities for new ways to better serve the UNO community. This thesis will contribute to this “exploration,” by (1) identifying what library mobile resources/services participants are interested in and (2) assisting in future development of Criss Library mobile initiative resources/services. Focusing future library mobile development in areas of interest to UNO community members will allow the UNO Criss Library to leverage existing resources of staff, time and money to maximum effect.

In an era of digital tablets such as Kindles and iPads, hardcover books and other resources that are conventional to libraries are becoming obsolete (Conner, 2010). The Criss Library is a resource that all students and professors across all disciplines at UNO can access. As sweeping advancements in technology are reflected in the classroom, it is important that the library reflects these changes in order to maintain its relevance and purpose at UNO.

The purpose of this research is to examine how UNO students, faculty, and staff, use Internet enabled mobile devices (i.e., Smartphones, iPod Touch, iPads, and iPhones) to access Criss Library resources as well as to investigate the impact that user attitudes and perceptions may have on developing, and communicating, library mobile services in higher education.

The goal of the study is to better understand users' awareness and use or non-use of the current available mobile resources. Gaining an understanding of the 'how and why' of mobile technology use in a university library will be accomplished by identifying UNO student, faculty, and staff motivations, preferences, and expectations. The findings of the study will assist in the design and development of appropriate mobile learning resources that are in congruence with their communication behavior.

The results of the study will help Criss Library Virtual Services comprehend how UNO library users perceive the use of library mobile services. More specifically, the study will help identify what mobile services are necessary to support and meet user needs. The insights gained from the study could be reflected in the Criss Library's technological advancements by determining where resources are spent and to ensure efficiency within the Library.

Rationale

As early as 2007, The Horizon Report warned, "Higher education is facing a growing expectation to deliver services, content and media to mobile and personal devices" (New Media Consortium, 2007, pg. 5). With the proliferation of mobile

technology in the daily lives of undergraduates, members of the higher education community began to explore the possibility of incorporating mobile device use into the educational experience of students. Academic libraries, in turn, began exploring the possibility of delivering services, resources and collections to college students via mobile devices.

The UNO Criss Library supports the mission of the University and thus the educational objectives of on-campus and distance students as well as the research goals of UNO faculty and staff. As mobile device use among UNO community members grew, the Library began experimenting with offering mobile device services to the UNO community. The UNO Criss Library mobile website, mCriss (m.library.unomaha.edu) launched in March 2010. It provides access to the online library catalogue, library information and access to many electronic journals and databases subscribed to by the Library. Along with mCriss, the Library also offers Short Message Service (SMS) text-messaging assistance which allows anyone to send a question to a librarian via text-message and receive a response within a few minutes. During 2010, the Library also introduced the use of QR codes (Quick Response 2D barcodes) within the building for immediate access to library resources and way-finding as well as additional information about exhibits and displays at Criss Library.

Each piece of the Library's mobile initiative is being used by the UNO community. However, the Library is uncertain how users found out about these

mobile services; which aspects of the mobile initiative are most useful; and what other services or resources not currently offered would be beneficial to mobile users.

This study uses an online survey of UNO students, faculty, staff, alumni and UNO Library Friends to determine if participants are aware of the different aspects of the UNO Criss Library mobile initiative; if participants use UNO Criss Library mobile resources/services; if participants are interested in other library mobile services (and if so identify which resources/services are of interest); and participant perceptions of library mobile resources/services.

Ascertaining participant awareness and perceived significance of current Library mobile resources/services, combined with identifying Library mobile resources/services participants are interested in, will assist in future development of Criss Library mobile initiative resources/services. Focusing future Library mobile development in areas of interest to UNO community members will allow the Library to leverage existing resources of staff, time and money to maximum effect.

Statement of Purpose

The purpose of this study is to find out what mobile technology and services are of interest to current and potential Criss Library users.

Chapter Two: Literature Review

Review of Literature

The literature review will illuminate what is taking place in the mobile technology realm in terms of technology changes, device uses, and user adoption within higher education. A vast quantity of the academic research into mobile technologies such as advertising is focused on creating frameworks and conceptual models to facilitate a base for the field. Since no precise mobile theory exists, researchers are examining traditional and Internet theory and practice models to determine whether they may clarify the mobile field. According to Hanley, Becker, & Martinsen (2006), the most common theories used by researchers include Fishbein and Ajzen's (1980) Theory of Reasoned Action, Roger's (2003) Innovation Diffusion Theory, Festinger's (1957) Theory of Cognitive Dissonance, Davis's (1989) Technology Acceptance Models, Blumler and Katz's (1974) Uses and Gratification Theory, and Weber, Anderson, and Birnbaum's (1992) Theory of Perceived Risk to investigate mobile consumer attitudes, demographic and usage perspective, and acceptance. In light of this information, included is a brief overview of the theoretical insights from the literature that will guide the research. Communications theories relevant to this research study arise from the perspectives of diffusion of innovation and media uses and gratifications.

Diffusion of Innovation

Rogers defines diffusion as “the process by which an innovation is communicated through certain channels over time among the members of a social system.” The key elements in diffusion research are: the innovation, types of communication channels, time or rate of adoption, and the social system which frames the innovation decision process. Diffusion of an innovation occurs through a five-step process. This process is a type of decision-making. It occurs through a series of communication channels over a period of time among the members of a similar social system. Rogers categorizes the five stages (steps) as: knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003). In the *knowledge* stage, an individual becomes aware of an innovation and its functions. Prior experience with the Internet and demographic characteristics will influence knowledge formation. A patron will build their beliefs about the innovation based on their knowledge. In the *persuasion* stage, patrons develop their beliefs about and attitudes toward the innovation based on their knowledge. In the *decision* stage, patrons will make decisions regarding whether to adopt or reject the innovation based on their emerging attitudes. In the *implementation* stage, patrons will accept or reject the innovation (Jiang, 2009, p. 422). In the last stage, *confirmation*, patrons will reconsider the innovation adoption based on satisfaction with their usage experiences and will make decisions regarding whether they will continue to use the innovation in the future. Prior experience with components of the innovative process or product should increase willingness to adopt the innovation (Jiang, 2009, p. 423).

This study will explore the adoption of an innovation used by the UNO Criss Library system. Rogers defines an adopter category as a classification of individuals within a social system based on innovativeness. Five primary adopter categories are innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). The innovation is the use of mobile devices to obtain information distributed through mobile resources. The Library has adopted the use of mobile devices and is working toward getting the students and faculty to adopt and use it. Adopter categories are generally distributed normally in the population (Rogers, 1962). The 'domestication' of educational organizations makes innovation more difficult and the progress of change slower (Johnson, 1970).

Uses and Gratification Theory

Uses and gratification theory first proposed by Blumler and Katz, assumes prior adoption of an innovation and focuses on the user's motivations to continue the use of that technology (Ruggiero, 2000; Stafford, Stafford & Schkade, 2004). Uses and gratification theory is based on the idea that media cannot influence an individual unless that person has some use for that media or its messages. Therefore, the media and content choice is generally rational and directed towards certain specific goals and satisfactions (Rubin, 2002). Utilizing a cross-sectional research design, and eliciting data from secondary school students through a field survey-questionnaire, Mondri, Woods, and Rafi (2008) findings suggest that there are significant relationships between five dimensions of students' uses and gratification expectancy for e-learning resources, and their 'perceived e-Learning experience.' Uses and

Gratification approach also assumes that e-learning resources may compete with other information sources for satisfaction of students' learning needs. The researcher of the Criss Library mobile study is seeking to find what opt-in method fulfill the satisfaction of current and potential UNO Criss Library users' needs.

Opt-In Methods

The Criss Library is interested in expanding its mobile services to include Short Messaging Service (SMS) announcements, billing statements, and overdue notices. The most common opt-in mechanisms in use today are Short Messaging Service (SMS) text messaging and entering a web form. The use of SMS to access customers through their handheld devices is gaining popularity, making the mobile phone the ultimate medium for one-to-one marketing (Tsang, Ho, and Liang 2004).

Technology demands that we better serve our users by ensuring they are aware of the many services that are available to them and that we communicate that message in a way that gives them a sense of empowerment in having this knowledge at their fingertips. Tsang, Ho, and Liang (2004) investigated consumer attitudes toward mobile advertising and the relationship between attitude and behavior. The results of the survey indicated that, (1) consumers generally have negative attitudes toward mobile advertising unless they have specifically consented to it, and (2) there is a direct relationship between consumer attitudes and consumer behavior. Thus, it is not a good idea to send SMS advertisements to potential customers without prior permission (Tsang, Ho, and Liang 2004). A limitation to the study is it is not targeted to educators, but instead to mobile marketers. If tailored to educators, this study can

be useful for determining how to contact students and their attitudes towards SMS messages from educators for educational purposes.

Another opt-in method that is currently being used by the UNO Criss Library is Quick Response (QR) or 2-D Codes. A QR code is a two-dimensional barcode that can be read by mobile device cameras that have a QR code reader like ScanLife, Kaywa, Zxing and others loaded onto the device. Consumer takes a picture of a 2-D code (such as a QR-code or a data matrix code) captured by a mobile device. QR reader software loaded on the mobile device: processes the code; links the user directly to information, images and URLs embedded in the code; and presents the consumer with relevant content. The Library uses QR codes to link mobile device users to a variety of library information, resources and services.

Similar to the Library, the Wang (2010) study examined consumers' intentions of using image recognition opt-in in relation to real-life applications drawn from different product types and purposes, which will be useful in evaluating the usefulness and continued use within university libraries. This research also examined the impact of gender and previous experience on the intentions. The results showed that music was the most popular application, whereas books were the least popular application. The results also revealed that the respondents exhibited stronger intentions of using image recognition opt-in for music than magazine ads, product promotions, outdoor signs, event promotions, movies, in-store displays, books, and food. While there was no gender effect on respondents' intentions of using image recognition opt-in for different applications, respondents who have used image

recognition opt-in had stronger intentions of using image recognition opt-in on most applications than respondents who have not used image recognition opt-in before (Wang, 2009). A limitation to the study is it is not targeted to educators, but instead to mobile marketers. This is useful in comparing our current use of Quick Response (QR) as an opt-in method.

Some of the questions asked were taken directly from the Pew Research Center's study on *Understanding the Participatory News Patron: How Internet and cell phone users have turned news into a social experience* which was published March 1, 2010 and *Mobile Access 2010* which was published July 1, 2010. This was done to make direct comparisons between the respondents of our study and the respondents of the Pew Study. The survey also includes questions about use of Library mobile resources/services; perceptions and opinions of Library mobile resources/services; and some demographic questions (e.g. age, sex, UNO affiliation) to correlate stakeholder groups with mobile device use and interest.

Google Analytics Report

According to a 2011 Google analytics report completed by the researchers, over the past year Criss Library has experienced a 158.6 percent increase in visits to the UNO Criss Library Mobile Site mCriss. Traffic comes from a variety of sources, 46.1 percent from referring sites, 41.6 percent from search engines, and 27.5 percent direct traffic. The users are from 30 different countries using 99 different network operators on 103 different device types with 25 different browsers. The average

mobile user spends an average of one minute 33 seconds on the site and viewing 2.3 pages per visit, while 22.1 percent were returning users.

Drawing on insights from previous research, this study endeavors to analyze the impact of gender, age, UNO affiliation, and academic discipline/field of study on mobile library resource use in the population studied from the UNO educational community by addressing the following research question:

RQ: Which demographic characteristics and personal social media use are related to the use/usage of Criss Library mobile services?

Five suggested hypotheses about the relationship between social media use, UNO affiliation, gender, academic discipline/field of study and age are as follows:

H1: People who spend more time on a daily basis social networking (Facebook, Twitter, etc.) from their Internet-enabled mobile devices are more likely than those who report they spend less time on a daily basis networking (Facebook, Twitter, etc.) from their Internet-enabled mobile devices, to be interested in receiving announcements and notices via SMS text message from UNO Criss Library.

H2: UNO students are more likely than UNO faculty to have used the UNO Criss Library mobile website, mCriss (<http://m.library.unomaha.edu>) resources for looking up journals, eResources (database/journal), Library catalogue.

