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Baby Boomers and Technology: Factors and Challenges in Utilizing Mobile Devices

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BABY BOOMERS AND TECHNOLOGY: FACTORS AND CHALLENGES IN UTILIZING

MOBILE DEVICES

by

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ABSTRACT

BABY BOOMERS AND TECHNOLOGY: FACTORS AND CHALLENGES IN UTILIZING
MOBILE DEVICES

by

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Under the Supervision of Professor Iris Xie, PhD

This exploratory dissertation study reports an investigation of Baby Boomers utilizing

mobile technology to determine how Baby Boomers were utilizing mobile devices and if there

were any types of challenges and affecting factors some Baby Boomers could face when

searching for information in an online mobile environment. Fifty Baby Boomer participants were

recruited by a purposive snowball sampling method and were divided into two groups, twenty-

five Younger Boomers and twenty-five Older Boomers to look for comparisons and differences

among the Baby Boomers in regards to mobile technology usage, search activities,

environmental context, frequency and duration of search activities, as well as the factors and

challenges they could encounter while using a mobile device since the age range spans nineteen

years. The study was designed to answer two research questions: *How are Baby Boomers*

utilizing a mobile device to search for information in terms of the mobile device types, the

environmental contexts and the types of information searched?; and What are the challenges

concerning Baby Boomers utilizing a mobile device in searching for information and their

affecting factors? This exploratory dissertation study used a qualitative methods approach based

in grounded theory to analyze the data. Participants were given a choice of using print or

electronic instruments to participate in the study. Multiple collection methods were used to gather the data, consisting of a questionnaire and solicited diaries that were kept for a period of seven days with follow-up interviews given to all participants. The grounded theory approach created a coding scheme of ten types of challenges representing five major categories and twenty-three affecting factors. The comparison and interpretation of the search activities, the types of challenges and the affecting factors led to the development of the Baby Boomer Mobile Device Information Searching Model. Theoretical, methodological and practical implications that include system design and library services have been discussed providing suggestions to system designers, researchers and information professionals within and outside the Library and Information Science field.

To

my husband Rich,

and especially my children Amanda and Nick

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LIST OF ABBREVIATIONS

ALA	American Library Association
AMO	Adults Midlife and Older
ASK	Anomalous State of Knowledge
ACRL	Association for College and Research Libraries
BA	Behavior Activity
BI	Behavior Intention
CL	Comfort Level
DA	Device Application
DB	Database
DC	Device Convenience
DD	Device Design
DE	Device Ease-of-Use
DK	Domain Knowledge
DL	Digital Library
DP	Device Performance
DS	Device Security
ED	Education
ELIS	Everyday Life Information Seeking
ES	Economic Situation
FCC	Federal Communication Commission
HCI	Human-Computer Interaction
ICT	Information and Communication Technology

IR	Information Retrieval
IRB	Institutional Review Board
IS&R	Information Seeking & Retrieval
ISP	Information Search Process
LIS	Library & Information Science
OB	Older Boomers
OPAC	Online Public Access Catalog
PEW	Pew Research Center
PA	Physical Ability
PC	Personal Context
PE	Previous Experience
PL&I	Public Library & Internet
PP	Personal Perception
RK	Retrieval Knowledge
SA	Social Ageism
SE	Self-Efficacy
SK	System Knowledge
SP	Social Perception
TAM	Technology Acceptance Model
TC	Task Complexity
TR	Task Requirement
TT	Task Type
US	United States

YB   Younger Boomers

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degree. Thank you all for your thoughts and prayers.

Chapter 1. Introduction

1.1 Background

The world population has been aging and living longer due to improved health and technology. Research conducted on adults midlife and older (AMO) has been needed especially in regards to information technology and how they access and retrieve information. Many researchers have studied information retrieval (IR) and information seeking behavior among various populations of students and adults. These studies have produced theories, approaches and models that have identified different aspects of information seeking and retrieval.

User-oriented approaches in IR have been gaining in popularity to study user needs in seeking information. Taylor (1967) was a primary researcher to study user information needs and how different factors could affect the information seeking process. Prior research studies explored the different aspects of the dynamic interaction between an individual and an online system. Some earlier models examined this interaction by looking at the system performance of relevance and feedback (Spink, 1997) and the interaction between the user and the interface (Ingwersen and Jarvelin, 2005; Saracevic, 1997). The interface could play a key role in how easy it would be to retrieve online information. The ease of locating and retrieving electronic information could have an effect on the way an individual interacts with the information.

A user-system interaction has been important in the IR process. An individual's cognitive aspects could play a role when interacting with a system. Users could exhibit different types of behaviors such as anxiety or uncertainty that could affect the search process (Kuhlthau, 1991; Vakkari, 2001; Wilson, Ford, Ellis, Foster & Spink, 2002). In addition, ALA Digital Literacy Task Force (2011) mentioned how it was important for users to have the knowledge and digital

literacy skills to effectively access and retrieve information as well as having a satisfying experience with the system.

Furthermore, different types of tasks could play a role in the IR process. For instance, work tasks and roles could affect the interaction and the sources used to retrieve information (Fidel & Pejtersen, 2004; Pharo, 2004). Users have performed different strategies and have used different types of systems to find information. Research scholars have noted that the IR process is not straightforward but could go in different directions depending on the strategies implemented by the users (Bates, 1989; Xie, 2008).

Information technology has been changing daily and has been an important mode to access and retrieve information. Desktop computer ownership has been decreasing as laptops and other mobile devices to access and retrieve information have been increasing dramatically (Griffey, 2010b; Smith, 2010). In addition, mobile technology has gained in popularity, though usage by AMO has been small compared to younger aged individuals. The popularity of online information has also increased. Therefore, the access and retrieval of online information from a mobile device could be important since mobile devices would allow access and retrieval of information from anywhere and at any time. AMO have been an increasing demographic due to the Baby Boomer generation (Federal Interagency Forum on Aging Statistics, 2012). As the population ages, more individuals may want access to information at their fingertips, due to a more active lifestyle that take users away from a standard desktop computer. However, there could be challenges among AMO when utilizing mobile technology while accessing and retrieving information.

New research conducted on Baby Boomers would provide an opportunity to investigate whether established theories and models are applicable to the Baby Boomer generation,

especially when utilizing mobile technology. New research could identify ways in which the models would be updated or refined, or the research could spawn the creation of a new model for this unique and large population. This study was intended to fill a gap in the field of research in Library & Information Science (LIS) by investigating the information needs of Baby Boomers. It addressed the question of how Baby Boomers located and used information from a mobile technological device as well as the factors that could affect the utilization of mobile technology and the challenges Baby Boomers might face in seeking online information. Chu (2003) stated information searching, information seeking and information accessing could be considered synonyms when discussing IR within an electronic system, though at times could have different focuses (as cited in Xie, 2008, p. viii). In this dissertation, the terms were used interchangeably unless otherwise noted.

1.2 Significance of the study

Characteristics of AMO have varied and therefore, perception, access and retrieval of technological information by this age group could vary. There were limited studies researching AMO, especially concerning IR and access of information in different types of environments with different undefined tasks conducted by real users. AMO have been researched in other fields of study such as gerontology and other health related fields but research has been limited in the LIS field. This exploratory dissertation study was conducted to help contribute to Baby Boomer research and create awareness of the utilization, unique factors and challenges some Baby Boomers could face when searching for information in an online mobile environment. Baby Boomers could be considered digital immigrants since they were born in a period where certain types of information technologies had not yet been created or used as frequently as those born more recently. This could create a digital divide with AMO in the understanding and usage

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of mobile technology that could make it difficult for them to retrieve relevant information. In addition, it could create a divide between individuals who could be afraid to learn new information technology and those who embrace it as part of their daily lives. This comfort level could vary among this age group and as more information becomes available online, could cause issues and challenges. This dissertation study provided unique new knowledge and created more awareness of Baby Boomers in relation to their use of mobile devices. This information would be valuable to inform library communities, system designers and other groups who provide services and assistance to Baby Boomers.

Various models, approaches, theories, and applications have been developed to understand the information search process. They have greatly contributed to the understanding of the complex and active process of information searching. However, there was not a model, approach or theory that specifically examined Baby Boomers. Building on the contributions of previous research, this study provided a proposed model that could be used in future studies to aid in researching Baby Boomers and their IR needs.

1.3 Research problem, questions and goals

Baby Boomers have diverse characteristics. Some Baby Boomers have been exposed to information technologies while others have little or no training with computerized systems. In addition, age related changes, such as physical or cognitive issues, could affect some Baby Boomers and their interactions with information technology. However, there has been a lack of research specifically looking at Baby Boomers and their use of information technology, which called for a need to investigate this particular age group and how they retrieve information. In addition, with the increase in the popularity of mobile technology, there have been few research studies examining the growing population of Baby Boomers using mobile devices. This

exploratory dissertation study intended to understand how Baby Boomers effectively used, accessed and searched for information from a mobile technological device. This study was designed to address the following research questions and goals:

R1) *How are Baby Boomers utilizing a mobile device to search for information in terms of the mobile device types, the environmental contexts and the types of information searched?*

The first research goal examined how Baby Boomers were using mobile devices and whether they were finding different types of information unique to their specific age group. It examined where and when Baby Boomers accessed information. Frequency and time spent searching and retrieving information were measured to understand user engagement in the search process. This information determined whether Baby Boomers were spending a longer period of time finding information and whether they were accessing information more or less frequently than other aged adults.

R2) *What are the challenges concerning Baby Boomers utilizing a mobile device in searching for information and their affecting factors?*

The second research goal explored whether this age group had any challenges when accessing and retrieving information from a mobile device and examined the factors that Baby Boomers experienced while using and searching for information on a mobile device. Since this user group has various characteristics, different factors played a role in the IR process. Different factors were discovered from the qualitative data about Baby Boomers that were not previously discovered in quantitative research studies. Additionally, past research studies on Baby Boomers and previous older adult studies were mainly limited to examining usage with non-mobile

desktop computer devices, and few studies pertaining to mobile technology usage with AMO participants.

By answering the above research questions, this exploratory dissertation study provided important contributions and filled in a gap in research about AMO using mobile devices and specifically about Baby Boomers.

1.4 Definitions of terms

An overview of terms and their definitions found within this dissertation study has been presented below and has been divided into four areas: Information technology, Information technology mobile devices, Information technology users, and Information technology user skills. These definitions were created to understand how each term was considered in the dissertation study. Chapter 3 has additional explanations of information technology skills assessment.

1.4.1 Information technology

- *Information access*: The ability of a user to reach data stored on a computer or a computerized system and obtaining the information needed. This could include the Broadband connection as well as the system utilized to find the information.

- *Information retrieval***:** A broad concept limited to users interactions with systems. This could include searching, seeking and/or browsing for information in an online system as well as the user's knowledge, search skills or experience.

- *Information searching***:** The behaviors of users when interacting with different systems that would consist of search moves, strategies, patterns, and factors. This sometimes could be tied to specific searching techniques such as keyword searching by inputting words in a search box.

- *Information seeking***:** The active or passive behaviors of users acquiring information from systems or non-system sources such as print materials or personal communication with individuals to satisfy a goal, task or need. This would cover more categories such as users' cognitive, perceptual, and behavioral factors as well as the environment or social aspects of finding information.

- *Information technology*: According to the Dictionary for Library and Information Science (ABC-CLIO, 2015), information technology is defined as a broad term that encompasses all aspects of management and processing of information by a computer including the hardware and software to access the information. In the context of this dissertation, information technology is defined as ways in which a user accesses information by computers and other electronic devices for creating, storing, retrieving, and exchanging information electronically.

1.4.2 Information technology mobile devices

- *E-book reader or E-reader*: An electronic mobile device designed primarily to read books downloaded in digital format with some devices having the functions of Internet access, text-to-speech capabilities and other functions (ex. Amazon Kindle & Kindle Fire, Barnes & Noble Nook, Google Nexus, etc.).

- *Internet enabled cellphone or Smartphone*: A mobile cellular telephone that has more capabilities than a basic phone with built-in applications/functions and Internet access (ex. Apple iPhone, Samsung Galaxy, Android, Blackberry, AT&T GoPhone, etc.).

- *iPod Touch*: A mobile touch screen device from Apple that has combined wireless

  Internet connectivity and other functions such as music, videos, and gaming. The device

  does not have a cellular signal for data connectivity.

- *Mobile technological device/mobile technology***:** A small, handheld mobile

  computing device that typically has a display screen and/or a miniature keyboard (ex.

  Internet enabled cellphone, tablet, e-reader, iPodTouch, etc.)

- *Tablet*: A general-purpose mobile computer contained in a touch-screen panel

  operated by the fingers and/or stylus pen typically smaller than a notebook

  computer but larger than a smartphone (ex. Apple iPad, Amazon Kindle Fire,

  Barnes & Noble Nook, etc.).

1.4.3 Information technology users

- *Baby Boomers***:** The Pew Internet Generations Online (2009) defined AMO using

  different target groups: Younger Boomers (YB) (Born 1955-1964), Older Boomers (OB)

  (Born 1946-1954), the Silent Generation (Born 1937-1945), and the GI generation (Born

  -1936). According to the Library of Congress Authorities 2012 records, the American

  Heritage Dictionary defined older people as, "…someone between middle and advanced

  age." For the purpose of this dissertation study, AMO, who comprise Baby Boomers ages

  50-69, were considered and referred to as Baby Boomers throughout the paper. Please

  note that any prior research conducted on adults over age 50 referred to in this

  dissertation study typically labeled this age group as Baby Boomers, midlife adults,

  and/or older adults and these terms were used dependent on the study cited throughout

  this dissertation.

- *Digital immigrant*: An individual who has not been previously exposed to certain types of information technology, has adopted it to some extent later in life and has less of a comfort level using it.

- *Digital native*: An individual born during or after the general introduction of most information technologies and through interacting with the technologies from an early age has a greater comfort level using it.

1.4.4 Information technology user skills

- *Expert user*: An individual who has skills or experience utilizing various information technologies to access and retrieve information online with little or no issues.

- *Intermediate user*: An individual who has some skill using various information technologies to access or retrieve information online though still has issues and/or challenges.

- *Novice user*: An individual who has little or no experience or skill using various information technologies to access or retrieve information online.

1.5 Research design

The researcher conducted an exploratory user study with 50 diverse participants to answer the research questions. The participants were divided into two groups consisting of YB and OB with an age range of 50-69 years or born between 1946 and 1964. The participants filled out a short questionnaire that included demographic information (age, gender and education), information technology experience and mobile device ownership. After filling out the questionnaire, participants kept a diary and documented all the times that he/she used a mobile device to access, searched and retrieved information online. Participants recorded their information searching activities while utilizing a mobile device throughout a 7-day period.

During that period of time, the participant documented a maximum of 5 different typical search activities per day while using a mobile device for a total that could be up to 35 activities. Answers to the following questions were documented for the 5 different activities per day: 1) What type of mobile device did you use? 2) Where were you? 3) What type of information did you look for? Why? 4) How long did you use the mobile device to find your information? 5) Did you find what you were looking for? Why or why not? 6) Did you encounter any problems? 7) Did anyone help you? Who was it? 8) Why did you choose to use that mobile device to find your information? Subsequent search activities that were the same as the 5 activities that had answers to the above questions were recorded in a tally sheet marking that the search activity was repeated during that same day but detailed information pertaining to the questions about that activity was not documented after the first initial documentation. The researcher interviewed all of the participants after the participant diaries were completed and field notes were kept throughout the dissertation study. No specific search task was pre-determined by the researcher. However, the participants were provided a series of questions to guide the diary entries (see Appendix D). The grounded theory method was used in this dissertation study since there could have been valuable variables discovered or themes of interest pulled from the qualitative data that have not been revealed in previous quantitative research studies. The quantitative data in this study looked at the types of mobile devices and environments, the frequency of device usage and search activities as well as the duration of the search activities when participants were interacting with the mobile IR system. The qualitative data also identified factors and challenges the participants faced in utilizing a mobile device.

1.6 Dissertation structure

To answer the research questions, the researcher examined a wide range of theoretical and practical relevant literature to acquire a basis for this exploratory dissertation study, which is explained in Chapter 2. Chapter 3 outlines the sampling, theoretical and the methodological approach as well as detailing the data collection and data analyses procedures. Chapter 4 contains the analysis of the results and synopsis of the findings. Chapter 5 is a discussion of the findings, the Baby Boomer Mobile Device Information Searching Model and the theoretical, practical and methodological implications as well as unique and associated information. Chapter 6 summarizes the key findings and future directions of prospective research.

1.7 Chapter summary

This chapter highlighted this exploratory dissertation study that investigated Baby Boomers utilizing a mobile device in searching online information. This research was undertaken due to a dearth of research conducted about Baby Boomers in the LIS information retrieval and access area. This study utilized a qualitative methodological approach to gain further insight than previous quantitative research studies. Two research questions were developed to investigate Baby Boomer IR and access needs as they pertained to mobile technology. This dissertation has reported on a study of 50 diverse Baby Boomer participants mobile information needs over the course of 7 days. The researcher examined the types of participant information needs, mobile device(s) used, how long the participants used the device to conduct the search, how often they used the device to search for information and whether there were any challenges and affecting factors encountered during the IR process. Findings from the data gathered created the Baby Boomer Mobile Device Information Searching Model that identifies the factors and challenges Baby Boomers face when searching for information using a mobile device.

Chapter 2. Literature Review

2.1 Introduction

The previous chapter focused on the initial introduction, research questions and goals accomplished in this exploratory dissertation user study. This chapter examines prior research laying a foundation for the study.

Information searching has evolved from the user searching for information manually in a physical environment to searching for information with an electronic information retrieval (IR) system (Xie, 2010). IR and access have been important aspects of searching for and finding information effectively. Some users today have accessed and retrieved information with a mobile device. Mobile technology has evolved over the last few years and gained in popularity with users due to the convenience of access to information at their fingertips. Adults over age 50, specifically Baby Boomers, have a variety of characteristics and capabilities in regards to information technology. Some have been digital immigrants and not digital natives who grew up among different technological devices. Accessing and retrieving information online could be challenging due to these varying characteristics. However, this age group has not been readily considered for services and programming at public libraries or researched extensively in the Library & Information Science (LIS) field. The following literature review explored research on IR and IR constructs, mobile technology, and information on adults over 50 years of age. This provided a foundation on how individuals access and retrieve information in an online system.

2.2 Information retrieval

IR research has focused on system-oriented and user-oriented approaches. The system-oriented approach examined IR as a match between a query and a set of documents typically dealing with the precision and recall of a system. The user-oriented approach examined users'

cognitive aspects and the interaction with the information source when seeking information (Cool & Belkin, 2011). The LIS field has used user-oriented approaches more frequently in IR research since the 1980s (Wilson, 2000). Wilson (1999) stated there was a distinction among scholars between information searching and information seeking. However, it could be difficult to differentiate information searching, information seeking, and IR models since some information seeking models involved search components and processes. For the purpose of this dissertation study, the terms were divided into two separate sections. The first section illustrates theories, approaches and models with the terms information searching and information seeking used interchangeably and classified by the IR research scholars. The second section identified other information seeking theories and models that have not been classified into the macro, micro or macro/micro levels of IR. Each section has been summarized in a table with the main focuses of IR, information searching and information seeking bolded for easy reference.

2.2.1 Information searching and retrieval theories, approaches and models

2.2.1.a Most cited and influential IR models

Taylor (1967) was an initial researcher to study information seeking utilizing a user-oriented approach in IR. He discussed information seeking when the user had a specific or an unconscious need for information. Taylor's Levels of Information Need Approach identified 4 types of information needs: visceral (unconscious) need, conscious need (but the need is unclear), formalized need (when a user can express it) and a compromised need (when the user modified the question so the system could understand it) that represented a flow of activity. Additionally, the information need could be influenced by internal or external factors that affected the information seeking process. These 5 factors were subject definition, objective and motivation, inquirer personal characteristics, the relationship of inquiry description to file

organization and anticipated or acceptable answers. Negotiations between the user and the librarians helped form an effective query aiding the information seeking process (Ruthven & Kelly, 2011).

Building on Taylor's (1967) types of needs, Belkin (1980) developed a cognitive communication system for IR. The ASK (anomalous state of knowledge) Hypothesis illustrated how the user had an uncertainty or gap in knowledge that prevented the user from accomplishing a goal. The user tried to fill the gap by seeking information causing an interaction between the user and the information source associated with text or a combination of texts. The interactions would take place over time with the user engaged in the cognitive processes of navigation, representation, comparison, presentation or visualization dependent on the specific goal, task or problem. In this cognitive communication system, information would be forming knowledge (Case, 2002).

In 1972, Dervin developed the Sense-Making Approach to seeking information. This approach has been utilized often in research studies in the Communication and LIS fields. The sense-making model examined variables (situations, gaps and users) searching for patterns in user behaviors while interacting with information. The approach identified procedures and behavioral moves that changed during the process of seeking information. The information seeking process assisted the user to understand or make sense of the world. Internal as well as external factors could influence the process as the user moves through time and space to bridge a gap in their knowledge (Dervin, 1983; 1992).

