

Understanding users' needs for library mobile device application

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Abstract

As the growing of smart phone ownership, the mobile information service is becoming popular. Thus, no one should underestimate the potential of mobile internet and mobile app. However, what do people of Taiwan do with their mobiles? How do they use smart phone, especially the mobile application, to satisfy their information needs? The study about mobile device information service or mobile application needs is seldom in Taiwan. We believe that it is important to investigate library user's mobile information behavior and mobile application needs before proposing the library mobile information service. Understanding the why requires a deeper picture of what drives people to incorporate mobile Internet access into their daily lives. This paper reports on a diary and deep-interview study performed to better understand library user's mobile information behavior, and focused on their mobile device application needs. The author is seeking answers to help improve the development of mobile service and speed adoption of library mobile information services. The contributions of this study are twofold: First, we could utilize the experienced mobile device users have about good mobile services and applications to provide new adaptive service for library users. Secondly, we could provide suggestions about what kinds of mobile applications which library can provide for users to promote their service.

Keywords: mobile internet, mobile information needs, information access, mobile device application (App), library service

Introduction

Mobile Web access is currently being hyped as the next big thing for both mobile devices and Web search (Jones & Marsden, 2006). For example, the 2013 study shows that of consumers searching for local products and services, 45% tap mobile

devices first, while 49% use PC/Online as their primary media resource. Although 54% of all mobile users (including smartphone and tablet) indicated usage of additional media sources to aid in their purchase decision, 46% exclusively used mobile as their default/primary research tool. The study also demonstrated that 50% of all mobile users rely on their device at the beginning of the research process with 1 out of 3 users indicating they used their device throughout their entire purchasing process (xAd, 2013) .

Smartphone ownership is continuing to increase from the level in these studies, with 46% of American adults owning one in February 2012, up from 35% nine months previously (Smith, 2012). In Taiwan, 51% of Taiwanese adult owning one in March 2013, up from 32% one year previously. 69% of the owners use smartphone everyday, and 81% of the owners with smartphone when going out (Retrieved Aug. 15, 2013 from <http://news.cnyes.com/Content/20130813/kh9nwe1yi2n3k.shtml>). Perhaps the growth in mobile library discussion is because of the growth of smartphone ownership (46% of American adults) and has increased across a wide range of demographic groups (Smith, 2012). So increasingly it is the norm to access the internet from small, mobile, handheld devices and to do so regularly, as a normal part of daily life (Walsh, 2012).

The mobile revolution is upon us. Handheld devices, has meant an explosion in mobile internet use. And, when mobile users become accustomed to ubiquitous connectivity, they have the potential to satisfy their information needs through mobile web search (Hinze, Chang, & Nichols, 2010, p.2). The persistent Internet connection enabled immediate information lookup, with the majority of needs being addressed as soon as they emerged.

Facing the trend of fast growth of technology innovation, are libraries starting to respond to the demand for mobile device application service? The mobile phone provides an essential "any time", "any place" portal into the entire world wide web of knowledge (Boulos, Wheeler, Tavares, & Jones, 2011, p.3). It is a good chance for libraries to establish mobile applications to provide innovative services. What and how the libraries can do?

Before libraries elicit mobile application services, we need to understand what types of information people need while on the go and how they address those needs. Observing people's behaviors in such situations could point to improved mobile interface and system designs (Sohn, Li, Griswold, & Hollan, 2008, p.1)

In this paper, we propose a novel plan to support libraries providing mobile device application services, combining context features such as location, time, and social interaction to offer services that are well-adapted to the needs of mobile users. This study, therefore, seeks to explore how information use and mobile application services needs can vary in an environment where mobile devices provide quick and easy access to information on the move.

The research questions this study addressed were:

1. What are the library-related mobile applications in Taiwan?
2. What people need for library mobile device application services.