H3: Females are more likely than males to spend an average of 15 minutes or more a day accessing UNO coursework or lectures from an Internet-enabled mobile device.

H4: If the UNO Criss Library was able to send announcements and notices via SMS text messages, younger users are more likely than older users to be interested in receiving overdue book notices from the Library to an Internet-enabled mobile device.

H5: UNO community members whose academic discipline or field of study is in the Social Sciences (Education, LIS, Social Work, Communication etc) are more likely than UNO community members whose academic discipline or field of study is in the Formal Sciences (Engineering, Biology, Exercise Science, etc) to say “In the future, I plan to use mCriss (UNO Library mobile site).”

Chapter Three: Methodology

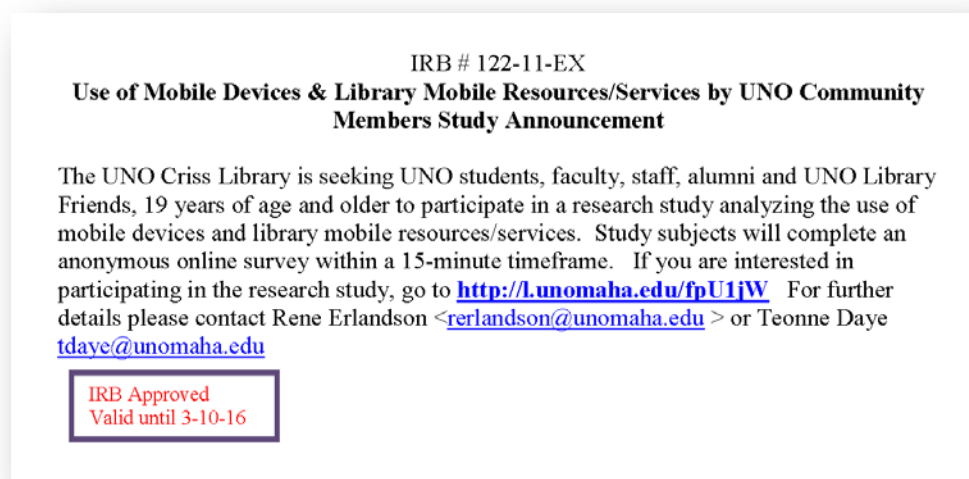
Methodology

According to the Fact Book for the University of Nebraska at Omaha (2011), the UNO population is made up of 11,663 undergraduate students, 2,676 graduate students, 884 faculty, and 1,069 staff members, . Our goal was to have a 50/50 male to female distribution of participants. To cover as many UNO faculty, staff, and student library users as possible and to protect the privacy, anonymity, and confidentiality of individual participants, the study investigators created a one-time, anonymous 15 minute, Internet-based survey questionnaire (see Appendix B) via the popular on-line survey software Survey Monkey. This service was chosen for convenience and because it is a familiar survey tool used in academia. The researcher also had access to a full subscription which would allow crosstab calculations and researchers to reach a wider audience.

In a similar 2006 study, Ball State examined the factors that made ads acceptable to over 650 students in a medium-sized Midwestern town. This study employed an online survey to validate mobile advertising acceptance factors and the types of incentives needed to motivate college students to accept advertisements on their cell phones. It found that 29 percent of students would accept ads on their phone if they received something for free, 51 percent of students said they did not want ads on their phones at all, 66 percent will accept cell phone ads if there are compensated (Hanley, Becker, & Martinsen, 2006).

Previously published research in library literature suggests 50+ participants will provide a baseline for mobile initiative development (Hu, 2010). We are opting to assess 75 subjects in this study. The number of subjects for this study was determined by identifying stakeholder groups. Then applying suggested participant numbers for successful mobile initiative development from library literature to those stakeholder groups and thus formulating the total number of study participants. A survey participant age range of 19 to 90 was set to include UNO students, faculty, staff, alumni and UNO Library Friends in the study, so anticipate the age range being from traditional college age to traditional retirement age and beyond to account for inclusion of emeritus faculty, alumni and Library Friends.

The following message, along with a web link to the survey questionnaire, was distributed April 4, 2011, until April 25, 2011, through UNO eNotes (an electronic newsletter), UNO Criss Library websites, Criss Library Breaking News! Blog, and Criss Library social media sites (i.e., Facebook and Twitter) inviting all UNO faculty, staff, and students to participate in the research study.

Figure 1: Survey Announcement

This study consists of 41 questions on UNO affiliates: students, staff, faculty, alumni, and Library Friends' types of mobile devices and uses of Internet-enabled mobile devices to receive information on what's happening at UNO Criss Library. Questions were asked about mobile communication, Quick Response (QR) Codes, social media (i.e., Facebook, Twitter, etc.), SMS text messaging, and other mobile device tools. Some of the questions asked were taken directly from the Pew Research Center's study on *Understanding the Participatory News Patron: How Internet and cell phone users have turned news into a social experience* which was published March 1, 2010 and *Mobile Access 2010* which was published July 1, 2010. This was done to make direct comparisons between the respondents of our study and the respondents of the Pew Study. The survey also includes questions about use of Library mobile resources/services; perceptions and opinions of Library mobile

resources/services; and some demographic questions (e.g. age, sex, UNO affiliation) to correlate stakeholder groups with mobile device use and interest.

All aspects of data collection and analysis were approved by the Institutional Review Board (IRB), and the approval letter is found in the appendices (See Appendix A). This study was approved by the University of Nebraska Medical Center Institutional Review Board, 987830 Nebraska Medical Center, Omaha, NE 68198-7830. Those responding had to complete the online survey by April 25, 2011, and be Adult Affiliates (19 years of age or older) of University of Nebraska at Omaha listed in the SAP directory in order to participate in the study. There were no known risks and no incentives given to study participants. Each respondent in the convenience sample were self-selected, and came from a variety of academic disciplines with varying UNO affiliations; there was no obligation on their part to participate. All those who returned the survey were considered a respondent. Submission of the questionnaire is voluntary and is an indication of their willingness to be a participant (See Appendix C).

Chapter Four: Findings and Results

Demographic Information

Respondents consisted of 240 males, 265 females, and 147 unknown (See Appendices D). Responses were received from 652 individuals, 22 of them did not qualify for the scope of this study and results were discarded, and 40.6 percent were female, 36.8 percent were male. Participant age ranges were not evenly distributed: 49.2 percent were 19 to 25 years old, 11.2 percent were 26 to 31 years old, 6.3 percent were 32 to 38 years old, 4.4 percent were 39 to 45 years old, 3.5 percent were 46 to 52 years old, 1.7 percent were 53 to 59 years old, and only 1.1 percent was 60 + years of age.

The size of the device display is important and effects the way users view the Criss Library website. A Minhee and Jinwoo (2004) study indicates that both information structure and screen size significantly affect the navigation behavior and perceptions of mobile Internet users. By identifying relationships among horizontal depth, screen size, and task type, the study investigators determined that the more complex tasks become, the more horizontal depth and screen size become critical influences and affects user navigation activities and perceptions.

The screen size has a significant interaction effect with horizontal depth on mobile user perceptions. One aspect of screen size, as it relates to horizontal depth, is the rate at which information changes as users scroll line by line through the menu structure (Minhee and Jinwoo, 2004, p. 169). The difference between the two screen

sizes lies in the rate at which information changes when users scroll up or down. The smaller the screen, the more radical the information change users experience – and the higher their cognitive load when they attempt to understand their current location relative to a reference point (Minhee and Jinwoo, 2004, p. 170).

Figure 2: mCriss Visitor’s Mobile Device Display Sizes

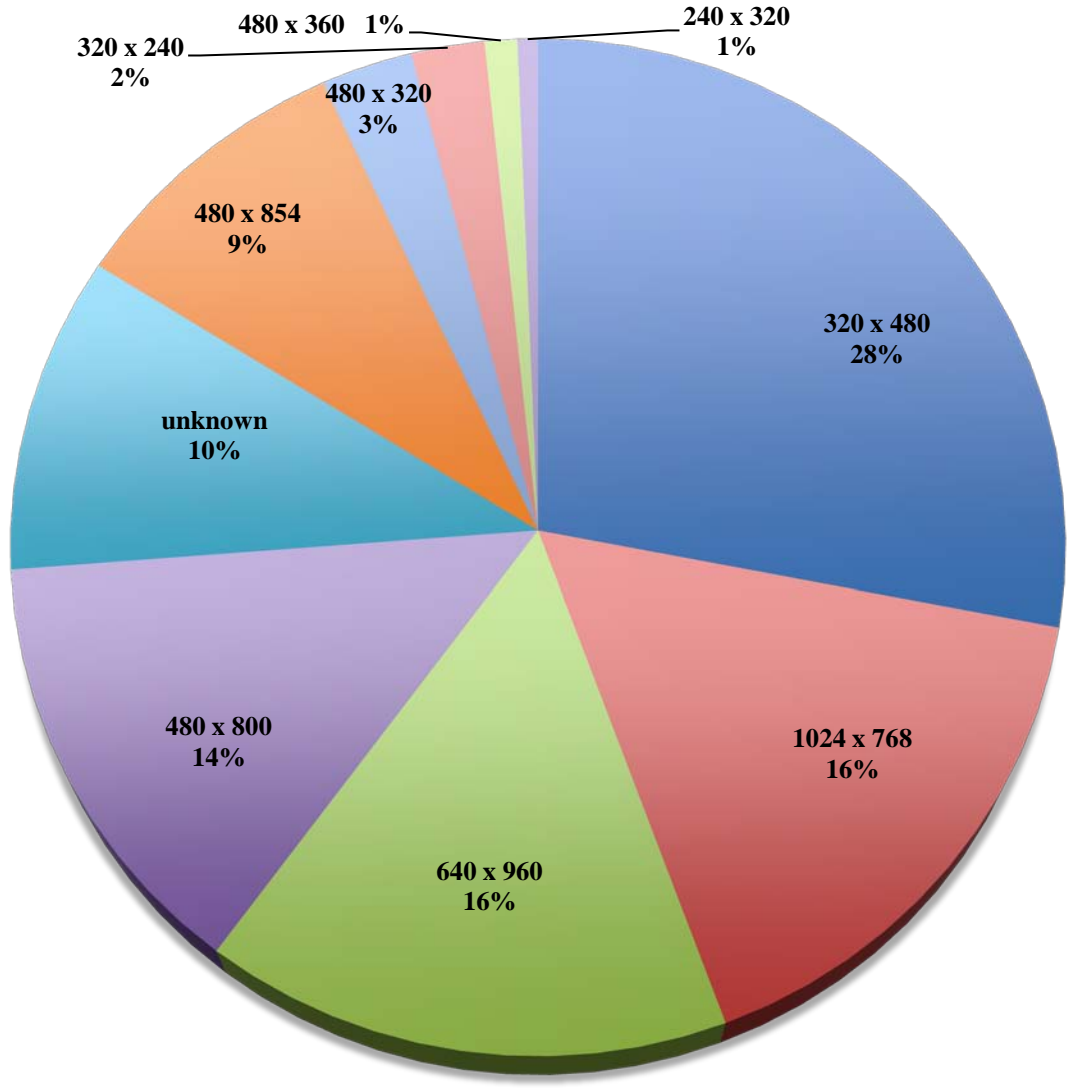
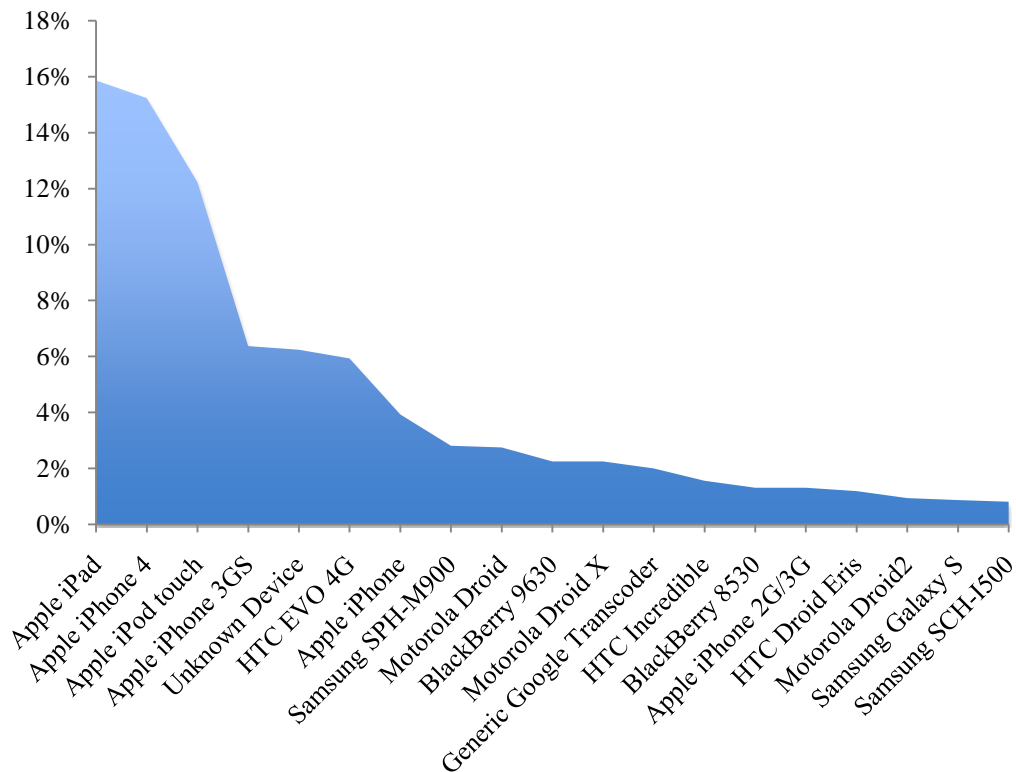