Kuhlthau (1991) incorporated Taylor's (1967) Levels of Needs and Belkin's (1980) ASK Hypothesis along with George Kelly's (1963) Personal Construct Theory (as cited in Fisher, Erdelez & McKechnie, 2005, p. 230) and developed the Information Search Process Approach

(ISP) model. The model revealed how information searching has physical actions with cognitive thoughts and feelings playing a role in accomplishing the task. The ISP would be initiated by uncertainty and has six stages: initiation, selection, exploration, formulation, collection and presentation. Each stage has the possibility of uncertainty, anxiety, relief, or clarity that would influence the information search. The search process has a sequence of events based on four criteria, task, time, interest and availability with user emotions playing an important role in bridging the gap in the information search process.

Rasmussen, Pejtersen, and Goodstein (1994) created the Cognitive Work Analysis Approach that examined the interaction of the user's cognitive activity, work domains, social activities and subject preferences (as cited in Xie, 2008, p. 15). This approach was guided by Pejtersen (1979) earlier work on the Cognitive Task Analysis Approach that illustrated how the user, the librarian and the system interacted together. The interaction strategies (browsing, known item search, analytical searching, empirical search and similarity search) were a part of the information seeking process. Based on Rasmussen et al. (1994) approach, Fidel and Pejtersen (2004) later developed the Cognitive Work Analysis Framework. This conceptual framework was based on the behavior of users in a work environment depicting the individuals as actors involved in a work related action. It focused on the task, the environment, the actor's goals and cognitive attributes, workplace organization, task analysis and the strategies used in the search process.

Wilson (1996) modified an earlier 1981 model and developed the Model of Information Behavior to accommodate the development of new contexts such as the World Wide Web. This model illustrated how in the course of information seeking, users interacted with information systems, information sources or have information exchanges with other individuals (Wilson,

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1999). These interactions could be formal or informal resulting in success or failure in finding

relevant information. The model suggested the perceived need would be bounded in context

according to stress theory, though the need alone may not activate user actions. Intervening

variables could either cause barriers or support information seeking activities. Risk/reward

theory and social learning theory could also play a role with user information seeking behaviors

(active, passive or ongoing). A feedback loop could occur when users evaluate information to

determine further actions. The user would search and find information or the user would stop

looking and the process ends. The activity would end with the success/satisfaction or failure/no

satisfaction with the information seeking process. The most cited IR models have been

summarized in Table 2.1.

Table 2.1.
Summary of the Most Cited Theories, Models, and Approaches

Theory	Model	Summary	Weakness
Taylor (1967)	Levels of Information need approach	The approach laid the groundwork for user-oriented approaches. It identified four types of information needs that were influenced by five internal or external factors. Negotiations of the factors between the user and the librarians helped form queries important to understand an individual's knowledge through communication or the social context. The model started with the task and matched the need to the document. It would indicate problems within **IR** systems. The approach was examined with a study of interviews with librarians.	The approach has not been tested in different digital environments. It also did not examine the behaviors affecting the process, the strategies or moves in information seeking.
Dervin (1972, 1983)	Sense-making method	This method studied **information seeking** in everyday life. It has a three way process involving situations, gaps, and uses. The information bridged the gap of uncertainty the user was feeling and the need was satisfied by active searching or by other means. This method provided a framework that looked at the behavioral moves during the process and points to problems with system design. This method was a turning point to more user-oriented approaches. Time-line interviews were conducted and still used with studies today.	This method did not examine the strategies involved in bridging the gap in the user's knowledge, the actual problem or the different behaviors affecting the situation.

Belkin (1980)	ASK (anomalous state of knowledge) Hypothesis	This hypothesis looked at the uncertainty or gap when resolving a problem. It involved a cognitive process where information forms knowledge. It could specifically indicate problems with **IR** systems by the user's interaction with text after the identified tasks.	The hypothesis did not examine the seeking strategies, the social context, the patterns and the behaviors. It also has not been tested in different digital environments.
Kuhlthau (1991)	ISP Information search process approach	This approach examined the user feelings, cognitive thoughts and physical actions as well as how they all play a role in accomplishing a task. The specified stages of the information process have a sequence of events where the active search process is trying to bridge a gap. The approach integrated models of **information searching** and **information seeking.** The researcher examined students' behaviors while writing a research proposal for a master's thesis. It has been widely tested by others in different digital environment.	The approach did not examine the type of need the user has and the information sources to satisfy that need. It has a general approach to the search process.
Rasmussen Pejtersen & Goodstein (1994) Fidel & Pejtersen (2004)	Cognitive work analysis approach Cognitive work analysis framework	Guided by Pejtersen's (1980) cognitive task analysis approach, the cognitive work analysis approach examined the interaction and the strategies as part of information seeking process where cognitive activity, work domains, social activities and subject preferences all interact together. The framework was based on the 1994 model examining the user behaviors in a work environment. The task, the environment, goals, organization of the workplace, strategies used and user cognitive attributes all interact in the process. This framework could be used to help design better systems for **information seeking.**	The framework did not examine the factors behind the moves in the process or the user thoughts and feeling during the process. It has been also difficult to generalize the results to other groups.
Wilson (developed in 1996)	Model of Information Behavior	This model expanded Wilson's 1981 model and examined the user need with uncertainty a part of the information seeking process. Intervening variables cause barriers or support with stress theory, risk/reward theory or social learning theory possibly being an important factor. Other individuals could influence the process. It has a problem solving process driven by behavior with a feedback loop. This model has integrated models of **information searching** and **information seeking.**	The model did not examine how the context could play a role, how barriers could affect user motivation, the seeking strategies or patterns of the process. The model only depicts a sequential process.

2.2.1.a Summary

The above user-oriented models have made a significant impact in research studies in the LIS field (Xie, 2008) and have continued to influence and inspire future user-oriented research. Taylor's (1967) levels of information need approach noted how it was important to understand an individual's knowledge through communication or the social context in the information seeking process. Taylor's experiences in the field and interviews with librarians led to the model development (Fidel, 2012). Taylor laid the groundwork and influenced future IR user-oriented approaches. Belkin's (1980) ASK hypothesis looked at the gap in the individual's knowledge. By examining the user's interaction with text, it could indicate problems with IR systems. Kuhlthau's (1991) ISP model was based on empirical research and has been tested in subsequent studies providing strength to its validity. It was the first model to study the information seeking process empirically (Fidel, 2012) analyzing user tasks and examining how the task performance affected information seeking (Vakkari & Järvelin, 2005). Dervin's (1983) sense-making approach focused on the concept of making sense of information. It assumed that life entailed making sense of the environment and one's experiences, which required a user to express his or her information need. Dervin's approach pointed more at the problem with system design and the lack of communication between the system and the user (Wang, 2011).

Adults midlife and older (AMO), similar to other age groups, have searched for information due to a specific need or an anomalous state of knowledge. Taylor's (1967) and Belkin's (1980) approaches could be utilized to study the types of needs AMO could have when seeking out information sources. However, neither approach had been tested in any type of digital information technology environment. Furthermore, the models did not look at user-system interaction, such as the behaviors behind the strategies user's would have in seeking information.

Similarly, Dervin's (1983) model also did not examine the behaviors and strategies involved in bridging the gap in the user's knowledge nor the actual problem itself.

Kuhlthau's (1991) ISP model would be a better choice to utilize in examining AMO since it incorporated Taylor's (1967) and Belkin's (1980) models together providing richer detail about user needs. This has been considered a general model since it draws attention to user feelings during the user system interaction (Wilson, 1999) and could be beneficial to understanding what an AMO felt about seeking information from different digital environments. However, the ISP model has limitations since it did not consider the type of need the user has and the information sources to satisfy that need. Research studies have shown computer anxiety to be correlated with age, with older participants experiencing more anxiety than younger participants about computers (Karavidas, Lim & Katsikas, 2005). Wilson's (1999) model incorporated other theoretical behavior models and considered information seeking as a problem-solving event driven by behavioral activities. Wilson also noted the importance of the social context in the process (Nichols & Twidale, 2011). This model would be an appropriate model to use to look at AMO behaviors especially if the researcher explored anxiety or self-efficacy of users information seeking. However, the model has a significant drawback since it illustrated a sequential process and information seeking sometimes moves in different directions depending on the strategies and the information received. Additionally, Fidel and Pejtersen's (2004) cognitive work analysis offered a unique framework to examine human behavior in a work environment, though the model's purpose was towards designing better information systems. Some AMO have continued to work even after retirement age, so the model would be beneficial in looking at work goals and the information seeking strategies. However, it did not explain the factors behind the strategies and the model would be better if combined with a behavioral model.

2.2.1.b Macro level

The LIS research field has cited extensively the following three traditional approaches. These approaches identified factors that affected the user-system interaction and guided the development of other user-oriented models, theoretical frameworks and approaches.

Ingwersen's (1992) Cognitive Model of interaction closely resembled Wilson's (1999) model that illustrated seeking information as an active search process and the cognitive communication of Belkin's (1980) cognitive communication system. Ingwersen's (1992) model had the user as the central component in the social organizational environment's cognitive space. Recent research by Ingwersen and Jarvelin (2005) resulted in the Interactive Information Seeking Retrieval (IS&R) and Behavioral Model, a revision of an earlier model that identified users as cognitive actors interacting with a system. The model illustrated a four-way interaction between the social, cultural and organizational context, information objects, information technology and the system interface with the user(s) or cognitive actor(s) in the center of the process. The task (work, daily life, or interest) was important in the model with uncertainty, a goal or a problem starting the information seeking process and the user interacted via the system interface. Each part of the interaction influenced the other.

Belkin's (1996) Episode Model with Text was developed to understand the interactions between the user and the system, what types of goals lead to the interaction and how the retrieved information affected the interaction. With the interaction as the model's center point, the user (goals, tasks, knowledge, problem or uses) and the information retrieved (text) affected the interaction. Various processes supported the interaction: comparison, representation, navigation, presentation and visualization. The user (actor) played a significant role and based on relevance judgments, guided the search process.

Saracevic's (1997) Stratified Interaction Model identified the user interacting with the system. The queries made, the user's knowledge, the situation and the environment interacted with the system and then adapted to the system output. The model revealed six types of interactions between the user and the system. According to Saracevic, three user elements or levels occurred in the interaction. The cognitive level: when users interacted with texts making relevance judgments about the retrieved texts, which could change the user's state of knowledge; the affective level: what motivated the user to interact with the system, which could include a user's beliefs and intentions; and the situational level; the problem, or situation that led the user interacting with the system. The system also had three levels. The engineering level: the system design and operation; the processing level: when the user dealt with the software or underlying system algorithms; and the content level: how reliable and relevant the retrieved resources were after analyzing the given information. The information seeking process involved five different types of feedback (content relevance, term relevance, magnitude, tactical review and term review) that played a critical part in the interactions. This model illustrated an active and complex information seeking process (Xie, 2008). The IR macro level models have been summarized in Table 2.2.

Table 2.2
Summary of Macro Level Theories, Models and Approaches

Theory	Model	Summary	Weakness
Ingwersen (1992) Ingwersen & Jarvelin (2005)	Cognitive Model Interactive **information seeking** retrieval and behavioral model (IS&R)	The user would be the central component in the dynamic process. It has a four-way interaction involving the social, cultural and organization context, system objects, technology and the system interface. The active search began with a task and the user's uncertainty could play a role in the process. This has been a useful model for system design.	The models did not illustrate the role of feedback in the process, the moves involved or the shifts in information seeking. The model has not been used in a large-scale study.
Belkin (1996)	Episode model of interaction	This model was based on the earlier ASK model. It has the interaction with the system as the central point. The **information retrieved**	The model did not include the behaviors behind the strategies the

	with text	affected the interaction. The process started with a goal/tasks and the user played a role on the relevance judgment of information and the interaction with interface. The model helped suggest how to design systems.	user would utilize in seeking information or the patterns of behaviors and did not look at other contexts besides text.
Saracevic (1997)	Stratified interaction model	This model included 6 types of interactions cognitive, affective, situational, engineering, processing and content level. The process involved five different types of feedback. The model showed the **IR** process as active and complex with user and system changing and adapting as they interact with the interface.	The model did not examine the interaction with other contexts than text, user behaviors seeking strategies or the patterns involved in the process.

2.2.1.b Summary

Ingwersen's (1992) cognitive model incorporated different interactive processes other than query modification as well as looking at user behaviors and system design issues. Ingwersen and Jarvelin's (2005) modified IS&R model could be used with other cognitive actor(s) not just information seekers and their interactions with other social, organizational and cultural contexts. It would be a useful model for designing a good IR system. Belkin's (1996) episode model, based on his ASK hypothesis (1980), illustrated the information need as a problem and the problem guided the strategies used. It provided a framework for information search strategies and it examined user interactions with texts. Saracevic's (1997) stratified interaction model illustrated how information seeking is continuous and interrelated consisting of users multitasking (Spink & Cole, 2005). The model could be used in depicting general goals and plans of everyday user information seeking as well as investigating some of the interactive IR issues by identifying factors that affect the interaction.

Ingwersen and Jarvelin's (2005) Belkin's (1996), and Saracevic's (1997) models looked at the system and user interface interaction. The interface design has been considered an important aspect of the interaction between the system and the user especially for AMO. Czaja et al. (2006) discussed that interface design needed to be easy to use, requiring less mental effort

for an older adult user. However, Ingwersen's (1992) model did not provide for testability (Wilson, 1999) or look at how or when to make a move in the search process. Additionally, Ingwersen and Jarvelin's (2005) modified IS&R model framework did not show shifts in user behaviors during the information seeking process. Saracevic's (1997) model would be more ideal to use when studying AMO since the model provided a framework that incorporated different factors affecting the interaction though, the model did not expand beyond this process. Saracevic's and Belkin's models also have limitations since they were based only on the interactions with texts and not with other contexts such as videos or music. In addition, the models did not look at user behaviors associated with seeking information.

2.2.1.c Micro level

Bates' (1989) classical Berry-Picking Evolving Approach illustrated how the user's search queries could change in the information seeking process. The model illustrated how multiple techniques were used as well as the process of accessing different retrieved sources to acquire information. This information seeking process was not straightforward but could go in many different directions, much the same as picking berries out in a field. Bates stated how Ellis' (1989) and Kuhlthau's (1988) studies of academic behaviors characterized a berry-picking evolving process when searching for information. Users typically engaged in six strategies when seeking information: footnote chasing, citation searching, a journal run, area scanning or browsing, subject searches and author searching. Users adapted to the strategy that they needed at the time of the search.

Ellis' (1989) Information-Seeking Behavior Framework identified users displaying different types of behaviors when information seeking. Ellis' research on scholars' information searching behaviors concluded a user experienced certain features while seeking information.

These six features or characteristics: starting (gathering information), chaining (following the connections between materials), browsing (self-directed or structured), differentiating (the user compares and finds the differences in the resources), monitoring (user checks specific resources for information), and extracting (the user is making judgments about the received information) could vary in sequence during the interactive search process. Ellis' subsequent study added more search behavior activities: verifying and ending, to the search process (Ellis, Cox & Hall, 1993). Additionally, Ellis and Haugan (1997) interviewed 23 engineers and research scientists investigating their search behaviors utilizing the information-seeking behavior framework. The results illustrated there were differences in the participant's information seeking patterns. However, all participants' behaviors were similar or identical clarifying results from earlier research studies.

Spink's (1997) research on 40 academic users' online search transactions resulted in the Interactive Feedback and Search Process Model. Findings illustrated how users' search strategies consisted of one or more cycles depending on the users' interpretations and judgments of retrieved information. The model involved one or more moves between the user and the IR system that directly related to the situation and the user's cognitive state at the time of the search. The interactive feedback could be the content relevance, term relevance used, the relevance of the amount of information retrieved from the query, the review of terms and strategies, and past search histories. The user engaged in the cognitive process of strategic moves with the system by query formulation or reformulation depending on the feedback the system. Later work by Spink and Jansen (2004) explored human-computer interaction (HCI) in regards to Web searching. After analyzing Web transaction logs, the researchers noted that human information behavior could influence the search due to the technological, social and organizational Web contexts.

Wang, Hawk and Tenopir's (2000) Multidimensional Model of User-Web Interaction identified three components, the user, the interface and the Web. Influenced by Ellis' (1989) framework of information seeking behavior, this model was created from a study of 24 students interacting with digital environments (Wang, 2011). The user-Web interaction had the user as the first element in the process in which four different factors: situational (task, a need or user knowledge), cognitive (thoughts, strategies), affective, (feelings that might change due to interaction) and physical (hand-eye coordination, control) influenced the HCI. The interface factors (access methods, navigational tools, access results, messages received if access fails, and devices such as keyboard, mouse, etc.) played a role between the user and the system that assisted in the process of seeking information. The Web factors included objects in any digital format, activated objects in the search process, Web spaces, organization schemes and metadata or description information.

Vakkari's (2001) Theory of the Task-Based IR Process refined Kuhlthau's (1991) ISP model. Vakkari researched students' behaviors while writing a master's thesis research proposal. The results assisted in the development of Vakkari's theory that looked at the tasks of information seeking as a series of stages connected to the types of information searched, the terms used, the changes in the search tactics during the process and the user's relevance judgments of the information retrieved. The user's level of uncertainty was an intervening factor in the information seeking process and connected the search tactics used with the information need (Jansen & Rieh, 2010). As the user progressed in the information search progress, the degree of confidence grew as the focus for the search became clearer, causing less uncertainty and terms and tactics increased resulting in a higher precision of search results. The IR micro level models have been summarized in Table 2.3.

Table 2.3

Summary of Micro Level Theories, Models and Approaches

Theory	Model	Summary	Weakness
Bates (1989)	Berry-Picking Evolving Approach	This model showed a dynamic search process where the search queries could change during the **information seeking** process with users adapting to 6 strategies. The system's interface design facilitated information seeking. The approach showed limitations of traditional models and set the foundation for interactive IR between the system and user.	The approach did not examine the different types of behaviors or the thoughts and knowledge of users influencing the process.
Ellis (1989)	Model of **information seeking** behavior framework	This model indicated 6 features in making judgments about received information. Users engaged in multiple strategies identifying information seeking patterns that can vary in sequence in the active search process. The model has been tested with academic social scientists by the researcher and by other scholars.	The model did not examine the cognitive activities or relate strategies to the search process It was also based on paper documents and not electronic systems.
Spink (1997) Spink & Jansen (2004)	Interactive Feedback and Search Process Model	The model examined how one or more moves were related to the situation and the user's cognitive state specifically the query formulation and/or reformulation of keywords due to the interactive feedback from the system and user. A transaction log study was conducted utilizing the model. The user and the cognitive process played active roles where the behavior could influence the **IR** search based on the user's judgment of the relevance and feedback.	The model did not examine the specific information need or the user domain knowledge.
Wang, Hawk & Tenopir (2000)	Multidimensional Model of User-Web Interaction	The model examined how the user is the first element in the search process. Four different factors: situational, cognitive, affective, and physical could influence the HCI. The interface and web factors played a role in **information searching.** An exploratory study of graduate students interacting with the university website gave verification to the model.	The model did not examine the actions or user domain knowledge.
Vakkari (2001)	Theory of the Task-Based IR Process	The theory refined Kuhlthau's (1991) model. The tasks have an impact on the **information search** process. It	The theory did not examine how different environments could affect the search process.

| | | examined how the work environment had a series of stages connected to the types of information searched, terms used, search tactics, and relevance judgments with uncertainty as an intervening factor. The process connected the search tactics used with the information need. The researcher examined students' behaviors while writing a research proposal. | |

2.2.1.c Summary

Bates' (1989) berry-picking model has been cited the most when depicting the search process (Xie, 2012). It illustrated how information seeking sometimes was not a straight path, especially when a user would browse for information. In addition, the model could determine how to design a system interface to facilitate information seeking. Ellis' (1989) behavioral framework examined different characteristics of seeking information and exploring user behavior patterns rather than the cognitive aspects and highlights the information seeking process. Spink's (1997) interactive feedback and search process model revealed how the different types of feedback were influencing factors in the information seeking process. Wang et al.'s (2000) multidimensional model illustrated how different factors influenced the HCI and related user behaviors to the interface design. This model was different from all the others since it focused on the specific environment and the Web. Vakkari 's (2001) theory of the task based IR process illustrated information seeking in the work environment. This model focused on the task and attributes of the user's perception of the information problem.

Wang et al.'s (2000) model would be the most ideal to use when studying AMO since it provided a framework that incorporated the physical skills needed for the interaction with the system. However, the model did not focus on user knowledge or actions. Bates' (1989) model would be a good model to explore AMO browsing behaviors. However, it did not look at user's

thoughts and knowledge variables that could influence browsing behaviors. User thoughts and feelings when seeking information could be beneficial to understand what AMO would feel about seeking information from different IR sources. Vakkari's (2001) theory gave more detail about user uncertainty and the interaction with the system. However, the theory did not look at the environment, which could affect the information seeking process (Pettigrew, Fidel, & Bruce, 2001). Ellis' (1989) model did not clearly relate any factors that could influence the search process, such as anxiety, which AMO could experience when seeking information in a digital environment. In addition, the model was based on paper documents not electronic resources (Joseph, Debowski, & Goldschmidt, 2013). AMO could have cognitive issues when seeking information from an IR system. Spink's (1997) model did not look at the specific information need or user domain knowledge in the search process, which would not give important information on AMO since the model focused on system relevance and feedback.

2.2.1.d Macro/Micro level

The following three models fall in-between the macro and micro levels. Pharo's (2004) and Hert's (1996) models were not considered macro-level models nor micro-level models but in between the two types of levels. Xie's (2008) model has a combination of macro-level and micro-level approaches.