Literature review

Simply providing mobile users with access to the internet and desktop tools is insufficient. Mobile users need applications and services that are designed to the particular requirements of mobile context and use. As just one example, mobile users are often preoccupied with the things going on around them. As a consequence, they often need to decide if they have sufficient time and attentional resources to access potentially useful information services (Sohn, Li, Griswold, & Hollan, 2008, p.1). The features of mobile device application, easy use, functional orientation, and fast information access, make applications become the primary information channel on the move.

Some research has been performed on adapting applications to match the user's context (Marmasse & Schmandt, 2000; Mihalic & Tscheligi, 2007). A First step some libraries take is to determine the library functions users want to access using smartphones. For example, students might want to access databases and course reserves, download citations, view a map of the library building and its physical resources, and ask a librarian for help (Seeholzer & Salem, 2009). The users also hoped to access online public access catalogs (PEACs) in order to assist with locating items within library buildings (Broussard, Zhou, & Lease, 2010). Mills (2009) found users wanted to select flat information by library apps, for example, library hours, library maps, and contact information. North Carolina State University Libraries built their own app called WolfWalk, which overlays historical images from the library archives a more than 50 point around campus, as well as provides the basic library flat information of other library apps (North Carolina State University Libraries, 2010).

Customized mobile applications (apps) utilized by colleges and universities aim to build relationships with prospective students and families, connect with their current students, strengthen alumni bonds, and to engage communities (Kaya, 2010). Harvard, Princeton and other universities have developed location-based apps that provide users with a combination of digital historical markers, fun facts, and present-day frequently-asked questions about points-of-interest on their campuses, including information on all student services and resources, navigation, and safety (Klamm, 2010).

The North Carolina State University Libraries (2010) and other library apps answer most of the same frequently-asked library questions, including finding the location of a physical item (e.g., a book in the library), making room reservations, and displaying the locations and hours of libraries. Most of the information that addresses these location-based may appear on libraries' Web sites, such as staff contact information and circulation policies. The navigability to retrieve that information should be different on a library app, however, and simply mobilizing an existing library website may not be sufficient (Bishop, 2012, p.269).

Library-specific mobile applications include digital reference services (Dempsey, 2009; Lippincott, 2010), navigation aids for physical library environments (Aittola, Parhi, Vieruaho, & Ojala, 2004) and portable knowledge collections (Bainbridge, Jones, McIntosh, Witten, & Jones, 2008; Hahn, 2009). Mobile devices allow users more flexibility in their information behavior, but also provides new opportunities for library-based services (Hinze, Chang, & Nichols, 2010).

Development of any library app would ideally gather similar reference transaction data from as many service points on campus as possible (Bishop, 2012, p.269). In 2010, The Reference Librarian published a special double issue on mobile libraries; and in the following year, the fifth Handheld Librarian Online Conference and their m-Libraries Conference were held (Murphy, 2010). An escalating number of presentations and publications detail how librarians are "bringing libraries and their rich resources to their patrons' mobile devices" (Murphy, 2010, p.1).

Assessment of reference transactions using this question typology could inform library app development. Previous studies' reliability testing indicated this question typology is reliably operationalized (Bishop, 2012, p.265). The study of Bishop (2012, p.268) concluded 8 kinds of questions transactions: find an item, printing, circulation, desk supplies, computer, staff, room access and hours. Bishop (2012, p.265) also

found location-based questions include two types: wayfinding questions (e.g., "Where is room 105?"), and attribute questions (e.g., "What are your hours?"). Wayfinding (i.e., directional) and attribute location-based questions are inquiries that concern a geo-referenceable site (Bishop, 2011). In contrast, many queries do not relate to a specific location, such as a user who needs help with citation software (e.g., EndNote) (Bishop, 2012, p.265). Bishop (2012, p.269) concluded that a simple platform with flat information appears to be a better long-term, cost-effective approach, because content management allows the same information to be drawn into the library app when library Websites are updated.