Figure 3: mCriss Visitor's Mobile Device Types



In response to general questions about cell phone usage and SMS

communication acceptance:

- 54.7 percent of participants reported having a cell phone
- 45.6 percent of participants reported having a Smartphone
- 65.5 percent of participants can access the Internet from their mobile phone but only 64.5 percent actually use their mobile device to access the Internet.

- 52.1 percent access free Wi-Fi connections with their mobile device when available.
- 82.9 percent subscribe to a texting plan while 49 percent subscribe to a data plan
- 46.6 percent of participants reported an interest in receiving advertisements from UNO Criss Library on their mobile device.

When asked what barriers are preventing respondents from using a mobile device to access the Internet, 19 percent said cost of data plan. Over 3 percent indicated that there are no barriers preventing them from accessing the Internet via a mobile device.

Other reasons given for not using the Internet:

- 6.3 percent Slowness of connection
- 2.7 percent No connectivity (lack of signal) in areas frequented
- 9.5 percent Small screens
- 4.8 percent Content is difficult to read due to poor formatting
- 2.9 percent Difficult to read in high light (or outside)

According to survey responses, 23.9 percent of participants have used their mobile device to access UNO Library resources. These include:

- 2.2 percent find directions to the Library
- 15.8 percent to locate Criss Library hours

- 12.5 percent use the online library catalogue
- 8.1 percent looked up journals
- 7.9 percent connected to one of the online databases or other electronic resources
- 2.7 percent emailed a question to UNO Library
- 3 percent sent a text message question to the UNO Text-a-Librarian
- 1.3 percent checked the line at the Library Café via the Café Cam
- 1 percent used the text call numbers to cell phone.

25.2 percent of study participants are satisfied with the UNO library mobile resources currently available, while 10.6 percent are not interested in accessing UNO library resources on a mobile device.

Use of the UNO Library Mobile Website, mCriss

(<http://m.library.unomaha.edu>)

On the mobile survey, 22.7 percent of respondents answered yes, I have used the UNO Library mobile website, mCriss (<http://m.library.unomaha.edu>) but only 6 percent stated, yes, I know the UNO Library has a website formatted for mobile devices. Respondents were primarily informed about mCriss on the main library website, 1.1 percent read about it in library promotional material (poster, bookmark etc), 2.5 percent heard about it from someone they know, 3.2 percent heard about it

from a library staff member, and 1.3 percent saw a notice about it on the library electronic signs. Other ways respondents were informed:

“Facebook posting” - 26 to 31 year old Male Undergraduate Student.

“Class. Heard about it from a professor” - 32 to 38 year old Female Graduate Student

“Haven't heard of it. I just use the Library's website very frequently.” - 19 to 25 year old Female Undergraduate Student

“I Googled it” - 19 to 25 year old Female Undergraduate Student

“Phone directed me to it” - 19 to 25 year old Male Undergraduate Student

Respondents are motivated to use the UNO Library mobile Website, mCriss because of convenience, an immediate need for information, and mCriss ease of reading on a mobile device rather than the regular library website. Other reasons:

“Anything where I can just whip out my phone and use it and find whatever I need is extremely helpful” - 19 to 25 year old Male Undergraduate Student

“Curiosity” - 26 to 31 year old Female Staff

“I wanted to test it out.” - 19 to 25 year old Female

Undergraduate Student

“Required for a class” - 19 to 25 year old Female

Undergraduate Student

“Walk with phone while looking for book numbers” - 19 to 25

year old Male Undergraduate Student

When asked to rate mCriss for ease of use, overall effectiveness, and overall appearance, the responses were consistent, those that found the Library mobile website easy to use also found it effective and appealing. Likewise, those that found Criss Library mobile website very difficult to use also found it very ineffective and very unappealing. Of the respondents, 1.2 percent gave mCriss a rating of very difficult/difficult to use, 11.3 percent neither difficult/easy to use, and 12.4 percent said it was very easy/easy to use. Several suggestions to help improve the UNO Library mobile website, mCriss include:

“Add a link to the full library website. It may not be pretty or easy to use on a tiny Smartphone screen, but any access to the full information is better than no access. The mobile interface for the research guides (libguides.unomaha.edu) is actually pretty nice.

Maybe that would be a good thing to link to on the mCriss main page, or at least the mobile resources page.” - 32 to 38 year old Female

Staff

“It needs to include as many features of the actual website as possible. It looked very plain (I can understand that)” - 19 to 25 year

old Male Undergraduate Student

“The catalogue search can be very slow to load on my AT&T network connection and then it looks like you are supposed to click on mCriss to advance when you supposed to type in the search box. I

would suggest moving that button down and relabeling to "return to mCriss. Otherwise, great mobile site!” - 39 to 45 year old Female

Faculty

“I use this primarily for reading eBooks on my kindle. If you had a link that would filter only available eBooks, that would be helpful.” - 32 to 38 year old Male Undergraduate Student

“I am not completely certain what "mCriss" is. Your survey will have to define these services so that I know what I'm being asked about. Although I am not familiar with the "mCriss" service, it sounds like a waste of time because I have no trouble using the previous services which have always on the library web page. Spend your time

getting people to read instead.” - 26 to 31 year old Male Graduate

Student

Quick Response (QR) Codes

A Quick Response code (aka QR code) is a two-dimensional barcode which can be read by mobile device cameras that have a QR code reader like ScanLife, Kaywa, Zxing and others loaded onto the device. Once a QR code is captured by a mobile device camera, the QR reader software loaded on the mobile device links the user directly to information, images and URLs embedded in the code.

Criss Library uses QR codes to link mobile device users to a variety of library information, resources and services. Over 70.7 percent of respondents have never used or even know what a QR code is. Only 8 percent of respondents have used a QR code and 3 percent have ever used a Quick Response (QR) code provided by the UNO Library. Respondents learned about the QR codes provided by the UNO Library on the Library website, saw QR codes in the Library, and/or read about QR codes in Criss Library promotional material. The motivation behind respondents' use of the QR codes provided by the UNO Library is curiosity, wanting to see how the service works and the codes easy to use. Number one reason for not having used the QR codes provided by the UNO Library, “I don't know what a QR code is.” Other reasons for not using QR Codes:

“I do not own a cell/mobile phone at this time” - 53 to 59

year old Male Undergraduate Student

“There aren't many places where it's convenient for me to use QR codes.” - 19 to 25 year old Female Undergraduate Student

“In my opinion they waste time” - 26 to 31 year old Male Undergraduate Student

“I am sure my phone is not compatible with the software to use QR reader” - 32 to 38 year old Female Graduate Student

“I can't afford data on my phone and my iPod Touch doesn't have a camera.” - 26 to 31 year old Male Graduate Student

UNO Text-a-Librarian Service

Of all survey respondents, only 4.8 percent have used a cell phone to send/receive a message from the UNO Text-a-Librarian Info Quest service provided by the library that allows users to text librarians for information. Respondents were motivated to use the UNO Text-a-Librarian Info Quest because they needed help from a librarian, had an immediate need for information, and they wanted to see how the service worked. While 40.6 percent of respondents have not used the UNO Text-a-librarian Info Quest service because they were not aware of the service, 23.5 percent usually don't ask librarians for help, and 27.1 percent are fine with getting help from librarians using other means like telephone, email or going to the reference desk. Other reasons for not using the UNO Text-a-Librarian service include:

“Have not yet needed to ask a librarian for help but would consider using the service when situation arises.” - 39 to 45 year old

Female Graduate Student

“I'd rather have the face to face contact” - 19 to 25 year old

Female Undergraduate Student

“I do not own a mobile/cell phone; I am also ‘slow’ technologically” - 53 to 59 year old Male Undergraduate Student

“When I involved (infrequently) with a research project seems to be the time when I consult a librarian.” - 60+ year old

Male UNO Alumni

“IM (Meebo) is fine. Don't see the need to limit my query to 160 characters.” - 26 to 31 year old Male Graduate Student

Only 6.9 percent of respondents learned of the UNO Text-a-Librarian Info Quest service through notices posted on the UNO Criss Library website, from Library staff members, they read about UNO Text-a-Librarian Info Quest service in Library promotional material or in the newspaper, and/or heard about the service through word-of-mouth.

Suggestions made by respondents to help improve the UNO Text-a-Librarian service:

“Brilliant idea! Very creative and helpful! Maybe to better advertise it, have a little jpeg on the library main page showing someone texting something to the librarian (“Hey, where do I search research databases?”) and them receiving a response from the librarian (“Click on the ‘Databases’ button on the library main page.”). Or something like that.” - 26 to 31 year old Male

Undergraduate Student

“I asked whether the laptops available for checkout had webcams and/or microphones, and the response indicated they did not know the answer.” - 19 to 25 year old Male Undergraduate

Student

“I did not get replied. Do you have limited service hours like 9-5 only and Mon. – Fri.?” - 32 to 38 year old Female Faculty

“Responsiveness or estimated response time” - 32 to 38 year old Male Graduate Student

When asked if UNO Criss Library was able to send announcements and notices via SMS text message “would you be interested in receiving them,” 46.6 percent of respondents said yes. The announcements or notices that survey

respondents would be interested in receiving from the UNO Library via SMS text messaging are Overdue book notices 41.4 percent, Billing notices 31.7 percent, Event/Exhibit announcements 28.2 percent, and Inter-library loan announcements 24.7 percent.