Pharo's (2004) Search Situation and Transition Model of information behavior was developed to discover the interplay between factors influencing information seeking or retrieval. Pharo's study focused on Web information searches and was influenced by a variety of earlier models. Five main categories: work task, the searcher, the social organization environment, the search task and the search process interacted with each other during the search process. The search process has different transitions and situations that become factors interacting and

affecting the work or search task and the searcher. Pharo and Jarvelin (2004) conducted a study with 13 students performing real searches and verified the interaction of the above factors in the information search process.

Hert's (1996) Model of IR Interaction illustrated how the user has a problem to solve or goal to accomplish during the HCI. Hert explored user goals in relation to user interactions with an online public access catalog (OPAC) system and found user goals were not usually modified. The users actions could be affected by different elements: the situation, the problem or goal, the actual user and the response from the system. The model revealed the IR interaction as a loop. The information seeking time and the goal consisted of the macro-time-scale and the micro-time-scale was the actual interaction time. When users interacted with a system, they were in the micro-time-scale. When users finished the search, the macro-time-scale moved forward from the results of the interaction. Then the process ended or another micro-time-scale would begin again continuing the search process.

Xie (2008) developed the Planned Situational IR Model to integrate the macro and micro levels of information seeking. Inspired by Bates' (2007) and other earlier views (Fidel, 2012), the model focused on the user's search process moves. The interaction consisted of information seeking strategies (interactive intentions, retrieval tactics) derived from a plan influenced by a user's goals and tasks, personal information and the situation. The information seeking strategies affected the interface, which in turn influenced the system and the situation. Three types of situations: routine (familiar), disrupted (distracted by something in the environment) and problematic (rearrange existing or new knowledge) could determine where the interaction led in the feedback loop that were dependent on the situation. The user or actor began the process

within the social, organizational context. The IR macro/micro models have been summarized in

Table 2.4.

Table 2.4
Summary of Macro/Micro Level Theories, Models and Approaches

Theory	Model	Summary	Weakness
Hert (1996)	Model of IR interaction	This model examined how the user has a problem to solve or goal to accomplish where the user's actions would be affected by the different elements associated with the situation, the problem or goal, the user and the response from the system. The interaction loop illustrated by a macro-time-scale (**information seeking** process time) and the micro-time-scale (the interaction time).	The model did not examine different types of user group or the behaviors that affect the moves. It also has not been tested on real types of tasks.
Pharo (2004) Pharo & Jarvelin (2004)	Search Situation and Transition Model	This model examined how behavioral factors influence **information seeking** or **retrieval** and was influenced by a variety of earlier models. Five main categories: work task, the searcher, the social organization environment, the search task and the search itself would be involved in the process and interacted with each other. The search process has different transitions and situations that become factors interacting and affecting the work or search task and the searcher. The researchers examined students performing real searches resulting in verification of the interaction.	The model did not examine how the different types of tasks play a role or the user thoughts and feeling during the process.
Xie (2008)	Planned Situational IR Model	This model was developed to integrate the macro and micro levels of **information seeking**. Inspired by earlier models, it focused on the user's moves in the search process. It examined how the interaction consisted of information seeking strategies influenced by a user's goals and tasks, personal information and the situation affecting the system. Three types of situations: routine, disrupted and problematic could determine where the interaction leads in the feedback loop all dependent on the situation. The user was the actor that began the process within the social, organizational context. The researcher's study of students researching an assignment gave verification to the model.	The model did not examine the user thoughts and feelings in the search process.

2.2.1.d Summary

Pharo (2004) as well as Pharo and Jarvelin's (2004) search situation and transition model illustrated the search process and related user information seeking behaviors. It looked at the different work and search task roles in shaping users information behavior as well as how the work task could be examined from different dimensions. Hert's (1996) model of IR interaction, based on a large-scale study of university students, looked at the system and user interaction with the interface. Xie's (2008) planned situational model incorporated many aspects of the information seeking process. It examined the challenge of information seeking and observed how users planned and shifted strategies in the process due to changes in thought (Wang, 2011). The model focused on the user's goals, strategies, and factors that could influence the interaction.

Xie's (2008) model would be ideal to examine AMO seeking information in a digital environment. However, the model did not look at user's thoughts and feelings; such as computer anxiety or self-efficacy, which could be important factors with this age group during a search process. In addition, Hert's (1996) model did not look at the behaviors that affect the search moves in the search process. Pharo (2004) as well as Pharo and Jarvelin's (2004) examined the user goal or work task. As mentioned previously, it would be beneficial in looking at the work goals and the strategies used in information seeking of AMO conducting work tasks. However, these models would be better when combined with a behavioral model depicting the behaviors behind the search process and some AMO have retired from the workforce.

2.2.1.e Information searching and retrieval summary

User-system interaction has been noted to be a dynamic process that involved many factors that contribute to the overall information search process. The above IR theories, models and approaches contributed different methods to examine the information search process. Each

model focused on different components to explore the interaction between the IR system and the user. This exploratory dissertation study examined Baby Boomers who have varying abilities and characteristics in seeking information from a mobile environment. Due to the age group's uniqueness, the aforementioned IR models were considered not to be the right fit to examine the factors and challenges Baby Boomers faced when interacting with mobile technology. Even though some covered several of the components a Baby Boomer could face, the models had limitations that needed to be addressed with the age group. For instance, some models didn't address electronic information seeking, different user characteristics, and the behaviors affecting the search, anxiety and comfort levels, or the environment. These would be just a few of the actors that could be associated with Baby Boomers information searching.

2.2.2 Information seeking theories and models

This section covered other information seeking theories and models that were not classified in the macro, micro or macro/micro levels of IR research. Information seeking has been considered to be, "with respect to all the information that comes to a human being during a lifetime, not just in those moments when a person actively seeks information" (as cited in Bates, 2002c, p. 3). Additionally, users could seek information from formal and informal sources with the user dealing with great volumes of information (Case, 2012). Users could be aware or unaware of gathering information and their information seeking behavior could include passive and active information seeking in relation to the information sources. The most prominent theories and models depicting information seeking behavior were discussed below to continue laying the foundation for this dissertation study.

Krikelas' (1983) model was an initial model that revealed information seeking behavior. The model looked at the importance of uncertainty and the level of urgency as factors in seeking

information. The model portrayed 13 components that flowed downward with parts that do not affect or encompass the other. The process started with the user gathering or providing information due to a need-creating event/environment and led to a deferred or immediate need, which determined whether the process returned in a feedback loop or moved downward. If the need was immediate, the process moved on to an internal source (individual's memory or direct structured observations) or external source preference. Individual memory has been noted to come from personal files that directly feedback to the memory. The information gathering process could rely on user memory (personal files) and bypass any direct observations or external sources. The external sources could be direct (interpersonal) contact or a recorded (literature) source (Case, 2012).

Savolainen's (1995) Everyday Life Information Seeking (ELIS) Model illustrated the role of social and cultural factors in information seeking. The model illustrated how a user needed a meaningful order of things to derive a mastery of life. Mastery of life was a way to approach everyday problems and could involve passive or active behaviors. The mastery of life had four types of behaviors: optimistic-cognitive, pessimistic-cognitive, defensive-affective and pessimistic-affective which could determine how users seek information. Values, capital, social, cultural and the user's current situation could affect the cognitive mastery of life. Inspired by Dervin's (1983) sense-making approach model, Savolainen believed users had a cognitive order and wanted to keep that order in their information seeking interests (Case, 2012). Savolainen later developed the social cognitive model in which network competence would be affected by the user's self-efficacy, anxiety, experiences and outcome expectations (Savolainen, 2002).

Bystrom and Jarvelin (1995) looked at task complexity in information seeking. The more difficult the task, the user would see the task as being more complicated. The theory of

Information Activities in Work Tasks began with the perceived task. The user determined an information need analysis that was affected by personal factors (education, experience, attitude, motivation and mood) and situational factors (time available to do the task). A user's personal style of seeking, and the organization where the user works could affect the course of action chosen that identified sources and ranked them to satisfy the need. Once the action was chosen, the results were evaluated. The need was satisfied and the task was completed or the need was not satisfied and further action was needed. A feedback loop determined the need complexity affected by the seeking style in organization. The researchers conducted an empirical study examining civil servant workers that demonstrated the use of the model.

Leckie, Pettigrew and Sylvain's (1996) Model of the Information Seeking of Professionals revealed how professionals searched and used information while working at their place of employment. It was similar to Krikelas' (1983) model with a downward movement flow, though there were some feedback loops that could change information need characteristics. The process would begin with the professional work role that influenced the task and the information need characteristics. The needs created an awareness of information and the sources of information motivated the professional to seek out information. The outcomes affected the sources and awareness with important variables (source familiarity, success, trustworthiness, packaging, timeliness, cost, quality and accessibility) playing a role in the process (Case, 2012).

Johnson's (1997) Comprehensive Model of Information Seeking flowed left to right and began with four antecedent factors: demographics (age, gender, ethnicity education, occupation, wealth), experience (knowledge, social aspects), salience (state of topic ignorance) and beliefs (self-efficacy) that motivated the user to seek information. These factors would lead into the information-carrier factors that were the characteristics and the utility of the information

channels (face-to-face interactions or print and media) selected by the user. Information actions involved user choices and feelings, which affected the user's behaviors and cognitive actions. Johnson's model was a sense-making approach influenced by context. The model has been tested empirically in the health communication fields (Case, 2012).

Pettigrew (now Fisher) developed the Theory of Information Grounds from research studies conducted in 1998, 1999 and 2000 (Fisher, Erdelez & McKechnie, 2005). The theory maintained information needs, the providing of information, seeking information and the use of information had a social context. Fisher, Durrance and Hinton (2004) derived seven key concepts to information grounds: context rich, temporal setting, instrumental purpose, social types, social interaction, informal and formal information flow, and alternative forms of information use. Actor information behavior influenced by the social aspects of the information grounds or environments affected the flow of information. The sharing of spontaneous and serendipitous information emerged within the social atmosphere (Fidel, 2012).

Chatman's (1999) Theory of Life in the Round was developed by Chatman's research on prison inmates. The theory maintained how users understood certain things about life, but there was also a certain degree of uncertainty. The social world could influence the users and the users' meanings of information. The theory has four concepts: small world, social norms, social types and worldview. In a small world, an individual determined what was and was not important. In regards to information seeking, social norms dealt with acceptable behaviors in a given context. Within that context, a person seeks information because of a common need. Social types described the individuals. Worldview was the common beliefs, customs and language by which the individual interprets the world. Life in the round theory maintained the information

behaviors were about making meaning of the information through the social context. The

information seeking theories and models have been summarized in Table 2.5.

Table 2.5
Summary of Information Seeking Theories and Models

Theory	Model	Summary	Weakness
Krikelas (1983)	Model (information seeking behavior)	This model looked at the uncertainty and the level of urgency in **seeking information**. The need and the user's perception of the need influenced the activity. There were thirteen components in gathering or providing information. This was the first model to depict information seeking as a dynamic, complex process.	This was a general model of information seeking and it only looked at recorded information or documents. User characteristics (age) were also not considered.
Savolainen (1995)	Everyday Life **Information Seeking** (ELIS) Model	Inspired by Dervin (1972), this model illustrated the role of values, social and cultural factors in information seeking. Users have a cognitive order and they want to keep that order in their information seeking to derive a mastery of life. Four types of behaviors: optimistic-cognitive, pessimistic-cognitive, defensive-affective and pessimistic-affective could be involved in the strategy to solve a non-work information seeking problem. The researcher conducted an empirical study of middle and working class users.	The model did not examine the connections involved in seeking information. The approach has not been tested in different digital environments.
Bystrom & Jarvelin (1995)	Theory of Information Activities in Work Tasks	This theory looked at information seeking by examining the activities that took place during the work tasks. The information sources used and the information sought were important factors in **information seeking** with the tasks divided into five categories of complexity. As the complexity increased, more sources would be gathered. The researchers conducted an empirical study of civil servant workers.	The theory did not examine the users' personal characteristics and only looks at professionals not general users.
Leckie, Pettigrew & Sylvain (1996)	Model of the Information Seeking Of Professionals	This model examined the professional's work role. The roles and the associated tasks determined how the user seeks out information. The user's work role could be a significant factor on how the user approached the **information seeking** task. This model has six major components and shows the complexity of searching for information in a work environment.	The general model did not examine variables that can affect the information needs such as professional's age, attitudes, and beliefs. The importance or context of the need also was not explained.
Johnson (1997)	Comprehensive Model of Information	This model has 7 factors under three headings that flow from left to right. The antecedent factors could affect and	The model did not have any feedback loops between the actions and

	Seeking	motivate the user's **information seeking** process. It has been the tested empirically in the health communication fields.	the antecedent factors.
Pettigrew (1998,1999) Fisher, Durrance & Hinton (2004)	Theory of information grounds	This theory examined the information needs, the providing of information, **seeking information** and the use of information having a social context. There were 7 key concepts to information grounds and the social aspects of the information grounds affect the flow of information, and influenced the actor's information behaviors. The sharing of spontaneous and serendipitous information could emerge within the social atmosphere. Research studies gave the theory verification.	This theory has not been tested with users interacting with online systems.
Chatman (1999)	Theory of Life in the Round	This theory examined how users understand certain things about life. The user has a need but experiences a certain degree of uncertainty. There were 4 concepts to the theory: small world, social norms, social types and worldview social norms that deal with acceptable behaviors in a given context. User information behaviors were about making meaning of the information through the social context. The researcher's study with prison inmates gave verification to the theory.	This theory has not been tested with users interacting with online systems
Savolainen (2002)	Social cognitive model	The model could be used when examining network competence in **information seeking** and identify problems of Internet use. In the context of information seeking, the user has perceived self-efficacy and perceived network competence. The network competence was affected by the user's self-efficacy. This would affect the user's anxiety or enjoyment, the outcome expectations and the information seeking experiences. The task context also played a role in the belief of self-efficacy.	This theory has not been tested with users interacting with online systems.

2.2.2 Information seeking summary

Behavior studies, stated in the previous section could be important when examining

AMO. Krikelas' (1983) Model of information seeking behavior looked at user uncertainty when

seeking information. It illustrated information seeking as a complex and linear process.

However, the information seeking process usually does not follow a straightforward path. This

general model did not take into account other sources besides recorded information or documents, and user characteristics were not considered in the process. Savolainen's (1995) ELIS model revealed that a person's way of life such as their values, attitudes and interests affected their information seeking (Rieh, 2007). It focused on everyday life information seeking and was utilized in an empirical study on middle and working class users. However, it did not show the connections to seeking online information. Bystrom and Jarvelin's (1995) theory of information activities in work tasks examined users conducting works tasks and the information sources used in the information seeking process. However, the theory looked at work tasks and not other tasks of information seeking. Likewise, Leckie et al.'s (1996) model of information seeking of professionals examined the information seeking in a work environment. It specifically looked at the different professional roles and did not consider other variables, such as age or attitude that could affect the process. Johnson's (1997) comprehensive model revealed different factors that affected and motivated the user to seek information. However, it did not look at the environmental context or that certain user actions could affect other factors when seeking information. Fisher et al.'s (2004) empirical research on information seeking between different groups gave strength to the information grounds theory and Chatman's (1999) notable theory of life in the round provided a deeper understanding of information behavior. Chatman felt information was an integral part of our social lives, shaped by social and cultural conditions (Fidel, 2012). Both theories examined the social aspect of information seeking. However, the theories did not specifically look at the interaction between users and an IR online system. Savolainen's (2002) social cognitive model looked at the association of network competence and self-efficacy. However, the model has not been used with users interacting with an online digital environment.

Savolainen's (1995) ELIS model would be a better choice to study AMO everyday life information seeking strategies since the model examined different types of behaviors that could affect information seeking. However, the model has not been used in any type of online environment and this dissertation examined participant's mobile technology usage. Savolainen's (1995), Wilson's (1999), Chatman's (1999), and Fisher et al.'s (2004) examined the social factors affecting information seeking. All would be ideal to use when studying AMO, though this would be only one aspect of information seeking studied and other factors could influence the process. Bystrom and Jarvelin's (1995) theory and Leckie et al.'s (1996) model examined users in a work environment. As previously stated, some AMO have continued to work but other individuals have retired, making the theory and model not the right fit for all Baby Boomers. Johnson's (1997) model examined different factors, such as user age and knowledge, which could be important in the AMO information seeking process. However, the process, as stated earlier, could vary and affect other factors during the information seeking process. Savolainen's (2002) social cognitive model would be a good model to examine AMO due to the concept of self–efficacy and the users' knowledge affecting the information seeking process. However, other factors such as the environment, user characteristics or the search moves could also play a role, especially with AMO.

Some Baby Boomers could be affected by the environment around them, which could affect their self-efficacy when working with online information technology. This could have an effect on anxiety levels and comfort in working with newer information technology such as a mobile device.

2.3 Information retrieval constructs

This section covers areas that could affect the IR and access process. It has been divided into the following sections: Information behaviors and associated variables, Systems and associated variables, and Context. Different user studies are noted if applicable in the different sections. However, AMO and Baby Boomers studies are placed in Section 2.5.

2.3.1 User information behaviors and associated variables

2.3.1.a Searching/browsing

Browsing, searching and navigating have been fundamental elements in the IR process (Shiri, 2008). "Browsing is a retrieval process where the users navigate through the text database by following links from one piece of text to the next, aiming to utilize two human capabilities ... the greater ability to recognize what is wanted over being able to describe it and ... the ability to skim or perceive at a glance. This allowed users to evaluate rapidly rather large amounts of text and determine what is useful" (Hertzum & Frokjaer, 1996 p.3). Browsing has been considered an informal or unplanned search behavior where serendipitous information could be found. On the other hand, searching behavior could be more analytical and involve more planning than browsing (Aula, 2005a) requiring more user cognitive load. Users need cognitive resources to construct specific search terms related to the problem (Marchionini, 1995). User searching and browsing behaviors have changed with the introduction of information technology. Xie (2009) discussed how information searching has advanced from the user searching for information manually in a physical environment to a user finding information with an electronic IR system. Users have diverse needs when searching and browsing in online systems (Borgman, 1986). Users have various searching and browsing behaviors that determine the system used in the IR process (Hertzum & Frokjaer, 1996; Wolfram, Wang & Zhang, 2009).

2.3.1.b Uncertainty/anxiety

Various factors could influence users' behavior such as the individual's thoughts and feelings. Kuhlthau's (1983) ISP model examined uncertainty during an information search (as cited in Kuhlthau, 1991 p.364). Kuhlthau's study examined the behaviors of 26 high school students researching a paper. Findings demonstrated how cognitive thoughts and feelings played an important role in the search process. Uncertainty could cause confusion, frustration and anxiety, which was associated with vague and unclear thoughts (Kuhlthau, 2005), putting more demand on the cognitive load needed in the information seeking process. Wilson et al. (2002) examined the concept of uncertainty in the information seeking process. Pre and post interviews were conducted to determine participants' feelings initially before and after the search process. Results showed there was a greater feeling of uncertainty at the beginning stages of the search and the level of uncertainty expressed depended on the degree of user knowledge. The greater the domain knowledge, the less uncertainty expressed about the search process.

2.3.1.c Goal and/or task

In addition to user thoughts and feelings, users could have a task or goal that triggers the IR process. A task or goal has a defined purpose that determines user motivation to seek information. User behaviors could change over time, either increasing or decreasing the activity, dependent on the information need or task (Cothey, 2002). Knowing about the task would assist in query creation for the search (Ruthven & Kelly, 2011). Bystrom & Jarvelin (1995) found that tasks could be simple or complex and as task complexity increases, the information need of the user, the need for domain information and the problem-solving need, the share of general purpose sources and the number of sources needed also increases. However, the success of the information seeking as well as the number of fact-oriented sources could decrease as the task

complexity increases. Furthermore, a task could have a series of smaller subtasks that would be undertaken towards a much larger goal (Vakkari, 2003). Xie's (2000) mixed methods study of 40 participants explored the 4 levels of user goals while seeking information: 1) long-term goal, 2) leading search goal, 3) current search goal and 4) interactive intention. Results concluded 4 types of shifts of interactive intentions could occur: planned, assisted, supplemented or improved and 3 types of information seeking strategies: change of methods, change of resources and change of both methods and resources clarified that the interactive intentions, the user's information seeking strategies and the user's long-term sub-goals were important in the information seeking process. Different types of searching could take place depending on the user task or goal and an electronic resource was selected due to the different type of task that needed to be accomplished (Jansen et al., 2008; Perley, Gentry, Fleming & Sen, 2007). Rieh (2007) investigated 244 information-seeking sessions of 24 participants examining how participants selected information resources and whether the user's goals or tasks affected the selection, if the resources were online and the strategies used during the process. The results revealed participants had five types of goals: personal information (the most frequent activity), academic, entertainment, problem solving and routines. Similar to Xie (2000), depending on the goal, the participants chose different resources with more than one resource utilized including information and human resources in the process. Communication with others was an integral part of information seeking either at the initial start of the search process, during the search or at the end to gain verification from others. This illustrated that interaction with IR resources could have a social aspect that affected the information seeking process.