Sometimes the information required is essential to the task at hand, such as finding a hotel for the night. Other times, the need is associated with a question prompted by a conversation or a nearby object (e.g., a billboard) (Sohn, Li, Griswold, & Hollan, 2008, p.1) Heimonen (2009 , p.50:7) showed that mobile Web access is the dominant information access method for active mobile Internet users. There is a clear dichotomy in the methods based on the user's intent - informational, hedonic needs were approached by using Web search and focused, utilitarian, pragmatic needs were satisfied by using a known website or application that would likely provide desire information.

Method

The observation was conducted from January 3, 2013, to February 5, 2013. We stayed at the National Central Library for a half day twice every week to observe and identify active library users, that is, the population that uses the library frequently for a long time. After detecting several target populations, we discussed with them the general situation of their library use and asked them whether they were willing to assist in writing the journal.

Our observations in the National Central Library are as follows. Most library users were generally seated near the window on the second floor, in which the New Books Area is located. Laptops could be used in the window facing Zhongshan South Road. Laptop users generally occupy the middle tables, where they can plug their laptops to the electrical sockets nearby. Desk lamps were stationed on tables. Determining whether the books that the readers read were from the library or their personal belongings is difficult.

Middle-aged and elderly (retired people) occupy mostly the Newspaper Section on the third floor. At noon, only a few users occupy the WebPAC Area, in which only three

to five people were using the computers. Only two to three users were in the Rare Books Room on the fourth floor. Similarly, only three to five people were in the Law Collection Room on the fifth floor because the section was only for special books.

Readers stayed in the Japanese/Korean Collection Section on the sixth floor for a short period. Thus, determining whether the room was used by long-term users is difficult. Only two or three people were inside the room near noon. The Study Room was not used during this period. However, we found that several books were placed in the study room. Therefore, we assume that the study room is used regularly on weekdays.

The number of library users decreases at noon. Rainy weather affects the number of people going to the library. Although we could not determine who the active users were, we found that many readers stay at the second floor for a long time.

Furthermore, readers stay in several book sections only for a short period. Thus, whether users were searching for materials or were only visiting due to curiosity (possibly to read random books) is unidentifiable. We considered taking pictures of the readers to assist recall, but did not do so to avoid intruding their rights. Therefore, this non-intrusive observation was limited to our own recall capacities.

How do we select and contact subjects? The observation process is discussed below. We selected seats wherein we can observe library users. After staying at one floor for one hour, we went to other floors to observe the screened candidate readers. We specifically focused on the objects of our study.

We stayed on each floor for more than one hour. We first sat down on a selected area and placed our materials. Afterward, we visited each floor to observe which individuals prioritize reading library books (many people bring their own books to read at the library on holidays). After determining the individuals who read library books, we unobtrusively checked whether they used smartphones in the library by observing whether a smartphone is placed on their desks. We did not approach these readers directly but listed them as candidates. Identifying the readers who read books for long periods could effectively show the intensity of library resources. Therefore, we checked whether these readers still stayed at the library after thirty minutes to one hour. We contacted readers who were still reading books or other publications after the period. This study is an observation of individual readers and a comprehensive overview of library users.

After observing these readers for five times or six times, we discussed with them our research purpose and verified their willingness to participate in the study. After identifying the readers who are willing to participate in our study, we sent letters asking them to help us by writing their daily records. Participants can randomly select 10 days within three succeeding weeks to write their records. The record contents include the information they gathered from papers and other print media, computers, and smartphones as well as their reading behavior.

This study considered using a smartphone application (app) to document information regarding the readers' library use as well as that concerning their daily lives. However, file transmission to computer via an app (e.g., MomentDiary) is not possible. Moreover, the app Action Diary, which was supported by Android phones, does not have sufficient features and is difficult to use. Thus, we thought of using a software that directly records daily life activities but did not do so in an intrusive way to respect the readers' right to privacy. Therefore, the traditional method of writing daily records was adopted in this study. The participants wrote their records manually and then encoded them into a computer. We provided the participants with a writing format for reference, which most of them followed.