Other Library services respondents plan to use in the future:

- 26.8 percent mCriss (UNO Library mobile site)
- 12.7 percent UNO Text-a-Librarian InfoQuest SMS reference service
- 16.2 percent UNO Library QR codes
- 34.9 percent UNO Emergency SMS service
- 10.8 percent All of the above

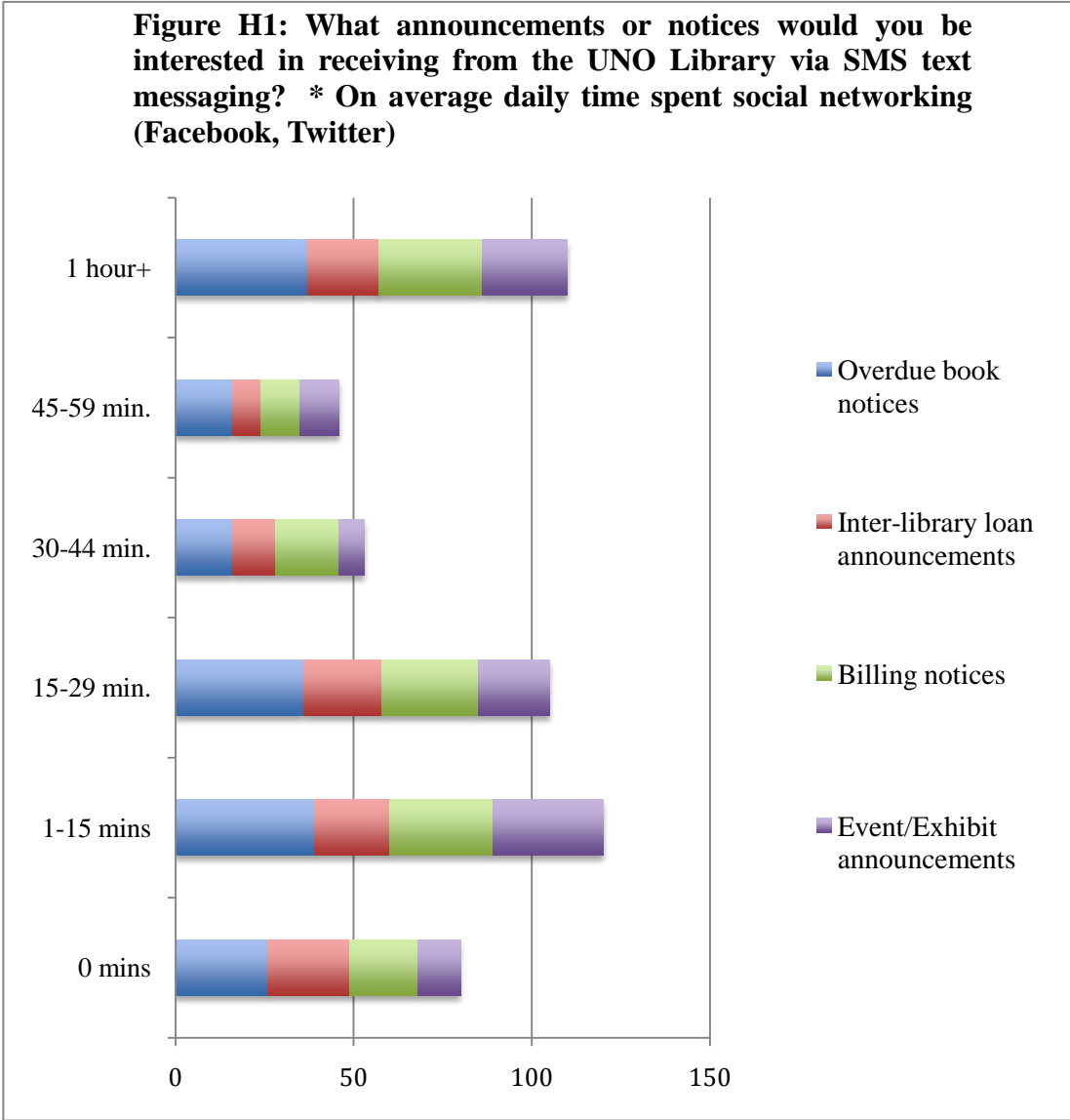
Determining which demographic characteristics and personal social media use are related to the use/usage of Criss Library mobile services

RQ: Which demographic characteristics and personal social media use are related to the use/usage of Criss Library mobile services?

Five suggested hypotheses about the relationship between social media use, UNO affiliation, gender, academic discipline/field of study and age are as follows:

The first hypothesis stated that people who spend more time on a daily basis social networking (Facebook, Twitter, etc.) from their Internet-enabled mobile

devices are more likely than those who report they spend less time on a daily basis networking (Facebook, Twitter, etc.) from their Internet-enabled mobile devices, to be interested in receiving announcements and notices via SMS text message from UNO Criss Library. The results of this hypothesis were not supported. The difference between groups was not statistically significant at the .05 level or less.



**Table H1: If the UNO Library was able to send announcements and notices via SMS text message would you be interested in receiving them? *
On average, how much time do you spend daily social networking (Facebook, Twitter) from your mobile device? Crosstabulation**

Count

		On average, how much time do you spend daily doing the following activities from your mobile device? (Check all that apply) - Social Networking (Facebook, Twitter)						Total
		0 mins	1-15 mins	15-29 min.	30-44 min.	45-59 min.	1 hour+	
If the UNO Library was able to send announcements and notices via SMS text message would you be interested in receiving them?	No	26	28	25	19	7	23	128
	Yes	30	46	38	21	16	38	189
Total		56	74	63	40	23	61	317

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.031 ^a	5	0.695
Likelihood Ratio	3.043	5	0.693
N of Valid Cases	317		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.29.

The second hypothesis stated that UNO students are more likely than UNO faculty to have used the UNO Criss Library mobile website, mCriss (<http://m.library.unomaha.edu>) resources for looking up journals, eResources (database/journal), and Library catalogue. The results of this hypothesis were not

supported. The difference between groups was not statistically significant at the .05 level or less.

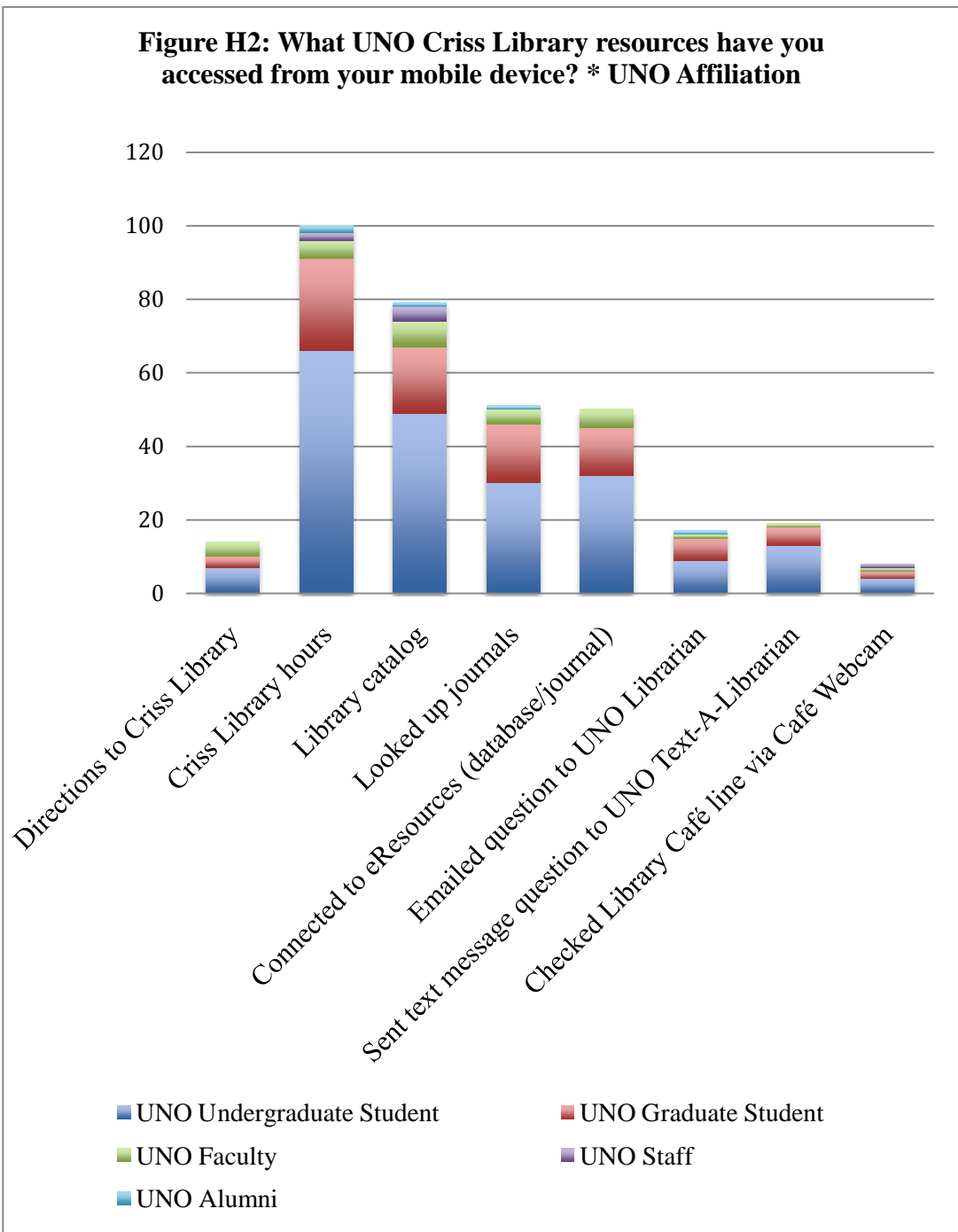


Table H2: Have you used your mobile device to access UNO Criss Library resources? * UNO affiliation Crosstabulation

Count

		UNO affiliation:						Total
		UNO Alumni	UNO Faculty	UNO Graduate Student	UNO Library Friends	UNO Staff	UNO Undergraduate Student	
Have you used your mobile device to access UNO Library resources?	No	3	8	39	1	7	156	214
	Yes	3	8	32	0	4	104	151
Total		6	16	71	1	11	260	365

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.097 ^a	5	0.836
Likelihood Ratio	2.448	5	0.784
N of Valid Cases	365		

a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is .41.

The third hypothesis states females are more likely than males to spend an average of 15 minutes or more a day accessing UNO coursework or lectures from an Internet-enabled mobile device. The results of this hypothesis were not supported. The difference between groups was not statistically significant at the .05 level or less.

Figure H3: On average, how much time do you spend daily accessing UNO coursework or lectures from your mobile device * Gender

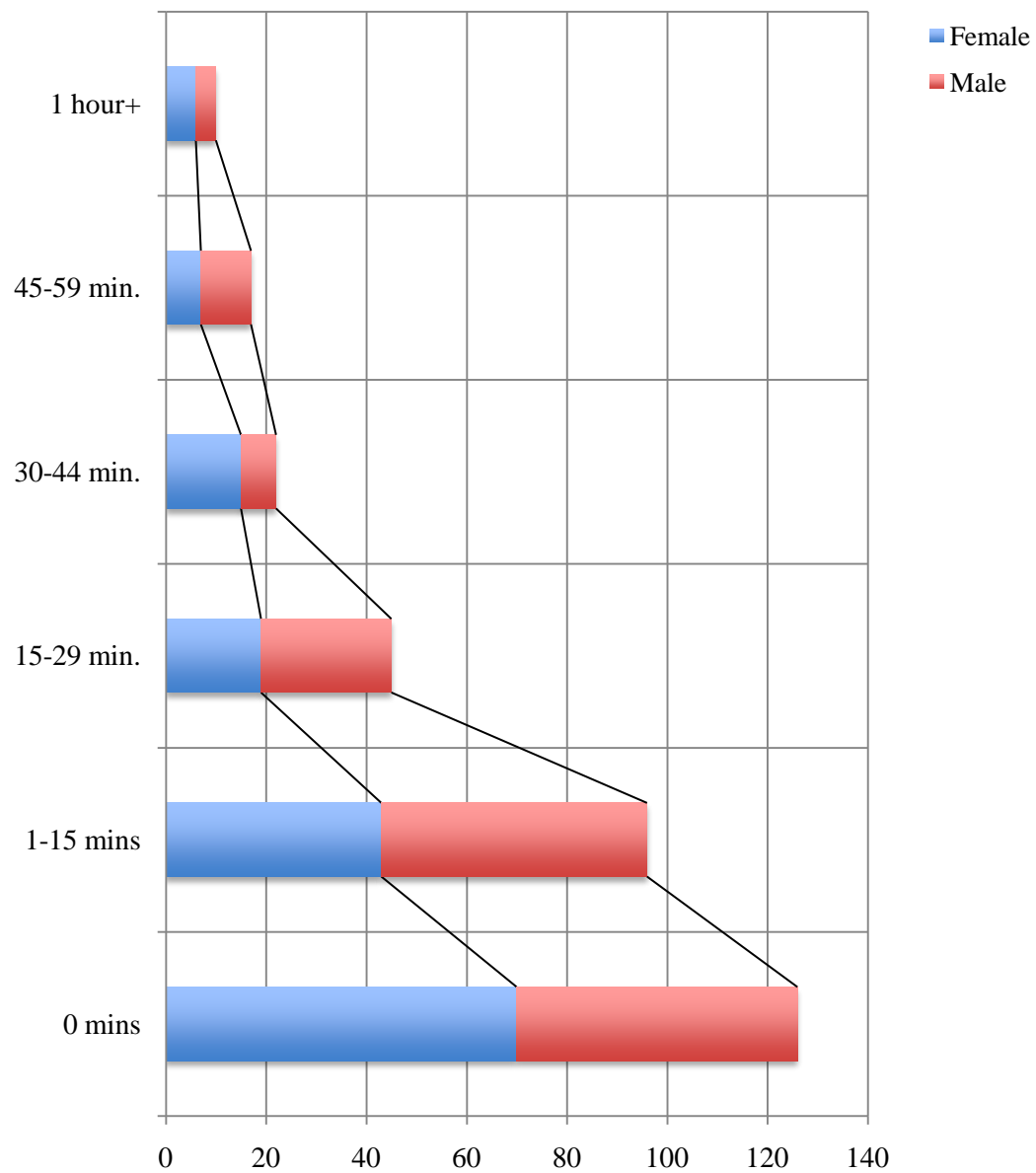


Table H3: On average, how much time do you spend daily doing the following activities from your mobile device? (Check all that apply) - Access UNO coursework or lectures * Gender Crosstabulation