2.3.1.d Skills, knowledge structure, cognitive style

Moreover, users have certain skills to effectively achieve goals when seeking and searching for online information. The Association for College and Research Libraries (ACRL) (2014) stated that with the explosion of information output and information resources, the 21st century was referred to as the Information Age. Digital literacy, therefore, would be important for users to acquire due to the increase in digital content. Information literacy has been an underlying presence in the definitions of digital literacy since literacy is important in language, reading, and writing developmental skills (Byrnes & Wasik, 2009). Information literacy was determined as a National Education Goals standard (ACRL, 1989). Literacy has been an important concept in the Education (ED) and LIS fields. Lanham (1995), an initial researcher on digital literacy in ED, stated literacy was "the ability to understand information however presented" and to be digitally literate was "being skilled at deciphering complex images and sounds as well as the syntactical subtleties of words" (as cited in Lankshear & Knobel, 2006, p. 12-13). Gilster (1997) took this concept further by saying digital literacy was "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (as cited in Gilster, 1997 p. 1). Gilster believed it was an extension of information literacy, with the information presented in technological form. Being able to navigate through sources, critically evaluate, and make judgments to assemble reliable information was important within an electronic environment. This definition was a good representation for the time-period since most online information was via a computer. Gilster believed the most important skill to acquire to be digitally literate was to be to be able to make informed judgments about information found on the Internet, which started increasing in the 1990s (Internet Society, 2012). ED and LIS researchers have varying interpretations and

different words to represent digital literacy: computer literacy, digital literacy, information and communications technology (ICT), information literacy, literacy, media education, media literacy, multiliteracy, multimodal, new literacy, network literacy, and transliteracy (AASL & AECT, 1998; ACRL, 2014; Bawden, 2008; Bruce, 1999; Coiro, Knobel, Lankshear & Leu, 2009; Cope & Kalantzis, 2000; Digital Transformation, 2002; Gilster, 1997; Hobbs, 2011; Jones & Flannigan, 2006; Katz & Maklin, 2007; Koltay, 2011; Kress, 2003; Kuhlthau, Maniotes & Caspari, 2007; Lanning, 2012; Lemke, 1998; Leu, Kinzer, Coiro & Cammack, 2004; Marcum, 2002; McClure, 1994; NAMLE, 2013; NEA, 2012; Thomas et al., 2007; Tyner, 2010).

Educational standards stated that to be digital literate was "to be able to function in today's media environment being an extension of traditional literacy with the skills and knowledge to access, understand, be aware of, analyze, evaluate, create, reflect and participate in a variety of formats. The original most cited version in the US includes access, analyze, evaluate and produce communication and Hobbs (2011) also included comprehension, collaboration, reflection and social action" (as cited in Scheibe & Rogow, 2012 p19-20). The National Broadband Plan (2010) and the Federal Communication Commission (FCC) brought digital literacy to national attention stating there was not a standardized definition for digital literacy and declared digital literacy as "…a variety of skills associated with using ICT to find, evaluate, create and communicate information" (as cited in Clark & Visser, 2011, p. 38). This definition incorporated the ACRL information literacy skills and the AASL 21st century learner framework. The American Library Association (ALA) affirmed that developing literacy skills including digital literacy was essential for all users. According to the ALA Digital Literacy Task Force (2011) digital literacy was "the ability to use information and communication technologies to

find, evaluate, create, and communicate information, requiring cognitive and technical skills" (as cited in Roach, 2013, para. 3) and to be digitally literate, a user:

- Possesses the variety of skills – technical and cognitive – required to find, understand, evaluate, create, and communicate digital information in a wide variety of formats

- Is able to use diverse technologies appropriately and effectively to retrieve information, interpret results, and judge the quality of that information

- Understands the relationship between technology, life-long learning, personal privacy, and stewardship of information

- Uses these skills and the appropriate technology to communicate and collaborate with peers, colleagues, family, and on occasion, the general public

- Uses these skills to actively participate in civic society and contribute to a vibrant, informed, and engaged community

Furthermore, a user's cognitive style determined how a user interacted with a system, such as whether a user was more exploratory or used a more systematic approach in the information seeking process. Domain knowledge about the search topic and technological skills affected information searching and browsing within an online environment. For a user to perform an effective information search, users have three types of knowledge: IR knowledge (user search skills, strategies, or experience level of searching), domain knowledge (cognitive style of searching, what the user understands and wants about the problem) and system knowledge (users' understanding about the system, features and functions) (cited in Xie, 2012, p. 35). Liu and Yang (2004) conducted a study of 164 distance education students ranking primary IR resources (DBs, OPACs, instructor printed materials, Internet, other). The findings concluded the lack of familiarity or experience with a system was a determining factor in IR resource selection.

Besides a user's cognitive style, users employed multiple searching techniques in the IR process. Bates (1989) berry-picking model explained how searching evolved over time where the user shifts and follows various leads while interacting with the system. Different search moves or tactics would be conducted to aid the search process by providing new ideas and possible solutions to the particular problem or task during the interaction (Bates, 1979a, 1979b; Wildemuth, 2004; Xie & Joo, 2010). Depending on the task, a user would employ different types of search strategies (Bilal, 2002). Users conducted multiple types of moves during a search in an online environment that assisted them in acquiring and satisfying their information need (Bates, 1979b; Fidel, 1985; Vakkari, Pennanen & Serola, 2003; Xie, 2008). Users would perform different search tactics during the search process and the interaction with the system co-determined the tactics used during the IR process. The strategies could shift depending on whether the user changed the original search goal, the interactive intentions and the retrieval tactics used in the search process (Xie, 2008). In addition, different behaviors and variables could play a role that included searching and/or browsing for information to satisfy an information need. These behaviors could be affected by the user's thoughts and feelings or by the particular task or goal that motivated the search. The user's knowledge and digital literacy skills could be a factor in how the user viewed or used the information technology or new information technology. These cognitive factors and skills, as well as the environment around the user could affect the search moves or patterns when searching in an online environment.

2.3.2 Systems and associated variables

Users could make use of different types of resources to search for information. This section examines some of the different types of electronic online systems utilized when searching for information as well as variables that could affect information access and retrieval.

2.3.2.a Accessibility

Accessing information electronically from different systems has been an important issue for some users. Accessibility of information has grown due to the resources individuals utilize to obtain information. However, access to information has varied with different regions having limited access to Internet connections, the digital divides among information technology available, and the qualified professionals who understand how to access online information (Zwass, 2012). Most users access information electronically through a Broadband connection. "Broadband refers to a high-speed, always-on connection to the Internet" (FCC, n.d.). Broadband access according to the National Broadband Map, revealed most of the United States (US) having Wireless connections, though there were still areas without Wireless capabilities and not having a Wireline connection. Increasing Broadband connections to underserved and unserved communities has become increasingly important in telecommunication policies (Saunders, McClure & Mandel, 2012). Broadband access has been an important service for public libraries. Library users have relied on the library to provide Internet and computer access for their information needs. Broadband access has varied by state with libraries benefiting or struggling with different issues on the amount and kind of access available for their users (Jaeger, Bertot, McClure & Rodriguez, 2007). Communities have looked at libraries to provide online access to information as content has become more prevalent on the Internet. A 2004 and 2006 Public Library & Internet (PL&I) study comparison showed disparities of access among individual states and between rural and urban libraries in terms of Internet access and Broadband connectivity (Bertot, Jaeger, Langa & McClure, 2006; Bertot, McClure, & Jaeger, 2005; Jaeger, Bertot, McClure & Rodriguez 2007). Recently, Bertot, Jaeger, McClure, Wright and Jensen (2009) PL&I 2008-2009 survey revealed demand for Internet access was increasing, though

some libraries felt unable to provide these services because of a too slow Broadband connection. These issues have made it difficult for libraries to meet their community needs. According to Visser (2014), the FCC Chairman, Tom Wheeler, spoke on Digital Learning Day (February 4, 2014), and discussed how there needed to be greater focus on acquiring affordable rates for high-capacity Broadband connections for libraries and schools. ALA has continued efforts to ensure libraries have access to Broadband (Wapner, 2014). In April 2014, the FCC developed an E-rate funding program to help boost library and school broadband access (Wright, 2014). The Broadband issue has been a continuing process, and changes on a daily basis. Access to Broadband connections could be important to AMO users who might not be able to afford or able to receive a home connection.

2.3.2.b Types of Systems

Users could be limited selecting the type of system used to access and gather information if they do not have experience with different resources. Xie (2004) explained how users could select an online resource due to content coverage. Resources selected first usually have the content that is needed. There were typically four types of systems users accessed to search and browse for information; digital libraries (DLs), online databases (DBs), OPACs, and online search engines.

The International Federation of Library Associations, IFLA, (2013) defined a DL as "an online collection of digital objects, of assured quality, that are created or collected and managed according to internationally accepted principles for collection development and made accessible in a coherent and sustainable manner, supported by services necessary to allow users to retrieve and exploit the resources." DLs house new materials created electronically or older materials converted to an electronic format (Lesk, 2005). DLs have been developing more interactivity

between the system and the user, though this could pose challenges for some users since there have not been universal standards in the creation of DLs. Therefore, the user has to learn each unique system (Xie, 2008). Mead, Sit, Rogers, Jamieson and Rousseau (2000) compared older and younger adults performing ten search tasks within an online digital environment. The purpose was to determine whether age related cognitive issues placed novice users at a disadvantage and whether users' experience was an important variable for success. The results concluded older computer participants who did not have computer experience did not complete all of the tasks, had more errors, and were less likely to use the Boolean search operators when conducting a search. This research showed that older users were disadvantaged in digital environments especially if they were searching within different IR systems.

An online DB has been defined as "a database of either full-text documents or citations and abstracts accessible via telephone or Internet connection" (as cited in Xie, 2008, p. 54). Databases usually have a controlled vocabulary and would be indexed to assist in retrieval initiated by user's queries (Tedd, 1994). Griffiths and Brophy (2005) found OPACs and DBs provided certain types of information and have become more interactive. However, they usually did not support system ease of use and user control over the search process. This could affect the search effectiveness for a novice or expert user (Xie, 2008). DBs have been usually housed within an OPAC system. An OPAC has been defined as "a database composed of bibliographic records describing the books and other materials owned by a library or library system…" (Reitz, 2014). OPACs changed the traditional card catalog system by incorporating a large amount of data that could be retrieved electronically either within the existing library or remotely. OPAC systems presented the tools to refine a search and deliver relevant documents dependent on the interface and system software. However, Borgman (1986) pointed out how OPACs were hard to

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use because queries were hard to input in the system to retrieve good results. This could pose a challenge on a mobile OPAC, which could have limited resources and capabilities (Reddy, Raju & Neerja, 2013) due to the device's software or the screen size.

Moreover, Web search engines have provided an Internet service that allows searching of a large DB of Web pages. Currently, there have been four types of search engines: spider-based search engines (a DB of sites using spiders to find keywords or tags); directory-based search engines (sites using human editors); metasearch engines and link-based search engines based on hypertext links between sites and (Net Industries, 2015; Xie, 2008). A general search engine has 4 components: 1) the identification and gathering of the material (web pages, etc.) to be included in the engine's database; 2) an indexing program and the corresponding general indexes; 3) the searching and ranking algorithms; and 4) the user interface (as cited in Hock, 2012, p. 302). Most of today's users have searched the Internet to look for information. Kim and Sin's (2007) study on undergraduate students concluded search engines were used most frequently due to the familiarity and ease of accessibility to a variety of information. However, users could experience cognitive overload from all the data retrieved from the Web in a given search (Bilal, 2000).

Zickuhr and Madden (2012) found in a recent Pew Research Center (PEW) survey that 53% of participants over age 65 were using the Internet, with 70% of those users going online daily. Rainie (2012a) found over 77% of Baby Boomers were using the Internet, which has been steadily increasing as the Baby Boomers age. This could be due to early Baby Boomers having used computers in the workforce or in their daily lives and continuing to utilize them. Search engine interfaces have been relatively simple to use (Xie, 2003). However, older adult users could have problems with the Internet, which could discourage future use (Aula, 2005b).

2.3.2.c System variables

Different system variables could play a role in the success and use of an online system. The most important factors in the IR process would be accessibility, convenience and whether the system offered a dynamic interaction between the system and the user (Breeding, 2008; Dewey, 2008; Mi & Weng, 2008; Sadeh, 2008). Different studies have examined the aesthetic interface appearance, ease of use, interactivity between the user and the system, learnability, navigation, satisfaction utilizing the system, item quality, accessibility, familiarity with the system, and convenience of using the system (Ruthven & Kelly, 2011). The following section examined some of these variables, which could be a factor in the IR and access process**.**

Interface design conceivably could play a role in how the user scans and analyzes the information during the IR process (Saracevic, 1997). Eick (2001) explained how it was important for the user to navigate a system and not get lost. The interface played an integral role in navigating a system and the visual space construction would be a fundamental part of the interface display (Wolfram & Zhang, 2001). Likewise, Parandjuk (2010) discussed how a library interface design needed to have a structure for intuitive access to content. This structure would then make the interaction easier for the user. The interaction with the visual interface gave the user more control over the information process, resulting in greater satisfaction with the online system (Enser, 2008; Koshman, 2006; Shiri, 2008; Xie, 2008). Additionally, visual interfaces could have many different types of tools ranging from scatterplots, bar graphs, glyphs, icons, symbols, metaphors, and maps. The interface could also have one, two or three-dimensional images displayed as well, with variations in color and/or lines linking the information together to aid the user in understanding the retrieved information. Koshman (2006) explained that the visualization tools on the interface allowed the user to open icons to documents, see the

interrelationships between the documents and have more control over the IR process. By representing information graphically, a user could visually see the initial results of materials, narrow down or refine the results and examine associated concepts all on the primary interface page. Information visualization has been an important element for users to discover data and knowledge (Zhang & Nguyen, 2005). Stronge, Rogers and Fiske (2006) compared younger and older adults' strategies in seeking information on the Internet. The results illustrated the older adult participants relied more on the system to aid in their search by utilizing more system tools to find correct answers as compared to younger adult participants.

Some visualization systems have surrogates or metaphors (icons) to aid the user in the searching process. Metaphors could entail a concept, such as language, color, shape, texture, and sound, to explain another concept on the interface page, thus making navigation easier on the user (Lakoff & Johnson, 1980; Zhang, 2008). A graphic metaphor would need to be specific and understood by many types of users. Therefore, the metaphor would be a useful tool enabling another avenue for users to navigate, search and browse an online system. Users typically preferred graphic metaphors and a simple key word search box, especially those who do not have extensive searching skills (Emmanuel & Kern, 2009; Mi & Weng, 2008). Mead et al. (2000) examined the ease of use of a system to determine the effects of age on novice database search performance. The results found older participants did not complete all the tasks and had more errors than younger participants. These results suggested older adults needed simplified interface pages to adequately access information. Mobile phone interfaces could be an issue for users when searching for information. According to Ziefle and Bay (2005), the usability of a mobile phone interface could be significantly more difficult to use due to the much smaller display. This could cause a greater cognitive demand on users.

According to Bates (2002b), the interaction between the interface, the metadata, and the indexing system played a significant role in the search process. The indexing and classifying of items organized the information to make the access process easier for users. Users were satisfied with the search if items were indexed properly and the system performed properly (Bates, 2002a). Electronic systems have utilized metadata to assist users in retrieving digital materials. The term metadata has been defined as data about data or "…addresses data attributes that describe, provide context, indicate the quality, or document other object (or data) characteristics" (as cited in Greenberg, 2005, p. 20.) Systems have different types of indexing: text, image, multimedia and in multiple languages dependent on the materials within the system.

There have been many metadata types from simple to complex that have assisted users in finding information. Users typically would construct keyword queries and the system recalls items dependent on whether the keywords matched the system program language. Classification schemes have arranged items within a system to create a taxonomic grouping in a systematic order. This arrangement would assist in subject field overview and aids in IR (Rowley & Farrow, 2000). Controlled vocabularies have been used as a type of authority control in indexing the terms that assist users in retrieving materials (Fidel, 1991). They would be an organized collection of words, phrases, and/or names, structured to show the relationships between terms and concepts. They could range from a simple alphabetical list of approved terms to a complex, carefully structured thesaurus, including broad, narrow and related concepts. The concepts would need to be clear and comprehensive to ensure retrieval of items within the collection.

Furthermore, some users have utilized natural or plain language when conducting a search. This type of search would use regular spoken language, such as English or other types of languages. Social tags, a type of natural language, have been used in some online IR systems and could be used as a type of metadata to enhance a catalog system to further aid the user in the IR process. Tags could

give the user more options to choose from and give more item information other than just the one subject heading from a controlled vocabulary system. Tags could be found on social networks, such as Facebook; business systems (e.g. Amazon), photo storage sites (e.g. Flickr), academic and public libraries, and many other user systems.

2.3.2.d System interaction/usability

The ease of use of a system could help or hinder users in acquiring the information. This could influence the users' overall system satisfaction and whether the users would use the system in the future (Malhotra & Galletta, 1999; Xie, 2008). Xie (2003) studied 40 participants interacting with five electronic IR systems and concluded an IR system needed to be easy to use and allow for user control over the information seeking process if it was an effective retrieval system. Ferreira and Pithan (2005) investigated learnability, efficiency and effectiveness as well as other interface design aspects of the DL InfoHab to determine the usability of the system. The researchers examined the participants' affective and cognitive actions when solving situations looking at errors made while conducting tasks with the interface. The results concluded that even though the participants were satisfied with learning the interface system, they still had difficulties accomplishing the tasks. Users could be discouraged or disappointed with unsuccessful IR system interactions (Xie, 2008). Therefore, the usability of a system would be an important aspect of any interface design. Additionally, Tsakonas and Papatheodorou (2006) collected 43 questionnaire responses examining the usefulness and usability of different types of IR resources. Results confirmed the most important attributes would be navigation, ease of use and learnability for a successful interaction with an IR system. System usability would be important for AMO seeking information since they could experience different health related issues that could affect the interaction with the system interface (Fisk, Rogers, Charness, Czaja & Sharit, 2009; Lin, Neafsey & Strickler, 2009). Current research by Martyn and Gallant (2012) examined

how adults over the age of 50 were using social media to gather and look for information. Two major themes emerged from the 98 surveys retrieved: the *ease of use of the technology* and *having personal contact to gather information*. If AMO were using an electronic system to gather information, they wanted the system to be easy to use.

System interactions have been based on user cognitive processes and behaviors, and the particular system interface (Ingwersen & Jarvelin, 2005; Kuhlthau, 1991; Saracevic, 1997; Vakkari, 2001). During the interaction, the user's behavior could change from deciding initially what to do, making various judgments during the process, then deciding when to stop whether an answer is discovered or not based on the feedback given by the system (Belkin, 1996; Du & Spink, 2011; Saracevic, 1997; Wang et al., 2000). Therefore, the dynamic IR process would be dependent on the user's needs and the interaction with the system. Xie's (2003) study of Web-based online IR systems found that the system design needed to encourage the user to have a more interactive role in the IR process with every feature making a difference in the overall process. However, problems could be encountered retrieving information that could be due to the individual users and the specific system (Borgman, 1986). Users have interacted with information objects that are within the IR system software and hardware. Using different multimedia technologies in the design would encourage more interaction between the user and the interface (Xie, 2006). Brusilovsky, Ahn, and Rasmussen (2010) survey concluded the interactive nature of a system is valued higher than the interface's visual appeal. The interface design and the information objects could affect the users' information seeking strategies. For instance, if an older adult has a physical and/or cognitive issue, different formats, such as icons, larger texts, or audio formats, could be utilized to encourage a better interaction with the IR system (Joseph, 2009).

When users search for information in an online environment, different systems and system factors could affect the access and retrieval of information. If users have limited Broadband connections, it could affect the use of the information technology. Users could also have access to different types of systems. This could be a factor in the user's digital literacy skills needed in utilizing the various systems. This could cause challenges for some users due to the different system variables to effectively access and retrieve information.

2.3.3 Context

Different social and cultural norms as well as the system structure could affect the interaction between the user and the system when seeking information. Ingwersen & Jarvelin's (2005) IS&R model revealed the social, organizational and cultural contexts as major components in the information seeking process. Ingwersen's (1992) Cognitive Model of interaction that had the user as the main element in the social, organizational, and environment's cognitive space closely resembled Wilson's (1999) model that illustrated seeking information as an active search process and the cognitive communication of Belkin's (1980) cognitive communication system. Xie (2010) discussed how the social-organizational context played a role in the interaction with IR systems.

Rieh (2007) investigated information seeking strategies with 24 participants. The results concluded information seeking was a form of social activity. Users communicated with others to seek out information, engaged in information seeking for others, or verified found information. This demonstrated how the social context could be a direct information source or play a secondary role in the information seeking process. Ng (2007) examined how social motivation was a factor in learning computer and other technologies. The researcher discovered older adult motivation went up when there was encouragement and sharing of skills from peers, family

members and their tutors. Being encouraged to ask questions and practice skills built a positive

attitude for seeking information from computer technologies (Nycyk & Redsell, 2010). The

social environment could also improve and motivate the older adult to utilize and try new

information technologies to search for information.

A stereotype that has characterized AMO within the social context would be ageism.