Some potential respondents refused to participate because of time-related concerns. A letter of invitation was sent to the readers who were willing to be interviewed. This study first included 21 participants; however, 4 of which were unable to finish their records. Thus, we analyzed data from 17 participants.

After the daily records were finished, the participants were invited to an interview regarding the contents of their daily records to facilitate discussion between both sides (i.e., the researchers' and the interviewees') and to ensure record clarity. However, after interviewing three participants, we found that the participants repeat what is written in their daily records and could not provide supplementary data. Therefore, we adopted the snowball method to gather a new set of interviewees. This study also adopted data saturation theory. That is, the interview is stopped immediately when an interviewee could not provide new information. At the end of May 2013, 18 respondents were interviewed.

Results

The library-related mobile applications in Taiwan

Currently, Google Play and Apple Store can be used to search library-related apps in

Taiwan, as shown in the following table. These apps can be issued either by libraries or by private enterprises. The functions of these types of apps include personalization services (such as establish personal library, personal borrowing records), latest news (include activities), new arrivals, online reference service, access and download e-journal, online check in and out (e-books), search library collections, virtual library tour, online book reservation, library information (open time, library instruction, branch library information, library information, how to use digital equipments), detail information of books, study room reservations, recommended purchase, campus news (include speech video), overdue notice and list of e-resources. The library apps of some schools also include other school-related information, such as lecture videos and digital teaching materials as well as the ranking of journals in the *Journal Citation Reports*.

The following list is the library-related apps we can find in Taiwan.

Table 1. The library-related apps in Taiwan

App Name	Units of Issue	Functions	Source
Mobile videos of National Library	National Library	Presents the latest news, video theme, new arrivals; provides online consultation and personalization services	Google Play
Mobile Library	Acer Inc.	Facilitates downloads of electronic journals; provides new contents; facilitates online borrowing and automatic return; provides blackboard reading mode	Google Play
Taipei Library	Taipei Library	Scans the bar code to check library collections; shows library collections via map	Google Play
National Library of Public Information (ibookfun)	National Library of Public Information	Presents a 360-degree virtual tour and introduction; describes the method of using digital equipment and Google Map navigation	Google Play
Mobile Library of Tainan	Tainan University of Applied	Facilitates searching college collections; handles online reservations and renewal by	App Store

University of Applied Sciences	Sciences	combining personal functions	
China University of Technology Library	China University of Technology	Allows searching library collections, library information and notice; offers personalization service, online borrowing, and reservation; facilitates searching collections	Google Play
Taipei University Mobile Library App	Taipei University	Presents the latest news and library collections; facilitates personal borrowing; presents announcements, key activities, and new books; allows online searching; check borrowing records; allows using of library bar code; can be synched with Facebook	Google Play
NTU Library	Taipei University	Allows scanning the bar code or ISBN/ISSN to search library collections; provides key word search	Google Play
Kaohsiung Library	Kaohsiung City government	Facilitates library collections search (voice search)	Google Play
Library Assistant	Private	Facilitates collections search; presents borrowing records; allows book reservation; lists the opening time and addresses of public libraries	Google Play
My Library	Private	Allows establishing of personal library; presents a list of borrowed and lent books; presents detailed information of books	Google Play
Kaohsiung University of Applied Sciences	Kaohsiung University of Applied Sciences	Provides the latest news; allows collections search; presents personal borrowing record	Google Play