Count

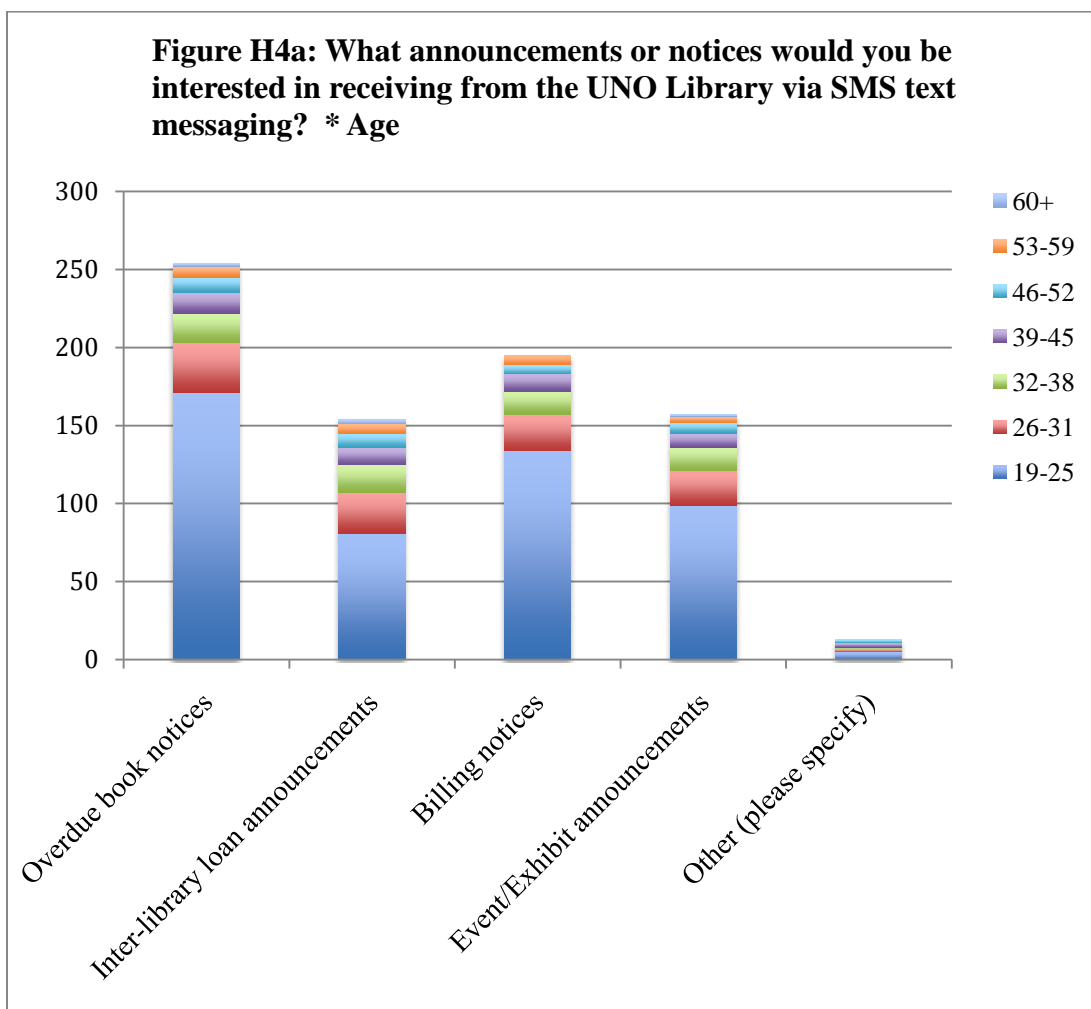
		Gender		Total
		Female	Male	
On average, how much time do you spend daily doing the following activities from your mobile device? (Check all that apply) - Access UNO coursework or lectures	0 mins	70	56	126
	1-15 mins	43	53	96
	15-29 min.	19	26	45
	30-44 min.	15	7	22
	45-59 min.	7	10	17
	1 hour+	6	4	10
Total		160	156	316

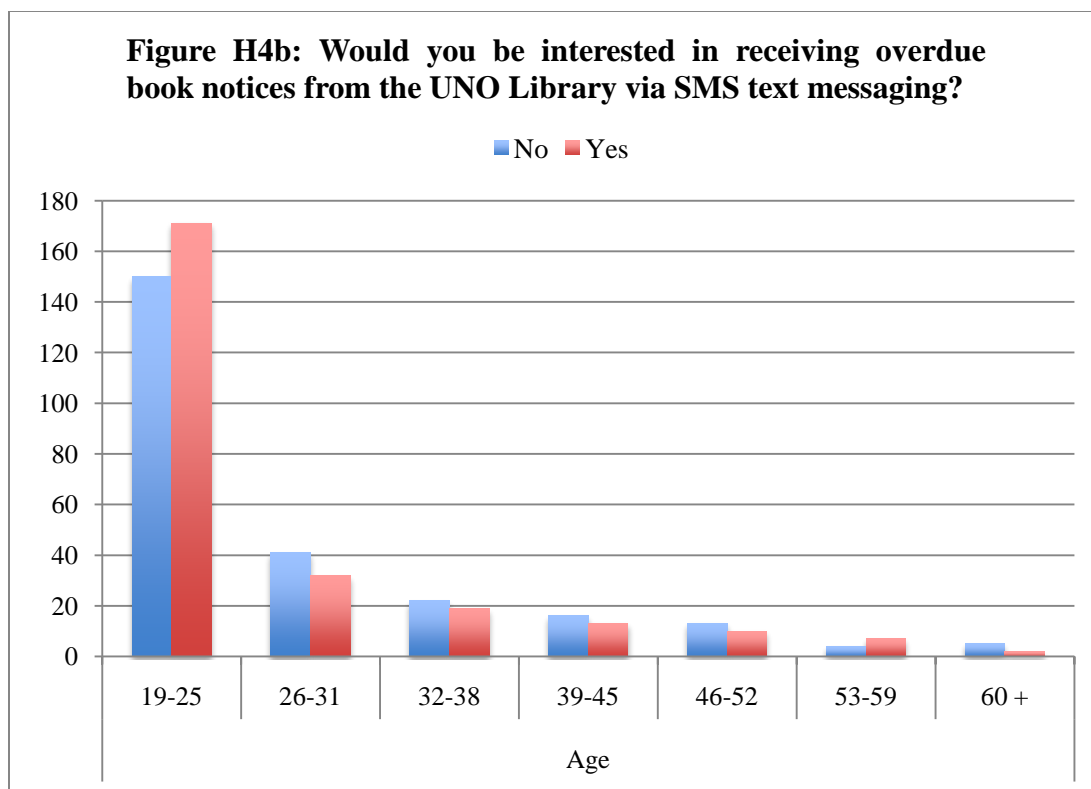
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.475 ^a	5	.188
Likelihood Ratio	7.557	5	.182
N of Valid Cases	316		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 4.94.

The fourth hypothesis asked if the UNO Criss Library was able to send announcements and notices via SMS text messages, younger users are more likely than older users to be interested in receiving overdue book notices from the Library to an Internet-enabled mobile device. The results of this hypothesis were not supported. The difference between groups was not statistically significant at the .05 level or less.





H4: Would you be interested in receiving overdue book notices from the UNO Library via SMS text messaging? * Age Crosstabulation

Count

	Age							Total
	19-25	26-31	32-38	39-45	46-52	53-59	60+	
Would you be interested in receiving overdue book notices from the UNO Library via SMS text messaging? No	150	41	22	16	13	4	5	251
Yes	171	32	19	13	10	7	2	254
Total	321	73	41	29	23	11	7	505

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.491 ^a	6	0.483
Likelihood Ratio	5.549	6	0.476
N of Valid Cases	505		

a. 2 cells (14.3%) have expected count less than 5. The minimum expected count is 3.48.

The fifth hypothesis stated that UNO community members whose academic discipline or field of study is in the Social Sciences (Education, LIS, Social Work, Communication etc) are more likely than UNO community members whose academic discipline or field of study is in the Formal Sciences (Engineering, Biology, Exercise Science, etc) to say “In the future, I plan to use mCriss (UNO Library mobile site).” The results of this hypothesis were not supported. The difference between groups was not statistically significant at the .05 level or less.

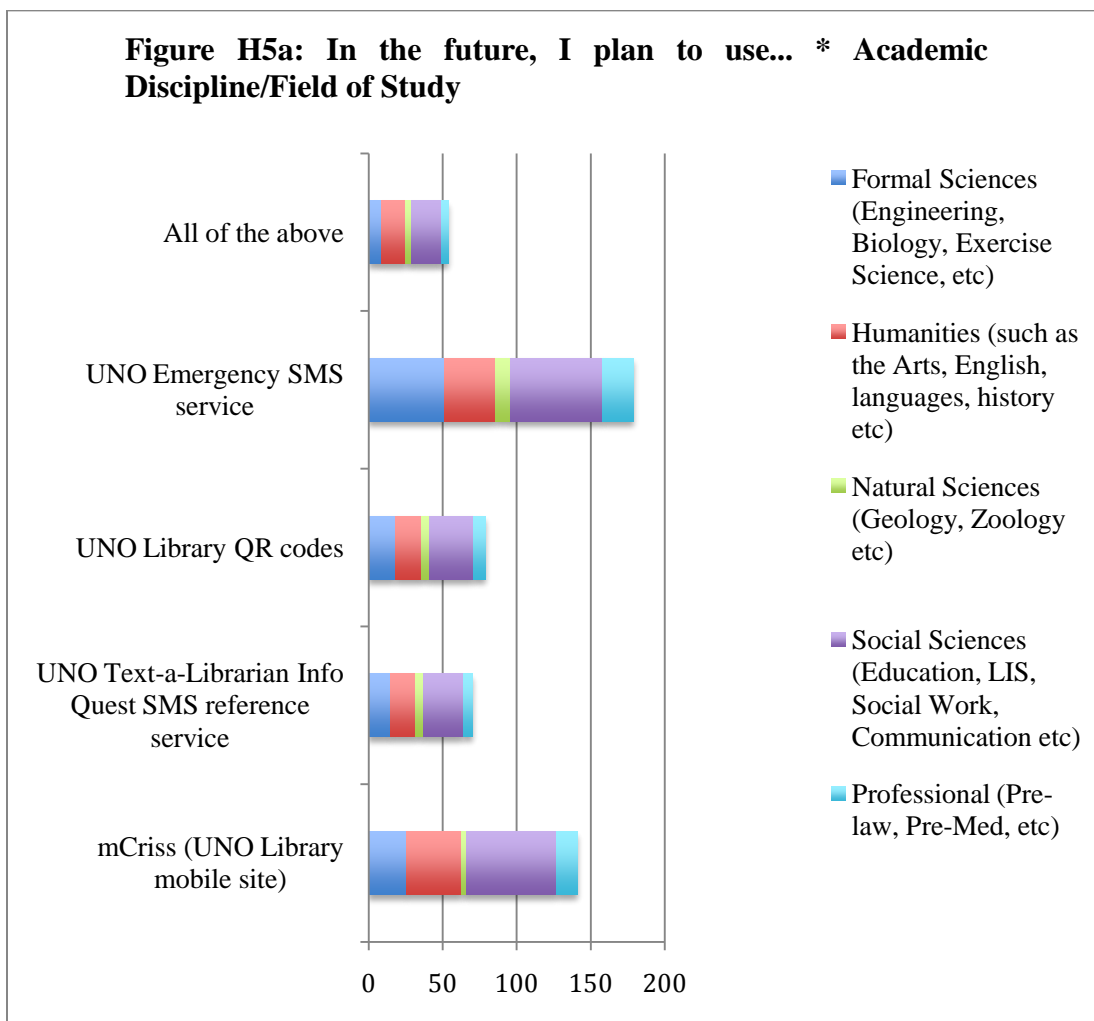


Figure H5b: In the future, I plan to use mCriss (UNO Library mobile site) * Academic discipline or field of study