Robert Butler (1969) identified ageism as a form of bigotry towards individuals because they

were old that has been perpetuated by society (Butler, 2005). Negative imaging in the media and

the widespread use of certain comments in everyday language has continued the existence of

ageism. "Baby Boomers are becoming quite comfortable using the term *senior moment* to cover

memory lapses" (as cited in Mates, 2003, p. 2). Ageism has been found among the younger and

older generations impacting attitudes and behaviors since the more it has been perpetuated by

society, the more AMO would believe the stereotypical information about themselves.

2.4 Mobile technology

Griffey (2010b) discussed how in the last ten years more information was being shared

among users than in any other time in history. Mobile technology has become the primary device

for individuals to communicate, access and retrieve information. It has been the fastest growing

and most widely adopted type of information technology today. Currently, there have been four

major mobile carriers in the US: AT&T, Sprint, T-Mobile and Verizon that have different

technologies available and different capabilities as well as seven smaller carriers: Metropcs; U.S.

Cellular, Cricket, Boost Mobile, Southern Linc, TracFone and Virgin Mobile (Griffey, 2010a;

Phone Arena. 2014). With these carriers, users could utilize a mobile device every day to

immediately access and retrieve information.

Mobile technology has changed the IR process of where, how, when and why information is accessed. It would involve any mobile device and mobile network available to search for information. Eight out of ten adults have owned at least 2 or more technological devices. However, adults under age 45 have owned most of the devices (Smith, 2010). As of January 2014, 90% of adults over age 16 owned a cellphone, 58% owned a smartphone, 42% owned a tablet computer and 32% owned an e-reader (PEW, 2014). Users today have searched and browsed the Internet when near a cellular or Wi-Fi signal. The number of users accessing the Internet has doubled since 2009. Sending and receiving texts or emails, downloading apps, getting directions, recommendations and listening to music have been popular activities on a mobile device (Duggan, 2013).

2.4.1 Types

Various types of mobile technologies could be utilized to access and retrieve information online (see Table 2.6). According to O'Toole (2014), 55% of Americans accessed the Internet in January 2014 on a mobile device. This exploratory dissertation study examined the following mobile technological devices, e-readers, tablets, iPod Touch, and Internet enabled cellphones. E-readers have been used to download electronic books (e-books), electronic PDF files and with certain e-readers, videos and music. Depending on the e-reader, newspapers, magazines and other printed documents such as websites or blogs could also be viewed (Educause, 2010). Thirty-two percent of adults owned an e-reader device such as a Kindle or Nook. Adults ages 50-64 were the second highest group (32%) compared to the highest (40% ages 30-49) owning the device (Zickuhr & Rainie, 2014). Tablet computers, such as an iPad, were not owned as prevalently as other devices. However, 30% of Baby Boomers did own a tablet (Rainie, 2012a). Purch (2014) discussed how there were 26 types of tablets that have different capabilities and

features that assist diverse users in various ways to find information. An iPod Touch would be a portable mobile device that downloads, plays and stores files as well as connect to the Internet (Apple 2014). According to Smith (2010), 47% of Americans owned an iPod touch, which has increased significantly since 2005. However, most owners were young adults under age 30. Cellphone ownership has steadily increased with 90% of all adults having a cellphone and 58% owning a Smartphone. Most owners were young adults, though there were a significant number (88%) of Baby Boomers who have cellphones. Two-thirds of Americans (63%) accessed the Internet from a cellphone and 34% mostly used it instead of utilizing other devices (PEW, 2014).

Table 2.6
List of Mobile Technologies

Mobile Technologies
Laptops/notebooks/netbooks (Dell, Apple, etc.)
Mobile game consoles (Gameboy, Nintendo DS, etc.)
Mobile media devices (iPod, iPod Touch, mp3 players, CD players, etc.)
Mobile phones (cellphones, smartphones etc.)
Mobile reading devices (Kindle, Nook, mp3 players, Playaways, etc.)
Mobile tablets (iPad, Galaxy, etc.)
Pagers (Motorola, etc.)
Personal digital assistant (PDA) (Palm-Pilots, etc.)
Personal navigation devices (Garmin, TomTom, etc.)

2.4.2 Issues and challenges

There have been hundreds of devices today that come in a variety of sizes, have various functionalities, and have different browsers when accessing the Internet. This could cause compatibility issues between certain websites and the software on the mobile device making searching and browsing for information potentially difficult for users. The devices typically have small screens, small buttons to manipulate, and low resolution, which could make operating and navigating difficult especially for an AMO with or without any impairment (Wobbrock, 2006). Some users have wanted the same type of experience as a desktop or laptop computer, which could make it challenging on a mobile device. Additionally, connectivity could be an issue in

regards to slow Internet speeds to download materials on some devices or when utilizing a cellphone, dropped calls or spam could be a factor (Boyles & Rainie, 2012). Privacy could also be a concern, especially in regards to mobile phone use with certain apps that could track your location and information. Boyles, Smith and Madden (2012) found that 57% of adults over age 50 decided not to install an app due to the concern of the app wanting personal information. This was almost 10% higher than adults ages 18-29. These above challenges could be significant factors in whether or not a mobile device would be utilized when retrieving information online.

2.4.3 User studies

Mobile technology user studies have mostly been conducted with student participants and within an academic library environment. Church and Smyth (2009) conducted a study of undergraduate, PhD and post-doctoral student's age 20-60 examining the intent to use mobile technology. Findings revealed that the location and time the information need took place was an important factor in using the mobile technology. The top three user goals were 75% geographical information, 65% personal information and 64% informational. Most mobile interactions took place when the participants were mobile or outside of their home or work environment. Hu and Meier (2011) found from 286 academic participant online surveys and interviews that 35% searched for information several times a day stating the mobile device provided convenience of looking up something right away. The research did find that 70% would rather read on a laptop computer than on their mobile device, though a reason why was not reported in the study. Similarly, Hanson's (2011) study of 101 students at an academic library found the most common participant activities conducted throughout the day on a mobile device were communication (email, text), social networking (Facebook), information searching (news, library), entertainment (music, video) and other (shopping, banking).

Along with user studies on how mobile technology has been used to search for different types of information, Seeholzer and Salem (2011) examined 20 undergraduate and graduate students expectations, perceptions and the use of the mobile Web. The results illustrated that participants performed a variety of tasks from their mobile devices and the most common websites visited were Facebook, email, weather information, directions and sport sites. In addition, most participants utilized the library website from their mobile device to interact with the library's resources and services. One theme noted by the researchers was the *design of site*. The participants were disappointed in the mobile website compared to the experience they had with the regular site on the computer. The participants also wanted more space between links on the mobile site to make navigation easier on the smaller screens. Cummings, Merrill and Borrelli's (2010) study of 206 faculty, graduate and undergraduate students found 58.4% of participants who owned a mobile device would access the OPAC. The survey did not break down the participants by age of who would use their mobile device to access the library website. However, only 13% of participants were over the age of 46.

Mobile devices and the mobile websites could be important in how users search for information and perform activities on the mobile device. Alzaza and Yaakub (2011) discussed how mobile technology offered a new way of learning anywhere or anytime for the user. The results from 261 Malaysian students under age 26 found half of the participants were aware of the mobile services offered at the university. Interestingly, site usability on the mobile device and training of how to use the device ranked lowest as a limitation of the mobile technology. However, a recent ethnographic study by Mizrachi and Bates (2013), which examined undergraduates age 18-22 personal academic information behaviors and tool preferences, revealed a broad range of individuality among the students. The choice of using a specific format

or device, such as a cellphone, varied on the type of task. Cognitive and learning styles as well as user personality traits also played a role. This illustrated that even among digital natives, there were distinctions among the young adult age group depending on the type of search task that needed to be accomplished. A mobile device user study examining a specific task was explored by Stockwell (2010), who looked at vocabulary activities performed on mobile phones compared to using a computer. The mixed method study on 175 participants from 2007-2009 explored the amount of time the participants took to complete the activities and the scores they achieved on the vocabulary activities. Results portrayed a larger portion of users in 2009 used the phone rather than the computer compared to the previous two years. It was noted that the activities took longer on the phone to complete, but there weren't any differences in the scores achieved. Nicholas, Clark, Rowlands and Jamall's (2013) study in England of 70,000 user transaction log interactions with a mobile device and the Europeana website found that information usage was less interactive and less content was viewed per visit compared with a computer device. The researchers believed this could be because a mobile visit was usually a faster interaction or fit because of the different mobile device utilized to conduct the search. Mobile technology, according to Stockwell (2010), has become more noticeable as a device to be used in the ED field, which could be a reason for the various studies on students and academic libraries.

The above mobile technology user studies did not specify a model or application when examining mobile device usage. The TAM or the Technology Acceptance Model has been one of the most influential models in technology adoption research and the model constructs were fairly general and universal to different types of computer systems and users. TAM looked at the perceived usefulness and ease of use of a system as well how user attitude and behavior affect adopting the system for use. However, the model did not look at the social influences for

technology adoption (Malhotra & Galletta, 1999). In addition, TAM was not explored in the context of this dissertation study, since the model did not examine the how or why mobile technology would be used for retrieval and access to information.

2.5 Adults midlife and older

Baby Boomers were born from 1946-1964 and they turned age 65 in 2011 (Decker 2010; Eriksson-Backa 2010; Joseph 2009; Piper, Palmer & Xie, 2009). Adults over age 65 have accounted for 13% of the U.S. population and were predicted to be 20% of the population by 2030 (Federal Interagency Forum on Aging Related Statistics, 2012). Different organizations defined and categorized AMO in different ways. Therefore, applying a uniform definition for the age group has been difficult. PEW (2009) defined older adults as Younger Boomers (YB) (Born 1955-1964), Older Boomers (OB) (Born 1946-1954), the Silent Generation (Born 1937-1945), and the GI generation (Born – 1936). A portion of this definition that identified YB and OB was used in this exploratory dissertation study.

AMO have diverse characteristics. Several AMO continue to work after retirement age, which is currently age 67 (Jones 2012) and continue to be active in their community. Other AMO have retired and have possibly lost touch with former colleagues and friends. Many AMO have worked with computers and other information technology. However, there have been AMO who have little knowledge or training in using information technologies. Wicks (2004) discussed how older adults just entering retirement age seek information differently than adults much older. Furthermore, there have been some AMO who do not have direct access to technological hardware or software and cannot afford the training necessary to use the information technology (Dunnett, 1998; Webb, 2002). In addition, there could be age related health issues such as mobility difficulties, impaired vision, hearing and cognitive issues. These issues could

potentially make it difficult to access and retrieve information from an online environment, especially from a mobile device.

2.5.1 Special needs

As individuals age, physical conditions could change due to the natural process of aging (Hutchison, Eastman & Tirrito, 1997; Wagner, Hassanein & Head, 2010). Biological, psychological and social differences could make it frustrating and difficult for AMO interacting with information technology. Some characteristics that could change would be sensation (color, vision, auditory), perception (what aware of in environment), cognition (reasoning, memory) and movement (control, coordination) (Fisk et al., 2009). This could make the usability of a system important but it could also make it challenging. These changes could affect an adult's ability to use standard interface features due to vision issues and they could experience difficulty understanding the overall IR systems (Hutchison, et al. 1997; Mates 2004). Cognitive abilities of AMO could play a role in using a computer or newer technologies. Czaja et al. (2006) examined cognitive abilities and the utilization of computer technologies. Results indicated cognitive abilities were an intervening variable in using a computer. This could be because some older adults have not been exposed to computer technologies and it would require them to learn new skills. This exemplified that system interfaces need to be simple and easy to use; thus requiring less mental effort and working memory for AMO needing to seek out information from an online IR system. Evaluating and making good judgments about the credibility of the material would be essential for AMO. With so much information out there, AMO would need to be able to decide whether the information presented to them was accurate. Creating or formulating new ideas from the information while using a technological device could be beneficial for AMO. McFadden and Basting (2010) discussed how research was starting to reveal how participating in different types

of creative activities could aid individuals cognitively and socially, which could lessen the effects of dementia. An active mind could play a role in keeping the body healthy (Kiel, 2005).

Visual acuity could also play a role in utilizing information technology. Stephen (2009) stated about 5% of the population in Sydney, Australia has a significant vision impairment, with the number increasing as the population ages. If the reading format did not suit the user, then the user would not understand the text meaning, or reading would become slower to enable better processing of the information. Additionally, the monitor interface could be difficult to read due to vision impairments (Hutchison, et al. 1997). Depending on the information technology used, the monitor screen size could be large or small, varying the text/image size on the screen. This could be challenging for individuals with a visual impairment. Mobile technology devices typically would have a smaller screen due to the small device for easier mobility. A study by Chae and Kim (2004) found that the screen size affected the content, causing the user to scroll and navigate more between Web pages. This significantly affected the behavior and perception of the mobile user. Even though the participants in the study consisted of teens to adults in their thirties, an adult with a vision impairment could also experience this issue. Furthermore, mobile devices could be utilized in different types of environments that could have poor lighting conditions such as sunlight reflection causing reading difficulty due to contrast issues.

Moreover, adults who have experienced a hearing loss or a hearing impairment could have difficulty accessing audio content on the Internet. A noisy environment could cause difficulty in hearing. According to Harper, Yesilada and Chen (2011), users with a hearing loss utilizing a mobile device could have difficulty listening to voice prompts to input data onto the device, which could cause errors in the buttons pressed to receive the correct information. This could cause the wrong information accessed by the mobile user.

In addition, Sears and Young (2003) stated, "…a physical impairment affects a person's ability to move, and dexterity impairments are those that affect the use of the hands and arms" (as cited in Harper et al., 2011, p. 678). The decline in motor control and coordination along with some disabling conditions, such as arthritis, could make it difficult to manipulate a standard computer mouse successfully or buttons and keypads on smaller devices. Smith, Sharit and Czaja's (1999) study on 60 participants (ages 20-75 year old) psychomotor ability with a computer mouse indicated older adult participants had greater difficulty handling different computer tasks than younger adult participants. These issues could be frustrating and sometimes embarrassing for the older adult user (Decker 2010). Mobile devices have smaller features to utilize, which could pose challenges for the physically impaired.

2.5.2 Information use and information behaviors

Age related changes in cognition and lack of computer experience could affect an older adult's use of online systems (Sit, 1998). Hutchison et al. (1997) discussed how older adults could experience overly cautious behavior and have difficulty remembering learned concepts; thus requiring more training on a computer than younger users. The researchers' study of 122 adults over age 50 indicated over 84% experienced frustration using one or more computer features. Karavidas et al. (2005) explored anxiety and self-efficacy of 222 participants (ages 53-88). The survey results revealed that computer anxiety and self-efficacy were variables that influenced computer knowledge and overall life satisfaction. The lower the self-efficacy, the higher the anxiety level the user had regarding learning about computers. Low self-efficacy could cause less motivation to learn information technology (Czaja et al., 2006) and could decrease information seeking skills. Bandura (1977, 1986) believed a user's confidence in the ability to perform a search task or self-efficacy could play a role in the information seeking

process (as cited in Watters & Duffy, 2005, p. 243). Czaja et al. (2006) explored the successful adoption of information technology of 1,204 participants (ages 18-91). Results concluded there was significantly less use and less experience with computers among older participants compared to younger participants. It was also found that middle aged and older adult participants had lower self-efficacy and higher anxiety with the use of computers compared to the younger adults. The findings suggested that computer self-efficacy was a predictor of general use of technology. Older adults could underestimate their actual computer knowledge due to feeling less confident about computer usage (Karavidas et al., 2005; Piper et al., 2009).

Martyn and Gallant, (2012) found study participants over age 50 did not want to seek information beyond their comfort level and ability. They found older users would seek out information if the technology was easy to use for their information searches. Butcher and Street (2009) revealed the computer needs of older adults were to keep instruction simple and provide practice time that would aid an older adult unfamiliar with the technology to search for information. The researchers emphasized having an environment that encouraged older adults to overcome their fear of information technology and anxiety of appearing foolish in front of others fostered a better learning environment that would improve their information seeking skills. Nycyk and Redsell (2010) case study on older adults found that continuous computer training was beneficial to older learners. A patient tutor willing to explain the technology in repeated steps aided the older adult learning computer technology. This study illustrated that older adults were capable of learning new skills to retrieve and access information within an online environment. If a user has less anxiety about using information technology, it could increase the possible usage of newer technologies such as mobile technology.

When searching in an online environment, AMO could have varying capabilities that could affect the IR process. Mead et al. (2000) compared older and younger adults performing within an OPAC system found older computer participants who did not have computer experience had difficulty searching within the online environment. Moreover, they demonstrated poorer understanding of the operations needed for the search. Additionally, Stronge et al. (2006), mentioned previously, indicated older adults did not use search strategies effectively and timed out when seeking information on the Internet more often than younger adults. This could be due to lack of knowledge about using different strategies, like the advanced keyword search, to assist in the information seeking process. This lack of knowledge could be due to a lack of the necessary digital literacy skills. Some AMO have worked with computers and other mobile technologies while others have been afraid to touch a computer (Decker, 2010; Wicks, 2004). Digital literacy skills have been important for this age group since there have been different types of information resources such as health information, government documents, educational opportunities, entertainment resources, financial records, communicating with family and friends, and leisure reading activities available via online environments. Leisure reading activities could have educational outcomes in adults (Moyer, 2007), thereby increasing lifelong learning. Having digital literacy skills could provide AMO the knowledge to be able to search for different types of resources. Martyn and Gallant (2012) found that most of the older adult participants did not want to use information technology to search for information. However, they understood more information was becoming more online. Eshet-Alkalai and Amichai-Hamburger (2004) discussed how digital literacy was more than just developing technical skills. They believed varieties of cognitive skills and knowledge were taking place when interacting with a digital environment.

Changes in cognition and having a lack of experience could cause anxiety and self-efficacy in regards to information technology. This, in turn, could affect how motivated AMO would be to learn and utilize new information technologies such as a mobile device. Having a variety of cognitive and digital literacy skills was important in the IR process and could affect how AMO view retrieving online information and the device they utilize in the IR process.

2.5.2.a Baby Boomers

Baby Boomers information seeking and searching behaviors have varied widely. The diversity could be because the Baby Boomer age range spans nineteen years. This age difference could affect the way they seek out information in a digital environment and their comfort level in using technological devices. According to Dempsey (2007), a key characteristic of Baby Boomers was they wanted to be in touch with information technology. However, information seeking differed even among Baby Boomers. YB used the Internet 15% more than OB (Rainie, 2012a). This could be considered a digital divide. Connaway et al. (2008) compared information seeking behaviors of Millennials and Baby Boomers found that Baby Boomers would use Google for quick searches, but this was secondary to seeking information from another person. Seeking information from a human source rather than from a technological device was a diverse factor among Baby Boomers. Additionally, cognitive factors and knowledge of information technology could be a factor for Baby Boomers seeking information. Martyn and Gallant (2012) discussed how adults over 50 would seek information if they felt they had the ability to use the technology. This could be a determining factor in seeking information among Baby Boomers. Some Baby Boomers have been in the workforce longer and therefore exposed to more technology, which could increase their comfort level and digital literacy skills. According to Ng

(2007), the social environment was important to learning information technology, which could also be an area that determines information seeking among Baby Boomers.

Furthermore, there have been some Baby Boomers comfortable with new technology and have been doing more online activities (Mack & Jennings, 2010). Niemela-Nyrhinen (2007) examined Baby Boomers (age 50-60) in Finland and whether they had less anxiety than traditional stereotypes believed for older adults using online technology and text messaging on a mobile phone. Findings revealed the Baby Boomer participants had less anxiety in using information technology. However, technological anxiety was higher than text messaging anxiety. These findings could be due to the variations in the meaning of technology and that Finland has been a leading edge country in mobile technology. Over 95% of the participants had a mobile phone and the participants could have felt that text messaging was a routine activity not associated with the word technology. The above studies have shown that Baby Boomers vary in their knowledge, experience and skills when seeking information while using information technology.

2.5.3 Utilization of information technology/mobile technology

In the US, information technology use varied with age, with only 24% of older adults over age 65 owning a technological device as compared to 58% of adults under 47 years of age (Rainie, 2012b). Mobile technology use also varied with 38% of Baby Boomers owning a mobile device with the highest percentage of device ownership being a cellphone and the lowest being a tablet (Zickuhr, 2011). Of the 88% of Baby Boomers who owned a cellphone, just a little over half (51%) used the device to access the Internet (Duggan & Smith, 2013).

Many older adults have limited access to broadband, computers and other electronic devices (Joseph 2009). Access to these technologies could vary for different reasons. Olson,

Obrien, Rogers and Charness (2011) investigated the use of information technology in a quantitative study with younger and older adults. Results revealed older adults use of different information technologies for information was less than younger adults. However, the study did not look at why the older adults did not use the technology or the strategies and behaviors affecting their computer usage.

Computer usage could be important for AMO to obtain information and to keep in touch with friends and family. Karavidas, et al. (2005) found the participants who had more practical understanding of a computer system were more satisfied with life. The AMO used the computer for social networking of friends and family in addition to staying informed about health related issues. Other research has suggested teaching email and social networking skills could help improve quality of life (Decker, 2010; Kiel, 2005; Piper et al., 2009, Wicks, 2004). YB and OB were more likely to search for government and health information than other activities when searching online (Zickuhr, 2010). A recent PEW study revealed that mobile phone activity among Baby Boomers ages 50-64 has increased from 7% in 2010 to 19% in 2012 when accessing health information via their mobile phone device (Fox & Duggan, 2012). This would be important to note as Baby Boomers age and would seek ways to keep healthier or find information on more health related issues.