App			
National Taiwan Normal University Library App	National Taiwan Normal University	Facilitates collections search and book exchange reservation; presents recommended purchase; allows study room reservation	Google Play
Campus Initiative App-China Medicine 2.0	China Medical University	Presents campus news and college introduction; allows collections search; provides traffic information and personalization service; with a literary corner	http://www.cmu.edu.tw/app.html
Library Collections of National Beimeng High School	Beimeng High School	Enables bar code scanning; lists recommended purchase books	http://blog.yam.com/youngers/article/59139578
Taipei University Library	Taipei University	Presents the latest news; facilitates collections search and personalization borrowing; presents library introduction	http://www.lib.ntpu.edu.tw/LibService/app.php
Xinbei Ai Book	Xinbei City Library	Facilitates collections search; latest news; new book information; a personalization service; provides branch library information; lists electronic resources	http://www.tphc.gov.tw/MainPortal/htmlcnt/6bec8b3d06564126ae7cfdc881bf254b
Library User Education	Library of Taitung University	Has QR code to search electronic books; collections search	App Store
Library User Education Library Instruction	Library of Kaohsiung Medical University	Presents digital materials; allows searching of journal rank in the <i>JCR</i>	App Store
Campus Speech	Library of Kaohsiung Medical University	Presents campus speech videos	App Store

Taipei Like Reading (Taipei Library Assistant)		Facilitates collections search and login search of library card; latest news and library location; presents borrowing records	https://itunes.apple.com/tw/app/tai-bei-ai-yue-du-tai-bei/id543779299?l=zh&mt=8
Kaohsiung Read Portable GO	Hyweb Technology Co., Ltd.	Facilitates Kaohsiung Library collections search; provides location-based positioning service; allows online reservation	Google Play
Academia Sinica Collections search	Academia Sinica	Facilitates collections search	Google Play
Library of Yunlin University of Science and Technology	Yunlin University of Science and Technology (Claridy Solutions, Inc.)	Provides personalization information; presents new books; allows study room reservation and collections search	Google Play
Taiwan University of Arts Mobile Library	Taiwan University of Arts (Hyweb Technology Co., Ltd.)	Facilitates collections search; online reservation; facilitates personalization services	Google Play
Ilan University Library	Ilan University	Facilitates collections search and bar code scanning and searching; borrowing records; book list, and online reservation	http://www.niu.edu.tw/library/
Hualien Culture	Cultural Affairs Bureau of Hualien County	Library and local cultural center information	Google Play
Tamkang	Tamkang	Overdue notice; allows online	Google Play

iLife	University	reservation; presents users' borrowing record; lists electronic resources	
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What do people need for library mobile applications services?

The interviewees' needs in a library app are as follows.

1. Collections classification search: The interviewees prefer library apps that can facilitate book search. They also expect a narrow book classification where books are categorized according to their target age groups or where the highly recommended books and most frequently borrowed books are segregated. The interviewees' statements are as follows.

“I believe that the app was excellent. However, the books could be further classified more finely. For example, the books can be categorized according to their target age group to aid me when I want to look for law books, legal books, or books for children. In doing so, I could search books based on their target age groups” (Interview 14:227–229).

“We could know which books are currently popular by knowing which books are borrowed the most frequently” (Interview 14:236–237).

2. Contents of master and doctoral thesis: The interviewees were graduate students taking up Master's degrees. Thus, they hope that a library app could provide thesis content. However, they mentioned that the copyright should be included.
3. Novel-type e-books: Several interviewees mentioned that an app can include the e-book forms of entertaining novels.
4. Reference services: One interviewee suggested that a library app should have a feature that allows its users to ask book-related questions.
5. Introduction of new books or bestselling books: Several interviewees expressed that an app should list the most recommended books. For example, a mother who wants to educate her children might refer to a book recommendation app that lists the top 10 bestselling books.

6. Personal borrowing records: A few interviewees wanted to have an app with circulation status search to avoid unproductive trips to the library.

7. Activities notification: Several interviewees suggested for an activities notification app. It should include all the information regarding the activities of the organization. The following statements are obtained from the interviewees' responses.

“I believe that if a library wants to develop an app, the app should be attractive and useful. For instance, the app should include information on library activities. The app may also notify its user if a library has new books or if the user has borrowed recommended book from the library” (Interview 2:219–222).