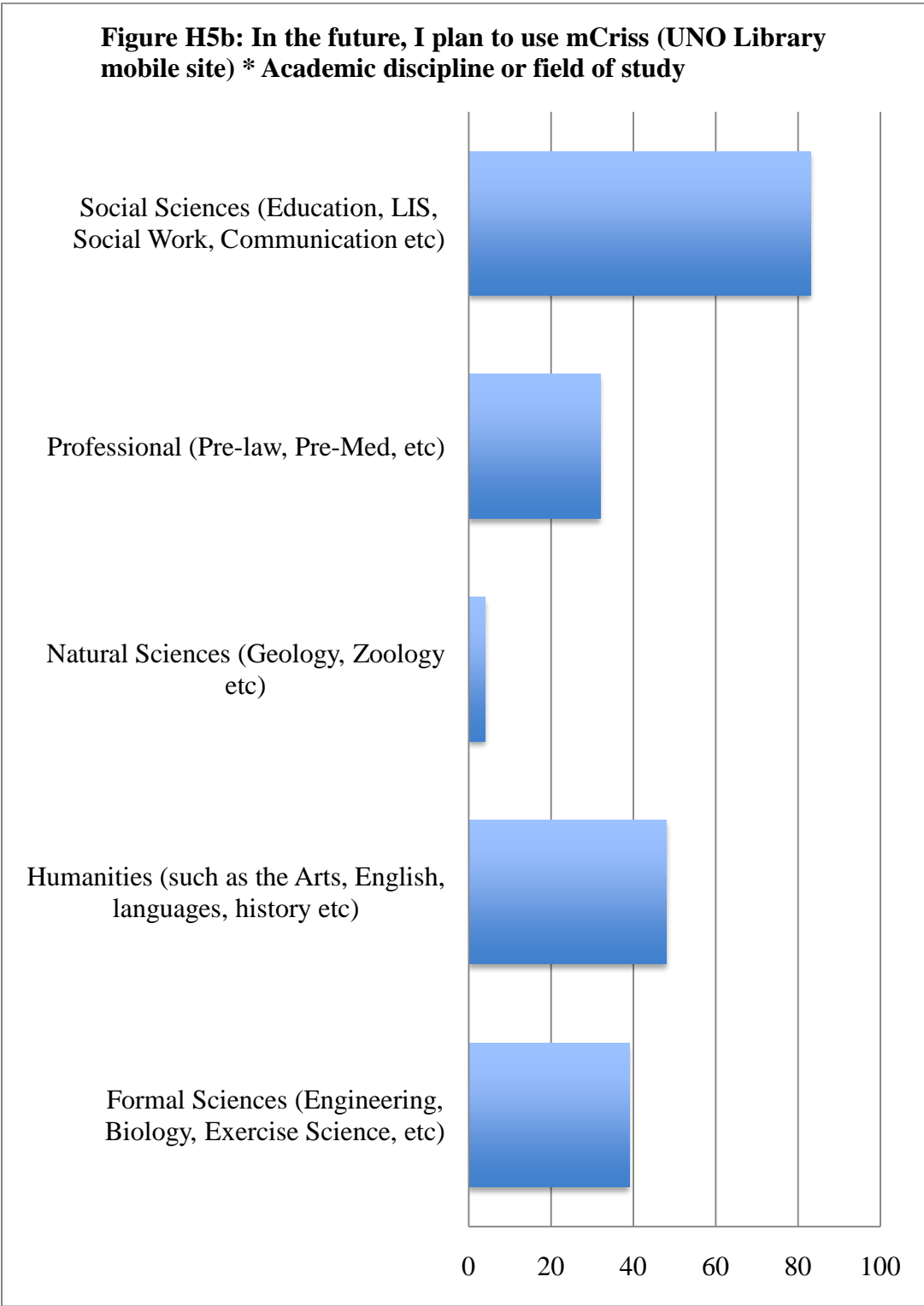


Table H5: In the future, I plan to use mCriss (UNO Library mobile site) * What is your academic discipline or field of study Crosstabulation

Count

		What is your academic discipline or field of study					Total
		Formal Sciences (Engineering, Biology, Exercise Science, etc)	Humanities (such as the Arts, English, languages, history etc)	Natural Sciences (Geology, Zoology etc)	Professional (Pre-law, Pre-Med, etc)	Social Sciences (Education, LIS, Social Work, Communication etc)	
In the future, I plan to use mCriss (UNO Library mobile site)	No	88	71	18	72	120	369
	Yes	39	48	4	32	83	206
Total		127	119	22	104	203	575

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.896 ^a	4	0.064
Likelihood Ratio	9.238	4	0.055
N of Valid Cases	575		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.88.

Chapter 5: Conclusion and Discussion

Discussion

The purpose of this study was to explore how the UNO Criss Library community is utilizing mobile devices using a multi method grounded theory approach. This study determined who the potential Library users are and their use of, and interest in mobile technology and services. The study found that the modal users of the Criss Library mobile website are Caucasian, female, undergraduate students between the age of 19 to 25 in the social sciences.

Established potential Library users' awareness and use of current Criss Library mobile services and interest in future Criss Library mobile services. Most of the UNO community members are unaware of the different aspects of the Criss Library mobile initiatives. Which indicates the adoption rate of these mobile resources will only increase if the types of communication channels used are varied. Rogers (2003) defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system." Diffusion of an innovation occurs through a five-step process. Rogers categorizes the five stages (steps) as: knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003). The Criss Library will need to focus on increasing potential Library users' knowledge of the Library's mobile resources/services and formulate a persuasive message that will allow patrons to

develop their beliefs about and attitudes toward the mobile resources/services based on their knowledge.

To discover potential Library users' perceptions of current Criss Library mobile services and possible new Criss Library mobile services, the study investigators asked, "Please specify, what UNO library mobile resources you would like Criss Library to provide or be interested in accessing via your mobile device if they were available?"

"It would seem possible for the catalogue to actual direct me to a book. I could click on a call number and it would show me a map of the floor with the appropriate shelf..." - 26 to 31 year old Male Undergraduate Student

"Easier catalogue and database search, easier ask a librarian (non text), much better website for mobile" - 32 to 38 year old Male Graduate Student

"It would be nice to get updates on new books or even a faster way to schedule study rooms" - 19 to 25 year old Female Undergraduate Student

“Would love to get full access to the library resource as if I’m connecting using the UNO ID” - 32 to 38 year old Male

Graduate Student

“Account information, ILL account/ordering, journal searching/article easily downloadable directly to iPad would be great” - 39 to 45 year old Female Graduate Student

“I would like to use my mobile device to look up books and provide directions to those books within the library. That is, I would like location-based services to be used inside the library. For example, I would like the library to identify which floor I am on and how many feet I need to walk in order to access a certain book. It would be like traffic directions, but inside the library.” - 19 to 25 year old Male Graduate Student

“Information on library and cafe hours. Push notifications of e.g. holiday hour changes. Access to research (e.g. NCBI) resources through a library app.” - 26 to 31 year old Male

Undergraduate Student

“More journal articles and Databases with full-text available electronically” - 39 to 45 year old Female Faculty

“Searchable database of books available and their status (checked out, in, etc). 'Turn by turn' or map based directions to anything in the library, or even campus wide directions services. Streaming video/audio of recorded lectures/guest speakers/etc. A free, UNO based, 'academic journal' eBooks, similar to other academic journals, but just about research UNO is doing. Maybe other things, idk.” - 19 to 25 year old Male Undergraduate Student

“Electronic Music Scores, or eBook lend outs without having to check out a library Kindle device” - 19 to 25 year old Male Undergraduate Student

“Cafe hours and menu (including daily specials), events taking place in the library (like when the Senator gave a speech), and a simpler format for signing up/checking times for a study room (individual or group)” - 26 to 31 year old Female Undergraduate Student

Based on these comments and the study findings, the Library has decided to develop Android and iPhone applications as well as redesign the mobile website to better meet the needs of the UNO community. Something to keep in mind is mobile Internet structures are different than stationary Internet structures. The mobile website and apps will offer a lower level of available Criss Library resources, but it offer on

the spot connectivity, which makes it possible to use a mobile device at the moment of need, anywhere and anytime. Some of the initial features will consist of:

- GPS location based directions to the building and within the building
- Text/Call/email reference librarians to ask a question
- Search the catalog
- Library hours
- cafe hours
- contact info (directory of library staff phone numbers/emails)

Other supporting tasks being considered for future releases of the mobile applications are integration: with the self-booking tool/module of the integrated library system; with campus way-finding - specifically shuttle bus information and routes etc; and MavCard online to pay library fines with credit cards.

Limitations

Although the combination of research methods offered a unique perspective they also limited the amount of information gathered. Unfortunately, the faculty, staff, and students participating did not reflect the diversity of the University of Nebraska at Omaha campus. For example, of 630 usable study respondents, only 3.6 percent were African American, 3.6 percent were Asian American, 3.8 percent were Hispanic/Latino, 1.0percent were Native American, and 8.1 percent indicated they were of a mixed race, while 59.4 percent were Caucasian. The results of this study

might have been different if a more diverse group of UNO respondents participated in the study. The Pew Research Center's Internet & American Life Project (2010) *Mobile Access* study found that African-Americans and 18-29 year olds are leaders in mobile device usage (see Appendix E). Nearly two-thirds of African-Americans (64 percent) and Latinos (63 percent) are wireless Internet users, and minority Americans are significantly more likely to own a cell phone than their white counterparts (87 percent of blacks and Hispanics own a cell phone, compared with 80 percent of whites) (Smith, 2010, p.3).

Another limitation of this survey was the option to 'skip this question.' Towards the end of the survey, participants may have been experiencing fatigue. This option may have skewed the results of this study, in future studies the 'skip this question' option will be removed.

Future Research

With the constant expansion of communication technology, the study of mobile use by university and college libraries and the academic populations they service will continuously grow. It is important to understand mCriss mobile Internet adoption from a longitudinal perspective, further follow-up research should include situational, technological, and environmental changes. After the redesign of the current mobile Internet site and during the testing phase of the mCriss mobile apps, a follow-up mobile usability study will begin in spring of 2012 to expand: the possibilities of the tentative mobile website and apps, the assigned tasks, and the use

of mobile devices to include two iPhones. After the launch of the mCriss mobile apps, future studies will be conducted on various platforms to test whether the study results will stick with different interaction styles and larger screens. This research is expected to afford a variety of circumstance for university libraries to consider as they develop mobile services.