According to Pew, e-book readers have been owned by 19% of adults' ages 50-64, which is just slightly lower than adults age 30-49 at 24% (Rainie, Zickuhr, Purcell, Madden, & Brenner, 2012). The e-book market could attract more older individuals and has the potential benefits of interaction with information technology as well as the enjoyment of reading for pleasure. Reading e-books, though, could be challenging for AMO due to screen size on a device that could affect the presentation of the information. Lee, Shieh, Tsai, Jeng and Shen (2008)

discussed how most e-readers have multiple text sizes but there have been few studies examining whether this aids reading accuracy (as cited in Moyer, 2012, p. 348). Tsai, Ro, Chang, and Lee (2011) examined e-book reading performance on mobile phone devices, investigating the effects of font size and page presentation. Twenty-four older adults, ages 62-70, participated with the results indicating the participants preferred reading in 14-size font and read faster with a flip page method instead of the scrolling page method, which is typical on a mobile phone device.

Moreover, Baby Boomers were more likely to use the Internet. However, Internet use could depend on factors such as education level, workforce involvement, user occupation and the type of household (Willis, 2006). Information searching on the Internet could be difficult for AMO due to not having the correct digital literacy skills. Some AMO have looked to libraries to assist them in learning digital literacy skills. Bennett-Kapusniak's (2013) study on library programming for adults over age 50 found that just a little over half of the 50 public libraries examined offered a basic computer skills program for library users. Yet, few libraries had a computer lab to practice skills and more than half did not offer help from a librarian. This lack of services could be discouraging for adults who rely on libraries to assist them in accessing and retrieving information electronically. Aula's (2005b) study of 10 older adults' ages 61-74 found that support was an important factor in the continued use of computers. Participants were able to search the Web after little training. However, if there were usability issues, the older adults became discouraged if they did not have adequate support.

Lindley, Harper and Sellen (2009) researched the attitudes of older adults' 55-81 years of age and their communication with family and friends. The researchers explored how the participants felt about different communication media including technological and non-technological means of communicating with family and friends. Five main themes emerged from

the research with *keeping in touch* being the most important concept and worthy of the

participants time. However, the participants did not feel the need to be in touch all the time,

which was in contrast with their attitude on the younger generation, who they felt needed to be in

constant communication with each other by texting on their cellphones (Lindley et al., 2009).

This could be important in regard to how some AMO view and use newer technology. Baby

Boomer mobile device usage has increased, with 31% owning a mobile device compared to 53%

of adults under age 46 (Zickuhr, 2011). However; there were Baby Boomers who did not own or

use mobile technology. According to Zickuhr (2010), 34% of Baby Boomers were not online and

14% of that total was OB. The participants' top reason was they just were not interested in it.

This could be a factor in not utilizing mobile technology. For this dissertation study, Baby

Boomers who did not use mobile technology were not examined.

2.5.4 Digital divide

Some Baby Boomers have unique information search behaviors when interacting with

information technology and need to be considered when investigating this specific age group.

The personal computer made an appearance in the late 1970s and was in the workforce in the late

1980s. This was significant since nearly all Baby Boomers and some pre-Boomers would fall in

a gap of not having the use of this information technology when they were in high school

(Salkowitz, 2008). This caused a generational difference of being exposed to information

technology and could affect comfort level when finding online information. Prensky (2001)

defined these users as digital immigrants or individuals not born in a digital world who would be

considered digital natives. However, Decker (2010) and Joseph (2009) noted it was important

not to generalize or make assumptions on the technological abilities of this age group due to the

varied individual characteristics. Selwyn (2004) conducted interviews of adults over age 60

providing more in-depth data about older adult's adoption and use of ICT. Two broad themes

emerged which were *the use and nonuse of ICT by older adults*. Computer use changed over

time dependent on the situation and whether the computer would fit conveniently in the

participant's life. A key finding in the study was how the older adults felt the computer was an

efficient provider of information and many participants were embarrassed to admit they did not

have the knowledge to use them. However, it has been noted that there have been some older

adults who expressed a positive attitude towards change and who were not afraid of different

technological devices (Kiel, 2005; Nasmith & Parkinson, 2008). In recent research, Wong et al.

(2009) found a digital divide existed with some disadvantaged groups. Public libraries have

provided access to Internet computers and they have played a role in equalizing access to all

users (Kinney, 2010). Disadvantaged groups have been more likely to use the public library for

access to online information although more people have achieved access outside of the library by

utilizing, for instance, a mobile device. According to Gauder (2011), there was a substantial

increase in growth of Baby Boomers using email and Web searching from 2007-2010, making

the gap smaller between age groups. However, only 7% of Baby Boomers were searching the

Web with a mobile device.

The above research illustrated that there was a digital divide when it came to being

exposed to and using certain information technologies. The Baby Boomers use of information

technologies has been increasing. However, more recent research would be needed to determine

if Baby Boomers have been accessing the Internet more with a mobile device.

2.6 Chapter summary

AMO have diverse characteristics; therefore, different types of approaches could be used

when researching the older population. For this exploratory dissertation study, different IR,

searching and seeking models were examined since each explored different user aspects interacting with information sources. However, with the different characteristics and needs of AMO, one particular model, approach, or theory did not fit the user group and their IR and access needs. The information seeking process could vary dependent on what resource the individual decided to utilize in the process. Different user-oriented studies could be researched examining different aspects of the information seeking process. However, there were some limitations with the existing research regarding AMO information seeking behaviors especially focusing on Baby Boomers.

Most research studies were on system performance concerning precision and recall (Ruthven & Kelly, 2011). Spink's (1997) model examined relevance and feedback of a system and therefore does not give much information on AMO since the focus was on the online system. Ingwersen and Jarvelin's (2005), Belkin's (1996), Hert's (1996), Saracevic's (1997), and Wang et al.'s (2000) models also examined the system and user interaction with the interface. Certain aspects were missing from the models that need to be explored such as domain knowledge, the strategies used, the actual user needs or behaviors. In addition, there were few studies looking at the interaction from the users' perspective. Fidel and Pejtersen's (2004), Pharo's (2004) Bystrom and Jarvelin's (1995) theory and Leckie et al.'s (1996) models examined user goal or work task. These models and theories would be beneficial to examine AMO who continue to work even after retirement age. However, not all AMO have continued to work. Furthermore, different types of tasks could also affect different types of shifts when seeking information. Xie's (2008) planned situational model focused on the user's goals, strategies, and the different factors that could influence the interaction. However, the model did not look at user behavior, such as uncertainty and anxiety. There were also limited studies examining AMO searching in different

types of environments with different types of tasks and few looked at real users seeking undefined tasks.

Taylor's (1967) and Belkin's (1980) approaches could be used to study the types of AMO needs when seeking out information sources. However, Kuhlthau's (1991) ISP or Vakkari's (2001) models gave richer detail about user needs as well as user thoughts and feelings when seeking information. These models, though, did not examine the type of need or the environment around the user. Users have exhibited different types of behaviors when seeking information such as feelings of uncertainty (Belkin, 1980; Chatman, 1999; Kuhlthau, 1991; Taylor, 1967; Vakkari, 2001; Wilson et al., 2002). Research studies have shown computer anxiety was correlated with age. Krikelas' (1983) Model on user uncertainty would be a good choice to study AMO, though this would be only one aspect of information searching. Savolainen's (1995) ELIS model would be a better choice to look at AMO everyday life information seeking strategies of making sense of their world since the model examined different types of behaviors, which could affect information seeking. However, it has not been tested with any online system. Even though Dervin's (1992) model explained how there was a gap in knowledge and situations occur to bridge that gap, the model did not examine the different behaviors affecting the situations. Additionally, Johnson's (1997) model examined information seeking as a sense-making approach influenced by context (Case, 2012). However, it has only been tested empirically in the health communication fields. Wilson's (1999) model would also be an appropriate model to examine AMO behaviors, especially if the researcher was exploring anxiety or self-efficacy of users' information seeking. However, the model did not look at the context or the patterns of the process. Ellis' (1989) behavior framework examined different characteristics of seeking information but it did not clearly relate any factors that could influence the search process, like

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anxiety. Furthermore, Bates' (1989) model was a good model to explore AMO browsing behaviors. However, it did not examine the different variables that could be influencing browsing behaviors, such as a user's thoughts and knowledge. Having digital literacy skills to access and retrieve information online has been considered important for AMO but there have been limited studies exploring AMO interacting with different technologies and very few interacting with a mobile device. In addition, when AMO would be seeking information, social aspects could play a role in the process. Dervin's (1992), Savolainen's (1995), Wilson's (1999), Chatman's (1999), and Fisher et al.'s (2004) models and theories examined the social factors affecting information seeking. All but Dervin's would be ideal to use when studying AMO. However, this would be only one aspect of information seeking and other factors could be influencing the process.

Most user-oriented studies have focused on a few types of user groups, such as children, young adults and college students. However, little research has examined AMO information seeking and searching in the LIS field; specifically looking at Baby Boomers, even though these users could have special issues when seeking information from an IR system. Furthermore, Birkland and Karrst-Brown (2010) found that little research has been conducted on older adult experiences with information technology. Wagner et al. (2010) conducted a multi-disciplinary review of studies pertaining to older adults and their use of computers and the Internet. Results revealed there were a number of qualitative attitudinal studies of how older adults view computers and the Internet but very few examining different behaviors seeking information from a computer environment, and none were found with AMO interacting with mobile technology specifically examining Baby Boomers. In addition, there was a significant difference in the number of Baby Boomers accessing and searching the Internet on a mobile device, illustrating

that the characteristics of information technology use varies widely among Baby Boomers. There has been little research conducted on mobile technology IR especially in real life situations (Jansen, Spink, Bateman, & Saracevic, 1998; Sohn, Li, Griswold & Hollan, 2008). Information seeking studies that have been age-focused, such as on Baby Boomers, have been uncommon.

This exploratory dissertation study examined Baby Boomers and their use of mobile technology in everyday life situations. This study divided Baby Boomers into 2 groups consisting of YB and OB due to the varied characteristics of each age group. Previous studies that have examined older adults' responses to new information technology have typically used quantitative research designs with participants completing questionnaires or surveys with very few utilizing a qualitative research method. The participants in this study completed a short questionnaire asking demographic information, information technology experience and mobile device(s) owned as well as completing an electronic or print diary to document their information searching on a mobile device. The researcher conducted a follow-up interview of each participant to gain a richer context of the mobile technology interaction.

Chapter 3. Research Methodology

3.1 Introduction

The previous chapter explored prior research on information retrieval (IR), information access, mobile technology, and adults' midlife and older. This chapter details the methods used for this current study. The goals explained in Chapter 1 were investigated by a qualitative approach used in this exploratory dissertation study.

The user-system interaction has been important in user study research since it provides valuable information about the user when he or she retrieves information within a digital context. A qualitative method has usually focused on depth and development of a theory from the gathered data. The concepts would be from the thick descriptions and perceptions derived from the participants, typically within a natural setting. This method would evolve and change as the study progresses (Smale & Gillies, 2012). Connections and relationships were developed by clustering categories and codes together into themes and patterns relating to and explaining the central phenomenon discovered from the data (Cresswell, 2013). See Section 3.6 for a more detailed description of the coding scheme. This dissertation study examined how Baby Boomers utilized mobile technology, explored how Baby Boomers effectively acquired and retrieved information from mobile technological device(s), and any factors and challenges Baby Boomers had in the IR process.

3.2 Rationale for qualitative methodology

Qualitative researchers typically studied individuals in a natural setting and would seek understanding or meaning of the world around them. Researchers have chosen a qualitative approach for 1) an exploratory study, 2) the subject size and 3) for in-depth information. In other words, researchers would conduct qualitative research when a problem or a group of individuals

needed to be explored, and talking directly with the users allows them to tell their story, which derives a deeper detailed explanation and understanding of the problem or the group of individuals. Researchers want to bring about change focusing on the process and meaning of findings created from the data gathered. Corbin and Strauss (2008) stated the participants' perspectives were an important aspect of the data gathered. The qualitative approach typically focused on a single concept with the researcher interpreting the data bringing personal values into the study (Cresswell, 2009; Sale, Lohfeld & Brazil, 2002). The study would begin without a set theory in mind or a hypothesis to verify. Qualitative research would provide suggestions and/or evidence in the broad categories of contextual (describe and display phenomena), explanatory (examines reasons for or associations between what exists), evaluative (examines factors or effects) and generative (aids in the development of theories) research within the social science field (Ritchie & Ormston, 2014). Qualitative research, as opposed to quantitative research, could assist in explaining why or how certain factors were occurring among the data. Thick descriptions would be used to help convey sufficient information about the research to the reader (Punch, 2005). This method would allow the researcher the freedom to "check out ideas and follow the data trail wherever it leads" (Corbin & Strauss, 2008, p. 228). Qualitative methods would be useful when little information is available about the area of study.

Triangulation in qualitative research has helped to confirm and improve clarity in the research findings. According to Campbell and Fiske (1959), triangulation of the research could be referred to as "multiple operationalism, in which more than one method is used as part of a validation process" (as cited in Johnson, Onwuegbuzie & Turner, 2007, p. 113-114). The triangulation used in this dissertation study assisted in the understanding of the problem by examining the emerging themes and their connections or relationships to the research questions.

The different methods used to gather the data in this study consisted of questionnaires, diaries, interviews and field notes. These different data resources provided quantitative and qualitative findings that created a surplus of different information and innovative ways to understand Baby Boomers utilizing mobile technology.

The purpose of using a qualitative approach for this exploratory dissertation study was to gain further knowledge about Baby Boomers. The researcher gave greater detailed explanations examining why and how certain factors were affecting Baby Boomers utilizing mobile devices by attaining a richer perspective from the different types of gathered data. The qualitative methods added richer detail taken from the participant responses providing a reason why the device was chosen or used over another mobile device to search for information.

3.3 Research questions

The following research questions were examined and answered.

R1) *How are Baby Boomers utilizing a mobile device to search for information in terms of the mobile device types, the environmental contexts and the types of information searched?*

R2) *What are the challenges concerning Baby Boomers utilizing a mobile device in searching for information and their affecting factors?*

3.4 Sampling

A purposive sampling method was used in this exploratory dissertation study at the participant level to provide insight and understanding about Baby Boomers, an age group within adults midlife and older. In purposive sampling, the researcher would select individuals that would be typical cases who would provide rich and relevant information to learn more about the research goals (Flick, 2014, Pickard, 2013). This would be in contrast to random sampling typically found in quantitative research studies. A type of purposive sampling would be snowball

or chain sampling. The snowball sampling strategy has been defined as "a method that has been widely used in qualitative sociological research. The methods yields a study sample through referrals made upon people who share or know of others who possess some characteristics that are of research interest" (as cited in Biernacki & Waldorf, 1981, p. 141). Snowball sampling was used in this exploratory dissertation study to identify individuals who knew other individuals who fit the criteria for participation in the study. The purposive sampling method allowed for sampling across various locations in the United States (US) and even though the participants were in a specific age range, differences were among them, such as gender, education, information technology experience and mobile technology ownership.

The following inclusion and exclusion criteria were used for participants in the study. Inclusion criteria: 1) age range of 50-69 years or born between the years 1946-1964; 2) no evidence of physical or cognitive impairment that would hinder questionnaire or diary entrees; 3) the utilization of mobile technology at least once a day. Exclusion criteria: 1) adults 70 years and older or born before 1946. These individuals were not considered Baby Boomers and did not meet the study criteria; 2) a physical or cognitive impairment that would impede any use of mobile technology; 3) non-users of mobile technology or other forms of information technology.

Participants were selected in the age range of Baby Boomers (age 50-69). Fifty participants were selected and divided into 2 groups, Younger Boomers (YB) (Born 1955-1964) with the age range of 50-59 and Older Boomers (OB) (Born 1946-1954) with the age range of 60-69. Recruitment procedures used were varied to obtain the participants. Recruitment of adults over age 50 has been challenging with past studies documenting difficulties (Dickinson, Arnott & Prior, 2007) so various methods to recruit participants were used. The three types of recruitment methods were: personal interaction recruitment, online email recruitment, and online

social network recruitment. First, participants were recruited by personal interactions by the researcher, whereby the researcher would meet with potential participants, explain the details of the study and what they would do if they wanted to participate. The researcher would personally ask whether they were interested in participating or if they knew of other potential individuals who might be interested in participating in the study. Second, the researcher contacted friends of relatives via email who participated and/or recruited other possible participants (see Appendix B). These methods created a snowball effect from participant friends and/or relatives in the correct age range, which involved them in the recruitment process, promoted participation, and retention in the research study (Mody et al., 2008). Third, a flier was distributed via the social networking site Facebook to elicit Baby Boomer participants (see Appendix A). This also created a snowball effect or sampling of users who saw and/or participated in the study and passed the information on to "friends" in the specific age range. Due to the snowball strategy, more than half of the participants in the study were recruited within the first 24 hours. However, the participants were in the YB age range. To recruit more OB for the study, a revised flier was created requesting participants ages 60-69 to ensure an even number of YB and OB participants. The revised flier was used for each of the recruitment methods stated previously. Recruitment lasted 3 months until a total of 50 Baby Boomer participants were recruited for the study. The participants did not need to reside in the immediate area of the researcher to participate in the study. Saturation of the participants recruited occurred when the sample provided a diverse sampling of Baby Boomers. Section 3.5 details further explanations of the Data collection procedures.

The Institutional Review Board (IRB) of the University of Wisconsin Milwaukee, Milwaukee, Wisconsin approved this exploratory dissertation study to be conducted (see

Appendix E). An IRB consent form was given to all potential participants and was either handwritten or signed electronically dependent on the type of diary method chosen by the participant prior to the beginning of the study. Participants were allowed to request print or electronic format for the consent form, questionnaire and for the diary entries. Participants were able to withdraw from the study at any time. If a participant withdrew, the questionnaire and diary data from that participant was not included in the final results.

Participants were compensated $25 upon completion of the study as an incentive since the study required a time commitment of documenting responses in a diary for 7 days as well as participation in a follow-up interview. Participants who withdrew or did not complete the diary and the interview were not compensated. A total of 57 respondents expressed interest in performing the study.

3.5 Data collection

3.5.1 Methods

This study used a qualitative approach that consisted of different types of data for triangulation: questionnaires, diaries, field notes and interview responses. Using multiple kinds of data instruments provided corroborating evidence to develop a theme encompassing the data and presented further finding validity.

The researcher received 57 responses from potential participants. Four respondents, after receiving an initial email explaining the study procedures, decided not to participate. One participant started the study answering the questionnaire and creating 2 days of diary entrees. This participant contacted the researcher and withdrew from the study stating it was difficult to finish the diary due to employment workload. The participant did comment that the Smartphone was the initial device utilized for search activities. However, the researcher removed this

participant's data from the questionnaire results and the diary entrees were not used in the final analyses.

The following four procedures were used in the data collection process for this exploratory dissertation study. 1) participants filled out a print or electronic questionnaire, 2) participants documented in a print or electronic diary their mobile device information searching activities for 7 days, 3) follow-up interviews were conducted after completion of the diary entrees, 4) field notes were chronicled by the researcher throughout the data collection and analysis process. A more detailed explanation of the procedures are detailed below.

First, 50 participants filled out a print or an electronic questionnaire that identified demographic information (gender, age, and educational level), information technology experience as well as mobile device(s) owned and utilized. Socio-economic status of the participants were not collected to instill trust and cooperation to participate in the study. Gachter, Herrman and Thoni (2004) found that socio-economic variables strongly influenced people's trust in other people's fairness to be treated equally. Recruitment of adults over 50, as stated in the previous section, has been challenging, and to increase participation and trust for this study, socio-economic indicators were not collected. The definitions for information technology experience were broad and self-assessed by the participants. This was satisfactory in the context of this dissertation study because users have a sense of their own skills when searching for information online. This self-assessment could be a factor in how the participant viewed and felt about mobile technology. It also allowed for a diverse set of individual users for the study. Additionally, self-assessment could play a role in the use or non-use of mobile technology for information searching. The online questionnaire was on Qualtrics (UWM 2015), a nationally respected software instrument, ensuring the privacy and security of the participant's data. The

printed and electronic questionnaire had the same set up and questions to ensure consistency in

the data. See Appendix C for a sample of the questionnaire.

The 50 participants represented diverse backgrounds with ages ranging from 50-69 that

were divided into 2 groups consisting of 50% (N=25) YB and 50% (N=25) OB (see Table 3.1).

The majority of the participants, 74%, were female and 26% were male. In terms of their

educational background, 16% (N=8) were high school graduates and 84% (N=42) were college

graduates. Participants self-assessed their experience with information technology, 36% (N=18)

indicated they were expert users and 2/3 [64% (N=32)] of the participants indicated some

challenges finding and retrieving electronic information as intermediate users. Participants were

also asked whether they owned a list of mobile devices. Almost all of the participants had an

Internet enabled cellphone [96%, (N=48)], 80% (N=40) owned an e-reader, 30% (N=15) owned

a tablet and 4% (N=2) owned an iPod Touch.