8. Overdue notice: An app should have a feature that reminds its user of the due date of borrowed books.

In general, the interviewees' requirements for a library app service are similar to the original function of the library, as shown in table 2.

Table 2. The functions of apps which participants need

App Type (function)	Collections search	Personal borrowing records	Reminder	Contents	Others
	Book classification	Book borrowing and lending	New books	Masteral and doctoral thesis	Reference Services
	Top/bestseller list		Personal reading recommendation	Story books	Study room seats
	Top circulation list		Reservation notice	E-books	
			Activity notification		

The interviewees simply imaged their requirements in an app on the basis of their needs in physical libraries. However, when the interviewees were asked to identify their needs for future library services, they shared more innovative app requirements. For example, several interviewees mentioned that the library should have audio books. In reality, audio books are scarce in the library as well as in the Taiwanese market. App search was limited to the abstract part. Another interviewee raised an innovative idea. The interviewees suggested designing an app that allows readers to know how many seats are left in the library. An example of this type of app is Ubike. These apps help readers avoid an unproductive trip to the library (Interviewee 8:126–128). Additionally, several interviewees hoped for apps that integrate a map function so that they can learn the location of the nearest library (Interviewee 8:106–108).

There is a big gap between existing library-related apps in Taiwan and apps expected by the interviewees in this study. The libraries do more than what the interviewees want (or hope). On the other hand, we found new features expected by the interviewees included only ranking information, thesis and dissertations, study-room-seat searching functions, and other functions that can be obtained without the use of an app. If a library aims to create an app to provide information to library users in the future, the data sorted in this section can serve as reference.

Conclusion

Owing to new technologies, information needs on the move can be met immediately by mobile phones. Specifically, mobile phones add greater possibilities to people's lives. This study arrives at the following conclusions. Many public, college, and even private libraries in Taiwan have established library-related apps. However, the interviewees in this study did not use these library apps. They believe that their demands for a library app are based on their current library usage and believed that existing apps did not involve any innovation. This condition can be attributed to the focus of library resources on "books." Apps are essentially functional and emphasize providing information to meet a certain immediate need. When designing an app for a library, the demands of library users should be considered.

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References

- Aittola, M., Parhi, P., Vieruaho, M., & Ojala, T. (2004). Comparison of mobile and fixed use of smartlibrary. In *Mobile Human-Computer Interaction (Mobile HCI 2004)*. Glasgow, UK, pp.383-387, Sep. 2004.
- Bainbridge, D., Jones, S., McIntosh, S., Witten, I.H., & Jones, M. (2008). Beyond the client-server model: Self-contained portable digital libraries. In *ICADL'08: Int. Conf. on Asian Digital Libraries*, pp.294-303. Berlin, Heidelberg: Springer-Verlag.
- Bishop, B. W. (2012). Analysis of reference transactions to inform library applications (apps). *Library & Information Science Research*, 34, 265-270.
- Boulos, M.N.K., Wheeler, S., Tavares, C., & Jones, R. (2011). How smartphones are changing the face of mobile and participatory healthcare: an overview, with example from eCAALYX. *BioMedical Engineering OnLine*, 10(24). Retrieved Aug. 11, 2013 from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3080339/>
- Broussard, R., Zhou, Y., & Lease, M. (2010). University of Texas mobile library search. *Proceedings of the American Society for Information Science and Technology*, 47(1), 1-2.
- Case, D.O. (2007). *Looking for information: A survey of research on information seeking, needs, and behavior*. 2nd ed. London, UK: Academic Press.
- Dempsey, L. (2009). Always on: Libraries in a world of permanent connectivity. *First Monday*, 14(1). Retrieved Aug. 11, 2013 from <http://firstmonday.org/ojs/index.php/fm/article/view/2291/2070>
- Ellis, D. (1989). A behavioral model for information retrieval system design. *Journal of Documentation*, 15(4-5), 235-247.
- Erdelez, S. (1997). Information encountering: A conceptual framework for accidental information discovery. In P. Vakkari, R. Salvolainen, & B. Dervin(Eds.), *Information seeking in context: Proceedings of an international conference on research in information needs, seeking and use in different contexts* (pp.412-21). London: Taylor Graham.
- Hana, J. (2009). On the remediation of wikipedia to the ipod. *Reference Services Review*, 37(3), 272-285.
- Heimonen, T. (2009). Information needs and practices of active mobile internet users. In *Mobility '09 Proceedings of the 6th International Conference on Mobile Technology, Application & Systems* (New York, NY, USA, 2009), pp.