References

- Blumler, J., Katz, E. (1974). *The uses of mass communications: Current perspectives on gratifications research*. Beverly Hills, CA: Sage.
- Conner, M. (August 24, 2010). *Final Report: Discussion on the Future of UC Libraries and Librarians in the 21st Century*. Librarians Association of the University of California Committee on Professional Governance. Retrieved 11/18/2011, from <http://www.ucop.edu/lauc/committees/pg/cpg-2010.doc>
- Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly* 13(3), 319–40
- Festinger, L. (1957). *A theory of cognitive dissonance*. Evanston, IL: Row, Peterson.
- Fishbein, M., Ajzen, I. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice-Hall.
- Hanley, M., Becker, M., Martinsen, J. (2006). *Factors Influencing Mobile Advertising Acceptance: Will Incentives Motivate College Students To Accept Mobile Advertisements?* Center for Media Design, Ball State University, Muncie, IN
- Horrigan, J. (2010). *Mobile Access to Data and Information*. Pew Research Center's Internet & American Life Project. Retrieved 10/8/2010, from <http://www.pewInternet.org/Reports/2008/Mobile-Access-to-Data-and-Information.aspx>
- Horrigan, J. (March 25, 2009). *The Mobile Difference*. Pew Research Center's Internet & American Life Project Retrieved 10/7/2010, from <http://www.pewInternet.org/Reports/2009/5-The-Mobile-Difference--Typology.aspx>
- Hu, R., Meier, A. (August 18, 2010). *Mobile Device User Research Mobile Strategy Report*. California Digital Library
- Jiang, P. (2008). Adopting mobile Internet: a demographic and usage perspective. *International Journal of Electronic Business*, 6(3), 232-260.
- Jiang, P. (2009). Consumer Adoption of Mobile Internet Services: An Exploratory Study. *Journal of Promotion Management*, 15:418–454.
- Johnson, D. (1970). *The Social Psychology of Education*. New York: Hilt, Rinehart and Winston.
- Minhee, C., & Jinwoo, K. (2004). Do size and structure matter to mobile users? An empirical study of the effects of screen size, information structure, and task complexity on user activities with standard web phones. *Behaviour & Information Technology*, 23(3), 165-181.

- Mondi, M., Woods, P., & Rafi, A. (2008). A 'Uses and Gratification Expectancy Model' to predict students' 'Perceived e-Learning Experience'. *Educational Technology & Society*, 11 (2), 241-261.
- New Media Consortium (2007). *The Horizon Report 2007*. NMC and EDUCAUSE. Retrieved 9/24/2010, from http://www.nmc.org/pdf/2007_Horizon_Report.pdf
- Rogers, E. (1962). *Diffusion of Innovations*. New York: Free Press.
- Rogers, E. (1965). "What are innovations like?" in *Change Processes in the Public Schools*. Eugene, Oregon: U.S. Office of Education.
- Rogers, E. (2003). *Diffusion of Innovations*. New York: Free Press.
- Rubin, A. M. (2002). Media Uses and Effects: A Uses and Gratifications Perspective. In J. Bryant & D. Zillmann (Eds.), *Media Effects: Advances in Theory and Research*, Hillsdale, NJ: Lawrence Erlbaum, 525-544.
- Ruggiero, T. E. (2000). Uses and Gratifications Theory in the 21st Century. *Mass Communication and Society*, 3 (1), 3-37.
- Smith, A. (Jul 7, 2010). *Mobile Access 2010*. Pew Research Center's Internet & American Life Project Retrieved 10/7/2010, 2010, from <http://www.pewInternet.org/Reports/2010/Mobile-Access-2010/Summary-of-Findings/Findings.aspx>
- Stafford, T., Stafford, M., Schkade, L. (2004). Determining Uses and Gratifications for the Internet. *Decision Sciences*, 35(2), 259–88.
- Tsang, M. M., Ho, S., Liang, T. (2004). Patron Attitudes Toward Mobile Advertising: An Empirical Study. *International Journal of Electronic Commerce*, 8 (3), 65–78.
- Wang, A. & Dowding, T. (2009). An Exploratory Study on Patrons' Opinions on Image Recognition Opt-in Practice. *International Journal of Mobile Marketing*, 4 (2), 4-13.
- Wang, A. (2010). Patrons' Intentions on Usages of Image Recognition Opt-in. *International Journal of Mobile Marketing*, 5 (1), 141-153.
- Weber E., Anderson C., Birnbaum M., (1992). A theory of perceived risk and attractiveness. *Organizational Behavior and Human Decision Processes*, 52 (3), 492-523.

Appendix A: Institutional Review Board Approval



NEBRASKA'S HEALTH SCIENCE CENTER

Office of Regulatory Affairs (ORA)
Institutional Review Board (IRB)

March 16, 2011

Rene Erlandson
Virtual Services/Library
UNO – Via Courier

IRB#: 122-11-EX

TITLE OF PROTOCOL: Use of Mobile Devices & Library Mobile Resources/Services by UNO Community Members

Dear Ms. Erlandson:

The Office of Regulatory Affairs (ORA) has reviewed your application for **Educational, Behavioral, and Social Science Research** on the above-titled research project. According to the information provided, this project is exempt under 45 CFR 46:101b, category 2. You are therefore authorized to begin the research.

It is understood this project will be conducted in full accordance with all applicable HRPP Policies. It is also understood that the ORA will be immediately notified of any proposed changes that may affect the exempt status of your research project.

Please be advised that this research has a maximum **approval period of 5 years** from the original date of approval and release. If this study continues beyond the five year approval period, the project must be resubmitted in order to maintain an active approval status.

Sincerely,

A handwritten signature in cursive script that reads "Gail D. Kotulak".

Gail Kotulak, CIP
IRB Administrator
Office of Regulatory Affairs (ORA)

gdk

Appendix B: Use of Mobile Devices & Library Mobile Resources/Services

Survey

UNO Affiliation Information

1. UNO affiliation:
 - a. UNO Undergraduate Student
 - b. UNO Graduate Student
 - c. UNO Faculty
 - d. UNO Staff
 - e. UNO Alumni
 - f. UNO Library Friend
 - g. None of the above

If answered e-f skip to question #3

If answered g end the survey with a thank you statement indicating survey respondents must be affiliated with UNO.

Thank you for your interest in the survey. Unfortunately, you do not meet the study guidelines for participation. However, we appreciate your time and interest!

Academic Field of Study

2. What is your academic discipline or field of study
 - a. Formal Sciences (Engineering, Biology, Exercise Science, etc)
 - b. Humanities (such as the Arts, English, languages, history etc)
 - c. Natural Sciences (Geology, Zoology etc)
 - d. Social Sciences (Education, LIS, Social Work, Communication etc)
 - e. Professional (Pre-law, Pre-Med, etc)
 - f. Unknown
 - g. Skip this question
 - h. Other (please specify)

Device, Service and Connectivity Data

3. Which of the following devices do you own? (please check all that apply)
 - a. Desktop computer

- b. Laptop computer
- c. Netbook
- d. Tablet (like the iPad)
- e. eReader (like a Kindle, Nook, etc)
- f. Cell phone
- g. Smartphone
- h. Other (please specify)

If answered a-c only skip to end of survey

If you answered f or g in question #3, please answer the following questions:

- 4. Do you have a texting plan for your mobile phone?
 - a. Yes (if Yes, specify number of text messages covered by your plan)
 - b. No
 - c. Skip this question

- 5. Can you access the Internet from your mobile phone?
 - a. Yes
 - b. No
 - c. I don't know
 - d. Skip this question

If answer included at least one of d-g in question #3, answer the following:

- 6. Which of the following mobile device platforms do you own? (check all that apply)
 - a. Android
 - b. Blackberry (RIM)
 - c. Windows Mobile
 - d. iPhone
 - e. iPod Touch
 - f. iPad
 - g. Kindle
 - h. Nook
 - i. Edge
 - j. Windows Mobile
 - k. Other (please specify)
 - l. Skip this question

- 7. Do you use your mobile device to access the Internet?
 - a. Yes
 - b. No
 - c. Skip this question

If answer is “b” go to question #10

8. Do you subscribe to a data plan for your mobile device?
 - a. Yes
 - b. No
 - c. Skip this question

9. Do you access free Wi-Fi connections with your mobile device when they are available?
 - a. Yes
 - b. No
 - c. Skip this question

If answer is a or b skip to question #12

10. Are there any barriers preventing you from using your mobile device to access the Internet?
 - a. Cost of data plan
 - b. Slowness of connection
 - c. No connectivity (lack of signal) in areas frequented
 - d. Small screens
 - e. Content is difficult to read due to poor formatting
 - f. Difficult to read in high light (or outside)
 - g. Other (please specify)
 - h. There are no barriers preventing me from accessing the Internet via my mobile device
 - i. Skip this question

Mobile Device Use

11. From the list below, select the device you prefer to use to access the Internet.
 - a. Desktop computer
 - b. Laptop/Netbook
 - c. Other (Please specify)
 - d. Skip this question

If any of the above are answered skip to question #18

12. From the list below, select the device you prefer to use to access the Internet.
 - a. Desktop computer
 - b. Laptop/Netbook
 - c. Handheld mobile device (Smartphone, eReader, iPad etc)
 - d. Other (Please specify)
 - e. Skip this question

13. On average, how much time do you spend daily doing the following activities from your mobile device? (Check all that apply)

	0 mins	1-14 mins	15-29 mins	30-44 mins	45 min-1hour	1 Hour +
Text messaging						
Access Email						
Social Networking (Facebook, Twitter, etc)						
Get Directions						
Read academic content						
Read other content (newspapers, books, blogs etc)						
Search for UNO information						
Search for UNO Criss Library information/resources						
Access UNO coursework or lectures						
Search for other information						
Get weather and/or news alerts						
Play games						
Listen/Record/Upload music						
Watch /Record/Upload video						
Take photographs						
Use QR Codes or 2D Barcodes						
Shop (products or services)						
Visit news sites						
Play fantasy sports						
Visit sports sites						
Other (Please specify)						

14. Where do you most often use your mobile device to access the Internet?

- a. Inside
- b. Outside
- c. In the car
- d. While walking
- e. While waiting in line
- f. While sitting down
- g. Other (please specify)
- h. Skip this question

Mobile Device Use-UNO Library Resources

15. Have you used your mobile device to access UNO Library resources?

- a. Yes
- b. No
- c. Skip this question

If answer b, skip to question 17

16. What UNO Library resources have you accessed from your mobile device?
(Please check all that apply)
- Find directions to the Library
 - Locate Library hours
 - Online library catalogue
 - Looked up journals
 - Connected to one of the online databases or other electronic resources
 - Emailed a question to UNO Library
 - Sent a text message question to the UNO Library
 - Checked the line at the Library Café via the Café Cam
 - I have not accessed library resources via my mobile device.
 - Other (please specify)
 - Skip this question
17. What UNO library resources would you be interested in accessing via your mobile device if they were available?
- I am satisfied with the resources currently available
 - I am not interested in accessing UNO library resources via my mobile device.
 - Please specify mobile resources you would like Criss Library to provide.
 - Skip this question

UNO SMS Text Messages

18. UNO provides access to an off-site, mass notification system that will disseminate emergency messages via the SMS text message capabilities of commercial wireless. Have you subscribed to this service?
- Yes
 - No
 - Skip this question
19. If the UNO Criss Library was able to send announcements and notices via SMS text message would you be interested in receiving them?
- Yes
 - No
 - Skip this question

If answered b, skip to question #21

20. What announcements or notices would you be interested in receiving from the UNO Library via SMS text messaging?
- Overdue book notices
 - Inter-library loan announcements
 - Billing notices
 - Event/Exhibit announcements

- e. Other (Please specify)
- f. Skip this question

UNO Text-a-librarian Info Quest service

21. Have you ever used your cell phone to send/ receive a message from the UNO Text-a-Librarian Info Quest service provided by the library that allows users to text librarians for information?
- a. Yes
 - b. No
 - c. Skip this question