Table 3.1.
Descriptive Statistics of Participants' Characteristics

Measure	Items	Frequency	Percent
Gender	Male	13	26
	Female	37	74
Age	50-59	25	50
	Mean = 51.36, SD = 2.628		
	60-69	25	50
	Mean = 64.20, SD = 2.327		
Education	High School graduate	8	16
	College graduate	42	84
Information Technology Experience	Expert user	18	36
	Intermediate user	32	64
	Novice user	0	0
Mobile Technology Owned	Internet enabled cellphone	48	96
	E-reader	40	80
	Tablet	15	30
	iPod Touch	2	4

Most participants lived in the States of Wisconsin or New York. However, ten other US States were also represented providing a wider range of Baby Boomers living in different communities (see Table 3.2)

Table 3.2
Participants by State

State	Number
CT	1
MA	2
MD	1
MN	1
NC	1
NJ	1
NY	18
OH	1
SC	1
VA	1
VT	1
WI	21
Total	50

The second procedure for data collection after the questionnaire was participants were given the choice of documenting diary entrees in a printed or electronic diary. Diary studies have allowed participants to capture their information needs whenever it arose throughout the day. Solicited diaries have been noted to be different from unsolicited personal diaries. Solicited diaries usually have a specific purpose and unsolicited diaries have typically spontaneous writing with no incentive or purpose without the intention of someone reading and analyzing the passages. Researchers would request solicited diaries usually with a specific focus (i.e. health diary, food diary, daily activity log). Previous user group qualitative studies have utilized this method to gather research data. For example, Jacelon and Imperio (2005) examined participants with a chronic health issue (age 75+) that kept a 2-week diary explaining their thoughts and feelings on doing different activities. Xie's (2006) study had 20 participants (ages 40-51) that kept an information interaction diary on two search tasks for a 2-week period and Sohn et al.

(2008) explored participants (ages 19-58) mobile information needs, strategies, and factors that influenced their need using a 2-week diary method. Solicited participant diaries were attained from participants who documented daily activities they performed on their mobile devices. The solicited diaries in this dissertation study were a valuable source of information depicting data over a period of time that could not be easily observed since the participants would be documenting within their home communities. Responses in the solicited diary were of interest to the researcher and participants' completed the diaries with the knowledge the researcher would read and interpret the data (Jacelon & Imperio, 2005).

For this dissertation study, the diary was based on a set of questions designed to help the participants focus their thoughts on how and why they used mobile technology for information searching activities. The questions focused on what types of mobile device(s) the participant utilized, search activities, search activity context, activity time, frequency and duration of mobile device usage, whether the information was accessed successfully, any problems encountered during the process, whether anyone helped during the process and why the mobile device was chosen for the search activity (see Appendix D). To retain participants in the study, the diary was for a period of 7 days. Keeping a diary for 7 days would develop a rich data set. Past research has shown that maintaining a diary for a longer period of time, longer than 7 days, could cause the participants to become tired of documenting entries (Jacelon & Imperio, 2005). Throughout the 7 days, the participant recorded and answered questions on 5 different online activities per day with subsequent same activities for the day tallied without detailed information. For example, the participant could record and answer questions for the following 5 online search activities: health information, gaming, shopping, directions and the social network Facebook on Day 1. If the participant went on Facebook multiple times on Day 1, the participant would record and tally the

Facebook search activities without having to answer the questions in the diary after the first initial search.

Participants were given a choice of what type of diary they would use to document their entries (print or electronic format). A choice was given due to prior research detailing Baby Boomers having unique characteristics in using information technology. Providing the participant the choice of diary preference allowed more comfort in documenting diary entrees. Participants did not need to reside in the researcher's immediate area to complete the diary. The researcher provided and mailed printed materials that included a stamped return envelope to the participants. The participants who chose the electronic diary format accessed the diary from a technological device. The electronic diary was on Qualtrics (UWM, 2015) and an exclusive URL was created for each individual participant. The participants who chose the electronic version were given the URL to access the diary via email and printed diary participants were provided a printed version via US mail. The printed diary had the same questions as the electronic diary and were displayed in the form of a personalized folder. A typed written copy of questions was provided at the beginning of the printed diary for easy reference. Each page of the printed diary had one diary question for adequate space for written explanations. Diary studies have the possibility of missing data due to participants forgetting to report an entry. Participants in this study had reminders via email to encourage diary entrees. An initial reminder was sent to a participant if the participant had not started to record data in the electronic diary after 1 week from signing the consent form. After the initial reminder email, reminders were sent to a participant, if needed, in 2-week increments, beginning from the first day of the participant's diary entry. This was to check whether he or she was interested in finishing the study and to encourage diary entrees. All correspondence was done via email between participant and

researcher once participant consent was attained. All participant correspondence was through email irrespective of the print or electronic instruments chosen for the questionnaire and diary. The researcher sent all reminders to the participants.

Audio diaries were not used in this study due to the following reasons: 1) a small digital recorder would not have a place to attach the written questions for easy accessibility for the participants. This would cause undue issues of having to keep two separate items together for consistency in diary entrees; 2) small digital recorders have instructions on usage that the researcher did not want to have the participants learn to be able to participate in the study; 3) small digital recorders have small buttons and screens, which could be difficult to use for some participants creating possible frustration or withdrawal from participating in the study; and 4) small digital recorders require batteries to work efficiently. With the possibility of multiple usage on a daily basis, batteries would need to be supplied to participants with recorders that stopped working, which could interrupt the flow of daily reporting of activities.

The third part of the data collection procedures were the participant interviews. These were conducted after the diaries were completed and received by the researcher. Almost all interviews were digitally recorded for clarification of diary entrees. The researcher conducted interviews at a time convenient for the interviewee either in person, by phone or via the social network Face Time. If the participant indicated he or she was unavailable for a recorded interview, the interview questions were emailed to the participant. The researcher was the only interviewer to increase validity and consistency of the interview questions. The interview allowed other questions deemed pertinent and timely dependent on the interviewees' responses to the initial questions in the diary. The questions were semi-structured and open-ended, which allowed for follow-up of any new information expressed during the interview process. Interview

questions were the same for onsite and online interviews. There were 19 main questions (see Appendix F) that encompassed 4 areas of interest: 1) mobile device ownership and utilization, 2) mobile device problems and challenges with information searching, 3) non-mobile device utilization and 4) other information about mobile device(s) not covered in the questions.

The fourth and final procedure of data collection was field notes. These were taken by the researcher during the course of the study to allow for a richer context in data analysis. Field notes were the researcher's written chronicles during the data collection and transcribing process. The inclusion criteria for the field notes included thoughts, impressions and perceptions as well as short analytical insights about participant's correspondences with the researcher, the transcribed individual diaries, as well as during and after interactions with the participant's interview. In regards to exclusion criteria for the field notes, nothing was excluded from the field notes since all data gathered was useful in the final analysis. Section 3.6.3 has an example of the field notes.

3.5.2 Setting

Participants kept an electronic or print diary in their natural setting in their own community in the US. Participants were not required to be in the same community or state as the researcher allowing for a diverse group of Baby Boomers. All participants kept a diary in a natural setting to allow for real search activities to be performed and any real problems that could occur when utilizing a mobile device.

3.5.3 Pilot test

The researcher conducted a pilot study to test the instruments of the questionnaire and diary methods (print and electronic) with 3 participants to look for potential problems and bias of questions. The pilot test participants included one YB and two OB. Results from the pilot study found that the electronic and print questionnaire did not need to have changes made to the

questions since the pilot participants understood the meaning and wording of the various

questions. However, the electronic diary pilot participants experienced difficulty understanding

the last question (Question 11 or Q11) in the diary, which originally stated: Q11) "How many

times did you use your mobile device today?" The researcher believed the question caused

confusion for the online participant since the diary was created on Qualtrics (UWM, 2015) and

this question would have been answered each time the participant recorded a diary entry. This

could have occurred multiple times as the participant documented each time he or she searched

on a mobile device throughout the day. Q11 was removed from the print and electronic diary for

the actual study and the question was incorporated as an interview question for the actual

dissertation study.

3.6 Data analysis

A constant comparative analysis was undertaken to determine patterns in the data to build

a theory. The questionnaire, diaries, field notes and interviews were placed in categories and

compared to look for related themes or patterns across the data sets. The researcher started by

compiling the descriptive statistics from the questionnaire participants completed before starting

the diary. IBM SPSS Statistics 22 software and Microsoft Excel 2013 software was used to

create frequencies and charts of the various data sets. Next, the diaries were read and transcribed

by the researcher. Electronic diaries were stored on a password-locked computer accessed only

by the researcher. Returned printed diaries were stored in a locked file cabinet during and after

transcription. All diaries were transcribed and stored on one password-locked computer accessed

only by the researcher. Each participant was assigned a number (e.g. P1, P2, etc.) to protect

participant privacy. Digital audio interviews were transcribed and stored on the same computer

with the interviewees assigned the same participant number as the diary numbers. After audio

recordings were transcribed, the audio recordings were erased. The researcher used NVivo

qualitative software to assist in analyzing the transcribed diaries and interviews to derive themes

from the different gathered data. The triangulation of the data collected from the questionnaires,

diaries, interviews and field notes provided support and corroborating evidence for the related

concepts and themes discussed in Chapters 4 and 5.

After independently working, another PhD researcher, who had previous qualitative

coding experience, was consulted to examine diary entrees and interview transcripts. Theme

similarities and differences were discussed between the researchers. This process aided the

development of the categorical codes and inter-coder agreement. The researcher kept field notes

to record thoughts, reflections and analyses throughout the research study. Using the various

forms of analyses provided a deeper and richer understanding of the Baby Boomer information

need. Table 3.3 has the data collection and analysis plan.

Table 3.3
Data Collection and Analysis Plan

Research Questions	Collection Instruments	Analysis Methods
How are Baby Boomers utilizing a mobile device to search for information in terms of the mobile device types, the environmental contexts and the types of information searched?	Questionnaire Diary Interview	Taxonomies of usage types Descriptive analysis
What are the challenges concerning Baby Boomers utilizing a mobile device in searching for information and their affecting factors?	Diary Interview	Taxonomies of challenges Taxonomies of user factors, mobile technology and interactions Descriptive analysis

3.6.1 Grounded theory

Grounded theory has been termed as a "family of methods" with distinctions between

some versions of grounded theory and some overlap in others (Bryant & Charmez, 2007, p. 12).

Grounded theory would be when "…the inquirer generates a general explanation (a theory) of a

process, an action, or an interaction shaped by the views of a large number of participants" (Creswell, 2013, p. 83). In other words, theory grounded in data. The process could occur when there would be enough data to saturate categories and detail a theory. Multiple perspectives from participants could be considered when using the grounded theory approach and multiple levels of data analysis would be conducted throughout the research process. Grounded theory would involve the collection and analysis of data that has been examined, coded, compared, and categorized developing themes or concepts (Charmez, 2006; Corbin & Strauss, 1990; Glaser & Strauss, 1967; Glesne, 2011; Strauss and Corbin, 1994). Relevant concepts could be revealed by showing up multiple times within the data. As Kearney (2007) suggested, "grounded theory does not simply posit that A always leads to B, but rather that the degree to which A leads to B and what the relationship looks like depends on a range of factors that influence A, B, and the relationship between them" (as cited in Kearney, 2007, p. 128). The researcher's role would be to keep an open mind to any possible evidence that could exist in the dataset. Grounded theory has been used in different areas of study including the LIS field. Meaningful conclusions could be derived from analyzing the data and new insights or ideas could also be revealed (Allan, 2003; Corbin & Strauss, 2015). The data would typically be collected from research questions, not from the verification of defined hypotheses (Mansourian, 2006). This exploratory dissertation study explored search activities, the challenges and factors that affected Baby Boomers utilizing mobile technology. A constant comparative analysis was undertaken to determine patterns in the data.

There has been much debate on the literature review while utilizing grounded theory. For this dissertation study, a literature review has been provided to establish theoretical sensitivity and foundation for the study. The researcher needed to be "…steeped in the literature that deals

with both the kinds of variables and their associated general ideas that will be used" (as cited in Glaser, 1978, p. 3). This sensitivity gave meaning to the data setting the stage for the dissertation's objectives. The diaries, questionnaires, field notes and interview responses were placed in categories and compared to look for related themes or patterns across the data sets. The researcher started by transcribing the diaries and identifying the themes of the different data. Glaser (1978) pointed out that having many theoretical codes would enable the researcher to be more sensitive to the relationships between the data.

3.6.2 Coding process and coding scheme

The first phase of the grounded theory approach would be open coding whereby a category would be formed from the data. In other words, a code word or phrase would be assigned that accurately described the text segment meaning. Codes were broken down into categories or the codes' core concepts. Next, the researcher clustered together similar codes, thereby reducing the long list of codes to a smaller, more manageable number. The second phase is axial coding, which would be the process of finding associations between the categories to create themes. During this phase, the researcher would think about the main phenomenon, the causal conditions, strategies, context, intervening conditions and consequences (Charmez, 2006; Corbin & Strauss, 1990; Cresswell, 2013). Themes would start to develop by constantly comparing the data. This constant comparative analysis of the data gradually would evolve into a core of emerging theory or selective coding. This would be the central code that the other codes were related to or a more general concept, or central phenomenon. (Babbie, 2011; Creswell, 2013). *Figure 3.1* has illustrated the grounded theory process.
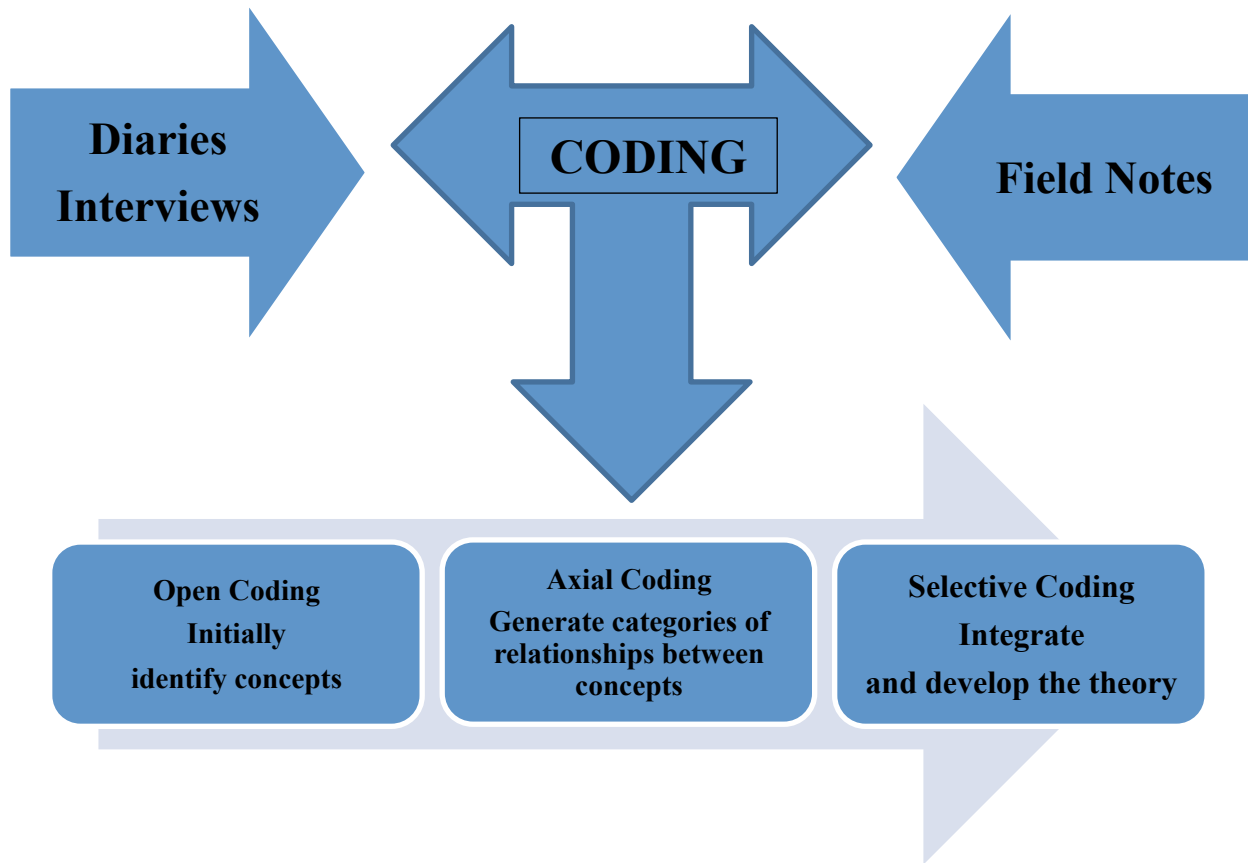
Figure 3.1 Grounded Theory Process

The researcher analyzed the questionnaires, diaries, interview transcripts and field notes using the grounded theory process (Babbie, 2011; Charmez, 2006; Corbin & Strauss, 1990; Glaser & Strauss, 1967; Glesne, 2011; Strauss and Corbin, 1994). The grounded theory method was used since there could have been valuable variables discovered or themes of interest pulled from the qualitative data which have not been revealed in previous research studies. Data was reviewed line by line (Glaser & Strauss, 1967) and codes were assigned as the concept emerged. Next, the researcher compared codes to look for relationships developing themes. The data collection and analysis process continued until the researcher attained conceptual saturation (Corbin & Strauss, 2015) and was satisfied sufficient data was discovered to describe each of the categories. See Table 3.4 for coding sheet and Table 3.5 for examples of the main categories.

Linking the concepts together by constantly comparing the codes and the relationships between

them built a model from the gathered qualitative data, which is discussed in Chapter 5.

Table 3.4
Coding Sheet

Participant Id	Type of Information	Mobile Device	Location	Challenge	Factor

Table 3.5
Coding Scheme: Examples of Main Categories

Types of Categories	Definitions	Examples
Type of Information: News/Sports	Participants' ability or inability to effectively search for News/Sports	"I get my news on an ipad because it's a bigger screen making it more easier to read." (P34)
Type of Information: Email	Participants' ability or inability to effectively search for Email	"I had difficulty searching my email…Parts of my school building, I can't find a signal so I go ½ a day without a cell signal." (P17)
Challenge: Inability to solve the Problem	Participants' inability using and/or figuring out how to use the mobile device to perform the search activity	"I couldn't figure out how to make my phone start speaking the directions" (P43)
Challenge: Inability to find information/solution	Participants' inability finding information they were searching for on their mobile device or finding a solution to assist them in finding the information	"There were too many screens I had to scroll through and my phone wouldn't let me back up. It was frustrating." (P30)
Factor: Personal Emotion Comfort level (CL)	Participant's feelings of enjoyment or frustration of using a mobile device	"The two locations I looked up I couldn't flag on same map...very frustrating that I didn't know how to do that." (P27)
Factor: Device Aspect Device security (DS)	Participant's perception of privacy and security of doing the search on a mobile device affected the use or non-use of the mobile device	"I don't shop on my device…I personally don't feel safe doing it from a mobile phone." (P5)

As mentioned previously in the data analysis plan, a PhD researcher (Coder 2) examined

the data and developed codes to create consistency and agreement among the datasets. Three

transcripts were given to Coder 2. One transcript contained Day 1 diary entrees from 25

participants that entailed 8 answered questions for a total of 200 passages coded. The two

remaining transcripts were interview transcripts randomly chosen from the participants, one YB and one OB participant. After coding the transcript passages, the researcher and Coder 2 met and discussed text code names identifying overlapping agreement on coded names and passages. Discrepancies in the codes were discussed and explained or resolved, and a codebook was created. The researcher and Coder 2 coded an additional transcript that contained answers to the Interview question "Have you ever had any difficulties or problems using your (mobile device)? If yes, could you please explain one to me?" from the 50 participants. This question was chosen specifically since the responses gave types of challenges and their affecting factors to establish at least a 90% inter-coder agreement (Cresswell, 2009; 2013) and inter-coder reliability of assigning types of challenges and affecting factors between the researcher and Coder 2. Cohen Kappa's (K) (1960) coefficient is a "measure of agreement between two raters (or judges), corrected for chance, on the classification of a group of objects" (as cited in Becker, 2000, p. 1172). Cohen's Kappa was used to measure inter-coder reliability to establish and validate the quality of the coding schema developed from the qualitative data gathered in this study. The results fell within a high measure of reliability at K=0.95 for types of challenges and K=0.93 for the affecting factors. As the process of grounded theory took place, emerging categories and subcategories were developed. The definitions for the types of challenges and affecting factors are explained in Chapter 4 with examples from the participant diaries and interviews These have been interpreted in the context and development of the Baby Boomer Mobile Device Information Searching Model discussed in Chapter 5.

3.6.3 Field notes

Field notes were used during the research study, which involved reflexivity of the researcher. Reflexivity in qualitative research would involve the …"critical reflection on how

researcher, research participants, setting, and research procedures interact and influence each other" (as cited in Glesne, 2011, p. 151). This would inform the reader what prompted interest in this exploratory dissertation study and how it informed the data's interpretation. The researcher's culture, social, gender, class and personal politics would be reflected in the interpretation (Cresswell, 2013). Due to the reflexivity of the findings, the researcher was conscious of the biases, values and experiences while interpreting the data. In total, 154 notes were chronicled during the research process. Two examples have been given below:

> 1/12/15: Received email from P7. Issues understanding Qualtrics diary and recording data. (Said was already confused-mentioned age-laughed) Self-efficacy apparent. Given examples to help.