50:1–50:8.

- Hinze, A.M., Chang, C. Nichols, D.M. (2010). Contextual queries and situated information needs for mobile users. Retrieved May 25, 2013 from <http://www.cs.waikato.ac.nz/puts/wp/2010/uow-cs-wp-2010-01.pdf>
- Jones, M. & Marsden, G. (2006). *Mobile international design*. Chichester, UK: John Wiley & Sons.
- Kaya, T. (2010). Location-based apps add virtual dimension to campus maps. *The chronicle of higher education, wired campus*. Retrieved Aug. 11, 2013 from <http://chronicle.com/blogs/wiredcampus/location-based-apps-add-virtual-dimension-to-campus-maps/27495>
- Klamm, D. (2010). How universities can win big with location-based apps. Retrieved Aug. 11, 2013 from <http://mashable.com/2010/09/22/universities-geo-location/>
- Lippincott, J. (2010). Mobile reference: What are the questions? *The Reference Librarian*, 51(1), 1-11.
- Marmasse, N. & Schmandt, C. (2000). Location-aware information delivering with commotion. *Proc HUC 2000*, pp.157-171.
- Mihalic, K. & Tscheligi, M. (2007). Divert mother-in-law' representing and evaluating social context on mobile devices. *Proceedings of the 9th international conference on human computer interaction with mobile devices and services. MobileHCI 2007*, pp.257-264.
- Mills, K. (2009). M-Libraries: Information use on the move. Retrieved Aug. 30, 2013 from <http://www.dspace.cam.ac.uk/handle/1810/221923>
- Murphy, J. (2010). The mobile revolution and the handheld librarian. *The Reference Librarian*, 52(1-2), 1-2.
- Savolainen, R. (1995). Everyday life information seeking: approaching information seeking in the context of "way of life". *Library and Information Science Research*, 17(3), 259-294.
- Seeholzer, J., & Salem, J.A. (2009). Library on the go: A focus group study of the mobile web and the academic library. *College & Research Libraries*, 72(1), 19-20.
- Smith, A. (2012). 46% of American adults are smartphone owners. *Pew Internet & American life project*. Retrieved May 25, 2013 from <http://www.pewinternet.org/Reports/2012/Smartphone-Update-2012/Findings.aspx>
- Sohn, T., Li, K.A., Griswold, W.G., & Hollan, J.D. (2008). A diary study of mobile information needs. In *Proceeding of the twenty-sixth annual SIGCHI conference on Human factors in computing systems (Florence, Italy, April 5-10, 2008)*. CHI '08. ACM, New York, NY, pp. 433-442.

- Walsh, A. (2012). Mobile information literacy: A preliminary outline of information behaviour in a mobile environment. *Journal of Information Literacy*, 6(2), 56-69.
- Wilson, T.D. (1981). On user studies and information needs. *Journal of Documentation*, 37(1), 3-15.
- Wilson, T.D. (1999). Model in information behavior research. *Journal of Documentation*, 55(3), 249-270.
- xAd (2013). 46% Exclusively Use Mobile for Researching Local Products, Services: Study. Retrieved Aug. 30, 2013 from <http://www.xad.com/about/news/46-exclusively-use-mobile-for-researching-local-products-services-study>