If answered b, skip to question #24

22. How did you find out about the UNO Text-a-Librarian Info Quest service?
- a. I saw a notice about it on the library Website
 - b. I read about it in library promotional material or in the newspaper
 - c. I heard about it from someone I know
 - d. I heard about it from a library staff member
 - e. Other (please specify)
 - f. Skip this question
23. What motivated you to use the UNO Text-a-Librarian Info Quest service? (Check all that apply)
- a. I needed information immediately
 - b. I needed help from a librarian
 - c. I didn't have access to the Internet
 - d. I wanted to see how the service worked
 - e. Other (please specify)
 - f. Skip this question
24. What is your reason for not using the UNO Text-a-librarian Info Quest service? (Check all that apply)
- a. I'm not aware of the service.
 - b. I don't text.
 - c. I usually don't ask librarians for help
 - d. I'm fine with getting help from librarians using other means like telephone, email or coming to the reference desk
 - e. Other (please specify)
 - f. Skip this question

mCriss: UNO Library Mobile Website

25. Have you used the UNO Library mobile Website, mCriss (<http://m.library.unomaha.edu>)?

- a. Yes
- b. No
- c. Skip this question

If answered b, skip to question # 32

26. How did you find out about the UNO Library mobile Website, mCriss?

- a. I found it on the library Website
- b. I read about it in library promotional material (poster, bookmark etc)
- c. I heard about it from someone I know
- d. I heard about it from a library staff member
- e. I saw a notice about it on the library electronic signs.
- f. Other (please specify)
- g. Skip this question

27. What motivated you to use the UNO Library mobile Website, mCriss? (Check all that apply)

- a. mCriss is easier to read on my mobile device than the regular library Website
- b. Using my mobile device was convenient
- c. I find mCriss attractive
- d. I find mCriss easy to use
- e. I needed information immediately
- f. Other (please specify)
- g. Skip this question

28. Please rate mCriss for ease of use

1	2	3	4	5
Very difficult to use	Difficult to use	Neither difficult/easy	Easy to use	Very easy to use

29. Please rate the overall effectiveness of mCriss

1	2	3	4	5
Very ineffective	Ineffective	Neither effective or ineffective	Effective	Very Effective

30. Please rate the overall appearance of mCriss

1	2	3	4	5
Very unappealing	Unappealing	Neither appealing/unappealing	Appealing	Very Appealing

31. Do you have any suggestions to improve the UNO Library mobile Website, mCriss?

- a. Skip this question
- b. Comment here (open ended)

If answer is a or b skip to question #33

32. Did you know the UNO Library has a Website formatted for mobile devices?
- Yes
 - No

Quick Response (QR) Codes

33. Have you ever used a Quick Response (QR) code?
- Yes
 - No
 - I don't know what a QR code is.
 - Skip this question

If answered b, skip to question #37

If answered c, skip to information page before question #38

34. Have you ever used a Quick Response (QR) code provided by the UNO Library that allows users to access mobile resources?
- Yes
 - No
 - Skip question
35. How did you find out about the QR codes provided by the UNO Library?
- I found out about QR codes on the library Website
 - I saw QR codes in the library
 - I read about QR codes in library promotional material
 - I heard about QR codes from someone I know
 - I heard about QR codes from a library staff member
 - Other (please specify)
 - Skip question
36. What motivated you to use the QR codes provided by the UNO Library? Please select all that apply.
- I wanted to see how the service works
 - The codes are easy to use
 - I needed information immediately
 - I could get the information I needed where I was at without having to go to another area of the library.
 - I needed help from a librarian
 - Other (please specify)
 - Skip question

If answer is a-f skip to question #38

37. What is your reason for not having used the QR codes provided by the UNO Library? Please check all that apply
- I don't know what a QR code is.
 - I am not aware of QR codes in use in Criss Library.
 - I don't have a camera on my phone.
 - I don't have QR reader software loaded on my phone
 - Other (please specify)
 - Skip this question

If answer is b-f skip to question #38

Information page:

A Quick Response code (aka QR code) is a two-dimensional barcode which can be read by mobile device cameras that have a QR code reader like ScanLife, Kaywa, Zxing and others loaded onto the device.



Once a QR code is captured by a mobile device camera, the QR reader software loaded on the mobile device links the user directly to information, images and URLs embedded in the code.

You may have noticed QR codes in magazine advertisements, on concert posters, drink bottles etc. Library's use QR codes to link mobile device users to a variety of library information, resources and services. So, if you have a camera on your mobile device, load a QR reader onto the device and begin using the codes you find around Criss Library.

38. In the future, I plan to use... (check all that apply)
- mCriss (UNO Library mobile site)
 - UNO Text-a-Librarian InfoQuest SMS reference service
 - UNO Library QR codes
 - UNO Emergency SMS service
 - All of the above
 - None of the above
 - Skip this question

Demographic Information

39. Age

- a. 19-25
- b. 26-31
- c. 32-38
- d. 39-45
- e. 46-52
- f. 53-59
- g. 60+

40. Gender

- a. Female
- b. Male

41. What is your race?

- a. African American
- b. Asian American
- c. Caucasian
- d. Hispanic/Latino
- e. Native American
- f. Other/Mixed race

End the survey with a thank you statement and the “submit” button.

Thank you for your participation in the "Use of Mobile Devices & Library Mobile Resources/Services by UNO Community Members" study. We appreciate your assistance in gathering information on how UNO community members use mobile devices and Criss Library mobile resources.

Note: Instructions in red are automatically interpreted by the survey software.

Appendix C: Adult Informed Consent Form

(page 1)



DR. C.C. AND MABLE L. CRISS LIBRARY

Adult Informed Consent Form

IRB #: 122-11-EX

Use of Mobile Devices & Library Mobile Resources/Services by UNO Community Members

You are invited to take part in this research study. The information in this form is meant to help you decide whether or not to take part.

You are being asked to participate in this research study because you are a UNO student/faculty/staff/alumni/UNO Library Friend, 19 years of age and older. The research study is being done to assess the use of mobile devices and library mobile resources/services by UNO community members.

This research study will consist of a one-time, anonymous online survey which will take approximately 15 minutes to complete. The survey includes questions about mobile device ownership and usage; use of library mobile resources/services; your perceptions and opinions of library mobile resources/services; and some demographic questions (e.g. age, sex, UNO affiliation) so we can correlate stakeholder groups with mobile device use and interest. Once you have completed the online survey your responses will be kept completely confidential. We will NOT know your IP address when you respond to the Internet survey. Only the researchers will see your individual survey responses. The results of the study will be used for technology planning and scholarly purposes only. Data from all completed surveys will be analyzed and compiled by the research team and a report given to the UNO Library Administrative Team. Study results may be presented in educational settings and at professional conferences; published in professional journals or education papers.

There are no known risks to you for participating in this research study. In addition, there are no expected benefits to you for participating in this research study. The possible benefit of this research study is to leverage existing library assets (e.g. time, staff) for future development of library resources and services. There will be no cost to you to participate in this research study, nor will you be paid to participate in this research study.

Your well-being is a concern of every member of the research team. If you have a problem as a direct result from being in this study, you should immediately contact one of the persons listed at the end of this consent form. Reasonable steps will be taken to protect your privacy and confidentiality of your study data. The only persons who will have access to your research records are the study personnel, the Library Dean/Acting Dean, the Institutional Review Board (IRB), and any other persons

IRB Approved
Valid until 3-10-16

(page 2)

or agency required by law. The information from this study may be published in professional journals or presented at professional meetings however your identity will be kept strictly confidential.

You have rights as a research subject. These rights have been explained in this consent form. If you have any questions concerning your rights or complaints about the research, talk to the Principal Investigator or contact the Institutional Review Board (IRB) by:

Telephone: 402-559-6463

Email: IRBORA@unmc.edu

Mail: UNMC Institutional Review Board, 987830 Nebraska Medical Center, Omaha, NE 68198-7830

Your participation is voluntary; you are free to withdraw your participation from this study at any time. If you do not want to continue, you can simply leave the survey site. If you do not click on the "submit" button at the end of the survey, your answers and participation will not be recorded. You may also choose to skip any questions you do not wish to answer.

You are freely making a decision whether to be in this research study. By clicking the "I Agree To Participate" button below you acknowledge 1) you have read and understood the consent information, 2) you have had your questions answered, 3) you have decided to participate in the research study, and 4) you understand you are free to withdraw your participation from the study at any point during the survey without penalty.

If you have any questions during the study, you should talk to the Investigator listed below. You may print off a copy of this consent form to keep.

Authorized Study Personnel

Principal Investigator: Rene Erlandson Telephone: 402-554-2144 Email: rerlandson@unomaha.edu	Secondary Investigator: Teonne Daye Phone: 402-554-3122 Email: tday@unomaha.edu
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Appendix D: Demographic Characteristics

Demographic Characteristics of the Sample (n = 652)

Variable	Description	Frequency	Percent
Gender	<i>Skip this question</i>	126	20.0percent
	<i>Female</i>	265	42.0percent
	<i>Male</i>	240	38.0percent
Age	<i>Skip this question</i>	126	20.0percent
	<i>19-25</i>	321	50.9percent
	<i>26-31</i>	73	11.6percent
	<i>32-38</i>	41	6.5percent
	<i>39-45</i>	29	4.6percent
	<i>46-52</i>	23	3.6percent
	<i>53-59</i>	11	1.7percent
	<i>60+</i>	7	1.1percent
Ethnicity	<i>Skip this Question</i>	129	20.5percent
	<i>African American</i>	23	3.6percent
	<i>Asian American</i>	23	3.6percent
	<i>Caucasian</i>	375	59.4percent
	<i>Hispanic/Latino</i>	24	3.8percent
	<i>Native American</i>	6	1.0percent
	<i>Other/Mixed race</i>	51	8.1percent
Affiliation	<i>None of the above</i>	22	3.4percent
	<i>UNO Faculty</i>	23	3.6percent
	<i>UNO Graduate Student</i>	107	17.0percent
	<i>UNO Undergraduate Student</i>	462	73.2percent
	<i>UNO Staff</i>	21	3.3percent
	<i>UNO Library Friends</i>	3	0.5percent
	<i>UNO Alumni</i>	14	2.2percent
Field of Study	<i>Skip this Question</i>	34	5.3percent
	<i>Formal Sciences (Engineering, Biology, Exercise Science, etc)</i>	128	20.3percent
	<i>Humanities (such as the Arts, English, languages, history etc)</i>	119	18.9percent
	<i>Natural Sciences (Geology, Zoology etc)</i>	22	3.5percent
	<i>Professional (Pre-law, Business, Pre-Med, etc)</i>	104	16.5percent
	<i>Social Sciences (Education, LIS, Social Work, Communication etc)</i>	204	32.3percent
	<i>Unknown</i>	20	3.2percent
Where You Live	<i>Skip this question</i>	64	10.1percent
	<i>Off-Campus</i>	504	79.9percent
	<i>On-Campus</i>	63	10.0percent

Appendix E

African-Americans and Latinos lead whites in their use of mobile data applications

	All adults	White, non-Hispanic	Black, non-Hispanic	Hispanic (English-speaking)
Own a cell phone	82%	80%	87%*	87%*
% of cell owners within each group who do the following on their phones				
Take a picture	76	75	76	83*
Send/receive text messages	72	68	79*	83*
Access the internet	38	33	46*	51*
Send/receive email	34	30	41*	47*
Play a game	34	29	51*	46*
Record a video	34	29	40*	45*
Play music	33	26	52*	49*
Send/receive instant messages	30	23	44*	49*
Use a social networking site	23	19	33*	36*
Watch a video	20	15	27*	33*
Post a photo or video online	15	13	20*	25*
Purchase a product	11	10	13	18
Use a status update service	10	8	13	15
Mean number of cell activities	4.3	3.8	5.4	5.8

Source: Pew Research Center's Internet & American Life Project, April 29-May 30, 2010 Tracking Survey. N=2,252 adults 18 and older, including 1,917 cell phone users. * = statistically significant difference compared with whites