> 1/22/15: Email form P30. Felt like only one asking for paper diary. (Interesting-need to ask in interview why) Participant thought would do better with it. (ageism, self-efficacy, was used to print)

3.6.4 Descriptive analysis

Qualitative research could involve quantitative analysis of data. In the context of this dissertation study, numbers, frequencies and percentages were derived from the questionnaire, diary and interview transcripts. Descriptive analysis was conducted to analyze information search activities performed by the Baby Boomers, mobile device types, the reason for mobile device usage, the frequency distribution of mobile device used and search activities, Baby Boomer comparisons, usage environment, time spent on the mobile device and number of challenges and factors.

3.7 Trustworthiness and research validity

Cohen and Crabtree (2006) discussed the importance of trustworthiness of a research study in evaluating its worth. Trustworthiness involves establishing credibility, transferability, dependability and confirmability. Different strategies were undertaken by the researcher to assess

the internal and external validity of this exploratory dissertation study. These include

triangulation of different sources to provide corroborating evidence, rich descriptions and actual

quotes from the participants, diverse characteristics and locations of participants in a natural

setting, peer review of the data and the clarification of researcher bias.

A purposive sampling method and gathered a small number of participants that allowed

for more in-depth information to be uncovered about a specific topic. By using a grounded

theory approach, themes developed, and by using qualitative statements from the participants,

gave more internal validity to the data. This study also used more than one set of data

(questionnaires, dairies, interviews, field notes) or triangulation, allowing for more in-depth data.

Triangulating the data among the different data collection instruments provided internal validity

to the findings.

A snowball approach was used and resulted in different types of participants who had

diverse characteristics giving internal and external validity to the research findings. Print and

electronic questionnaire responses from the participants identified demographic information,

information technology experience and mobile device ownership. Participants were in their own

environment and not in front of the researcher allowing for natural answers to the questions

creating ethical validity from the participants.

A wide scope of data was examined by acquiring print and electronic diaries from the 50

diverse Baby Boomer participants to obtain research trustworthiness. Participants recorded over

a 7-day period to allow for various search information activities from the participants utilizing a

mobile device. Participants documented data in a real setting with real problems or issues. This

allowed the data to be more trustworthy and giving more validity to the findings than if the data

was recorded within a lab setting or whether the researcher controlled the search activities or the mobile technology utilized.

Furthermore, the study included descriptive context-relevant statements that were reported to allow for transferability. Accurate quotes were stated from participants to give richer detail and give descriptive validity to the data. Interviews were conducted to clarify diary entrees providing interpretive validity to the data and to ensure accurate portrayal of the participant's statements and views. The researcher used non-leading, probing techniques to strengthen validity of the participant's responses and to minimize bias. The goal of the interviews was to understand or make meaning about how the participants' understand the experience they had using and searching with a mobile device. In addition, by interviewing the 50 participants, the researcher could connect the experiences and check the responses against those of other participants, creating further internal validity.

The qualitative data gathered gave the research more validity due to the richness and detailed description of the data. A second coder was used providing peer review and inter-coder agreement establishing validity to the coding scheme. In addition, the reflexivity of the field notes and the constant comparative data analysis provided inter-coder agreement and reliability to the existing data set.

3.8 Ethical issues

Some ethical issues could arise from the nature of this study. The main issue would be maintaining the participant privacy. The opinions and thoughts of Baby Boomers were a key factor in the research and all effort was made to ensure the information obtained did not effect current lifestyle or situation. "The basic ethical principle governing data collection is that no harm should come to the respondents as a result of their participation in the research…The

respondent's right to privacy and the right to refuse to answer certain questions, or to be interviewed at all, should always be respected, and no undue pressure should be brought to bear." (Oppenheim, 1992, p. 84).

Participants were referred to as P1, P2, etc…when quotes were used in the findings. The IRB consent form was mailed to each participant who preferred a printed copy. This was mailed back to the researcher in order to receive the written diary. Participants typed their name in the electronic IRB form on Qualtrics (UWM, 2015) to gain access to the electronic diary. The consent form safeguarded the participant's knowledge about the study and gathered participant's consent. Verbal consent was also asked of the participant before the recorded participant interviews. The participants were assured that anonymity and confidentiality would be maintained at all times.

Due to the subjective nature of grounded theory analysis (Cresswell, 2013), the researcher was not able to keep personal bias out of the findings. However, to aid in finding reliability, a second researcher reviewed and coded a number of interview and diary transcripts to establish inter-coder agreement on code names and coded passages. All data was reviewed and analyzed to maintain the importance of identifying "what a respondent was trying to convey because whatever the incident was, it had to have some significance for the participant to mention it" (as cited in Corbin & Strauss, 2015, p. 80). Field notes were taken throughout the study and after interviews to note of any impressions derived about the participants that would not have been conveyed within the printed or electronic diaries.

All information collected during the course of this exploratory dissertation study has been kept confidential to the extent permitted by law. Disclosure about presenting the data gathered and publishing the results in scientific journals or at scientific conferences was disclosed to the

participants' via the signed consent form. Participant information has been stored in a locked cabinet and on 2 password protected computers. The data collected will be stored for a period of 5 years in a locked cabinet and a password protected computer for future research studies.

3.9 Chapter summary

This methodology chapter outlined how the research questions have been formulated. The researcher recruited 50 participants representing diverse backgrounds such as age, education, gender and information technology experiences. The participants were divided into 2 user groups, YB ages 50-59 and OB ages 60-69 from various geographical areas. The participants conducted any search task on their mobile device(s) and reported all of their search activities over a 7-day period in a print or electronic diary. The diary entrees had pre-determined questions to allow for more consistency with the data collection. Data was collected through print and electronic demographic questionnaires, print and electronic diaries, and subsequent interview questions that clarified data gathered from the diaries. A qualitative approach was used to provide more in depth data providing a better understanding or explanation of the results. Grounded theory was used to discover variables not previously revealed in former quantitative research studies. The aim was to gain an understanding of the Baby Boomers experience with mobile technology and the information search processes of adults over 50 years of age. The resulting data provided further insight into Baby Boomers utilization of a mobile device filling in a gap in the LIS scholarly research on adults over 50 years of age IR and access needs as well as suggesting areas for future research.

Chapter 4. Results

The previous chapter discussed the methodology used in this dissertation. The following sections analyzes the results of 50 questionnaires, diaries and interview responses that answered the following research questions: R1) *How are Baby Boomers utilizing a mobile device to search for information in terms of the mobile device types, the environmental contexts and the types of information searched?* R2) *What are the challenges concerning Baby Boomers utilizing a mobile device in searching for information and their affecting factors?*

Participants chose a print or an electronic format to complete the questionnaire and diary. Two print diaries were not returned to the researcher and questionnaire responses for those participants were removed from the questionnaire results. Interviews were not conducted on those two participants, as they did not complete all the requirements for the study. Twelve [6-Younger Boomers (YB), 6-Older Boomers (OB)] chose the printed format. A total of 50 participants completed the diaries and provided responses to questions for at least 1 search activity conducted on a mobile device per day up to a total of 5 different search activities per day. Participants did not need to answer questions for more than 5 different activities, though they kept a tally sheet of all the search activities performed each day. The majority of the participants utilized their mobile device for all 7 days of the diary. However, ten participants (20%) did not utilize a mobile device every day to perform their search activities during the 7-day period (see Table 4.1).

Table 4.1
Number of Days Participants Recorded Dairy Entrees (N=50)

Number of Participants	Total Number of Days of Diary Entrees
41	7
5	6
3	5
1	4
1	2

The participants who did not use a mobile device for 7 days to perform search activities indicated they used a laptop or a desktop computer for search activities or they chose not to search the Internet on any technological device. Some typical responses for non-mobile device usage:

"I do not use it on a daily basis and I don't use it much at home." (P18)

"I use a computer all day and I'm busy doing other things." (P46)

The following Sections, 4.1 and 4.2, answers the dissertation study research questions.

4.1 How are Baby Boomers utilizing a mobile device to search for information in terms of the mobile device types, the environmental contexts and the types of information searched?

4.1 Types of mobile devices

Participants indicated the mobile device used when conducting search activities. Participants utilized 1 or more mobile devices for their different search activities dependent on whether they owned more than 1 type of mobile device. 94% (N=47) utilized a cellphone at least once for search activities during the 7-day diary period, 60% (N=30) utilized a tablet, and 18% (N=9) utilized an e-reader device. Only 1 participant used an iPod Touch just once for a search activity. Cellphones were utilized the most with participants using the device 58% of the time when performing search activities compared to tablets (38%). Only two YB and one OB did not use a cellphone for their search activities. *Figure 4.1* has a comparison of mobile devices and the number of search sessions on each device. Keep in mind that the participants in one search

session could have performed multiple search activities. Section 4.1.3 discusses the different types of mobile device search activities.
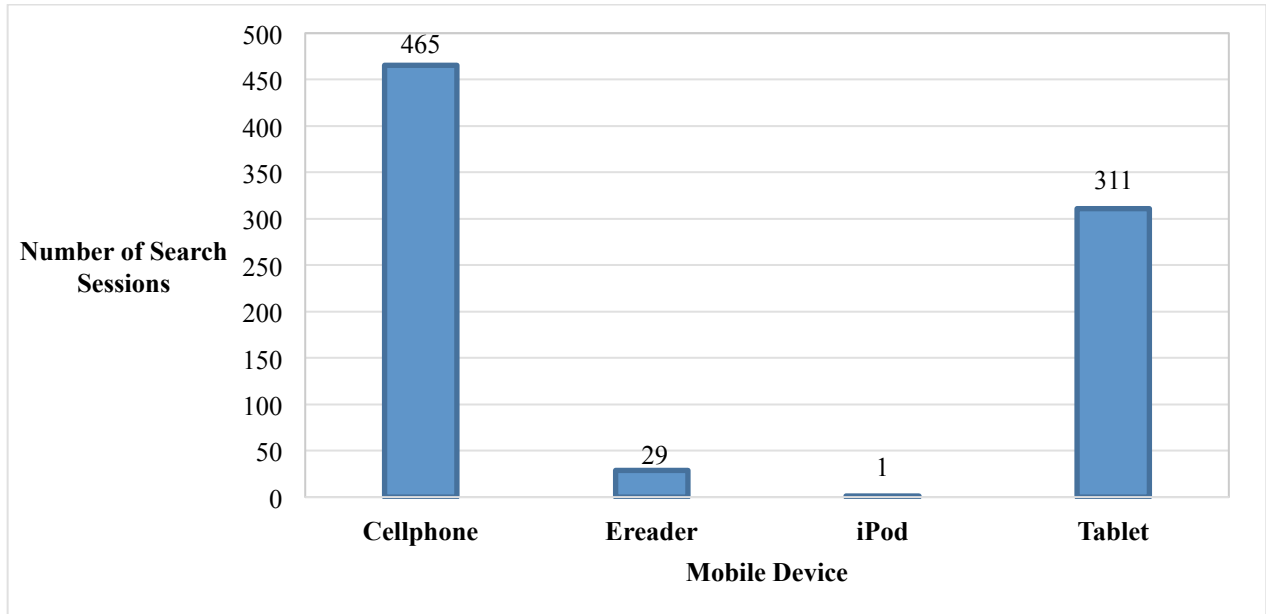
Figure 4.1 Mobile Device Usage

A frequency distribution was conducted on cellphone and tablet usage, which has been illustrated in *Figure 4.2 and Figure 4.3.* Both figures have the number of search sessions illustrated on the x-axis and number of participants (N=50) on the y-axis. *Figure 4.2* illustrated the frequency distribution of search sessions among the participants utilizing a cellphone. Participants performed search activities with their cellphones a Mean total of 9.3 times with a SD of 7.279 during the 7- day period. In comparison, *Figure 4.3* illustrated the frequency distribution of search sessions among the participants utilizing a tablet. The participants performed search activities with their tablets a Mean total of 6.22 times with a SD of 7.895 during the 7-day period. Participants did not use their e-readers (Mean=.58) or their iPod Touch (Mean = .02) as frequently to perform search activities, therefore a frequency distribution was not performed on these devices.
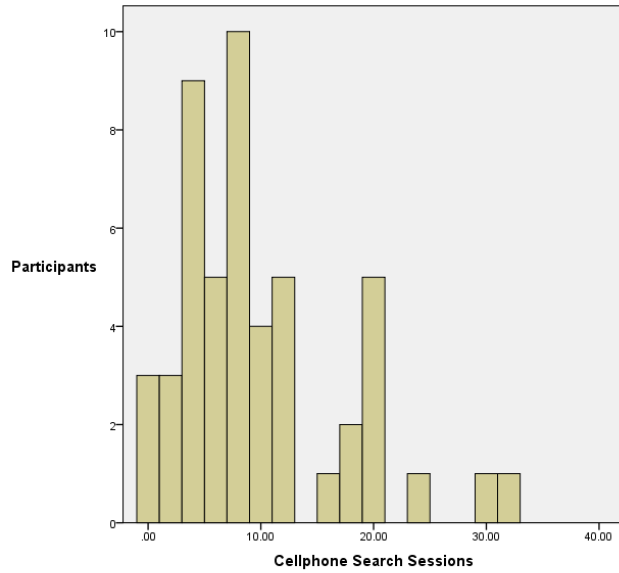
Figure 4.2 Frequency Distribution of
Cellphone Usage
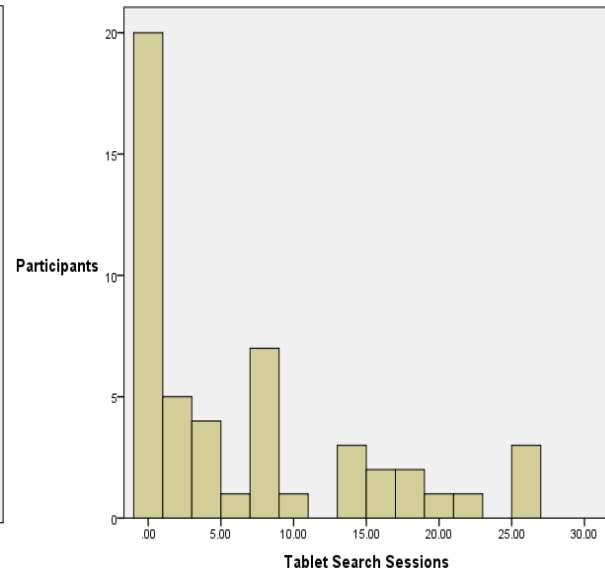
Figure 4.3 Frequency Distribution of
Tablet Usage

When comparing mobile devices used during each search session between YB and OB, there were only slight differences between YB and OB and the mobile device utilized when searching for information on the Internet (see *Figure 4.4).* However, YB conducted a greater number of search activities more often than OB during the search sessions, which is discussed in Section 4.3.
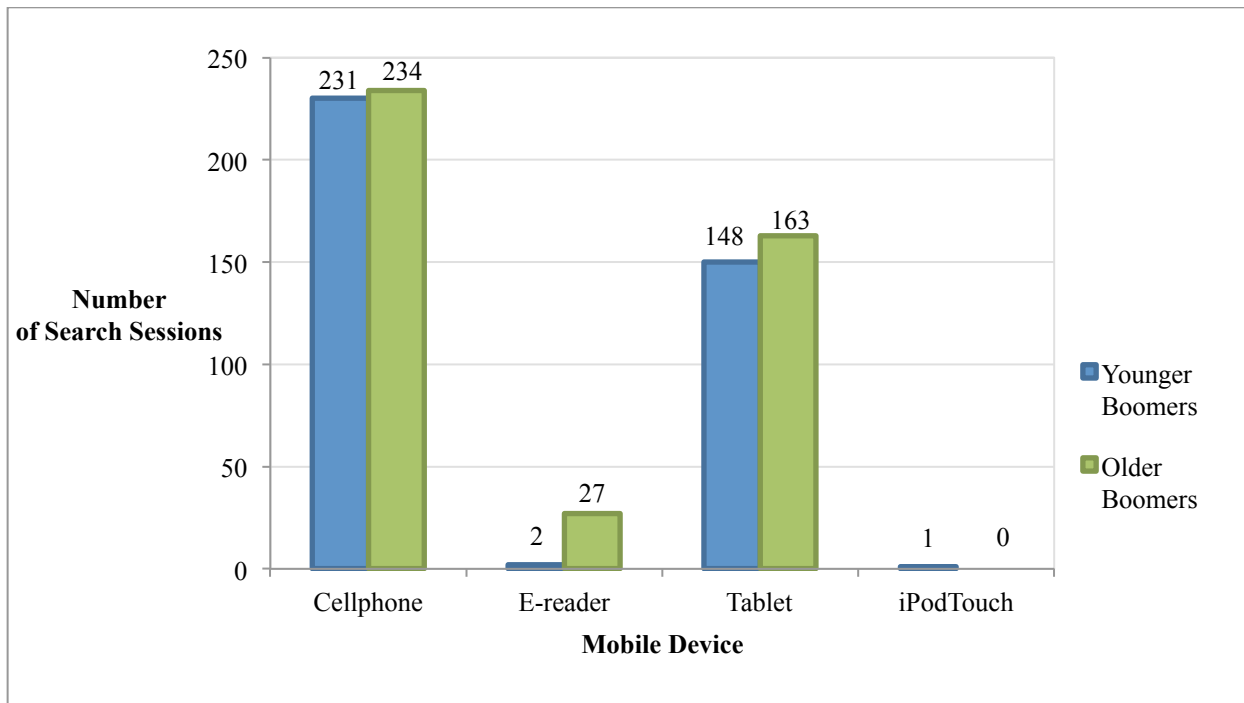
Figure 4.4 Younger Boomer and Older Boomer Mobile Device Usage Comparison

Participants expressed different reasons why they used their mobile devices instead of other forms of technology (See *Figure 4.5*). The convenience of the mobile device was stated by as the most prevalent reason (37%). 13% stated they utilized a mobile device because of a function or search activity was on the device. This was closely followed by the ease of use of the device (11%) and the location/accessibility (11%) of the mobile device compared to other forms of technology. Participants indicated 9% of their search activities were performed on a mobile device because it was the only device available. 6% of the search sessions were due to the portability of the mobile device. 5% of the sessions was because the mobile device was faster than another form of technology. The remaining 2% of the search sessions performed on the mobile device were due to the device size, ease of use and because the device was more efficient than a desktop computer.
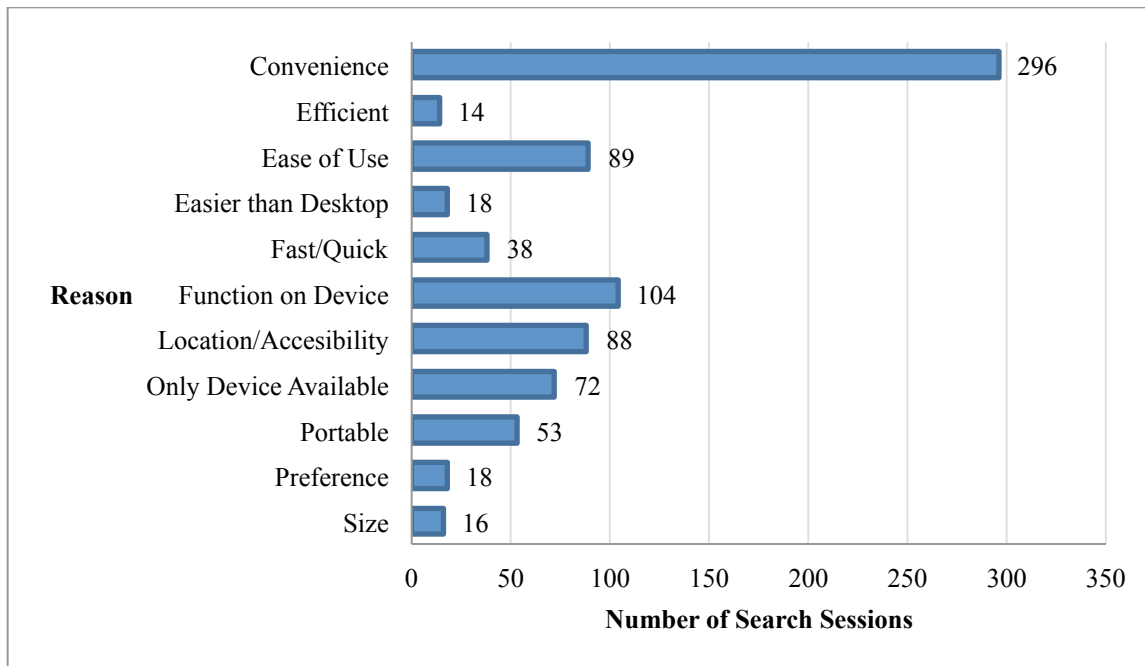
Figure 4.5 Reasons for Mobile Device Usage

4.1.2 Types of environments

Participants utilized their mobile device mainly within their home environment (57%) with only 18% performing search activities in the work place (see *Figure 4.6*). However, 94% (N= 47) of the participants indicated they still were in the workforce. Participants utilized their mobile device 12% of the time in "Other" types of environments. A typical "Other" documented place was another residence (daughter's or son's home) or another facility such as a car dealership, bowling alley or restaurant. 11% of participants utilized their mobile device in their car and 1% of participants were either at a school or the store. Most participants, as stated earlier, utilized their mobile device in a particular environment because of the convenience. Some typical quotes from participants were

"I like the iPad for the convenience; you know to do emails when I am away." (P40)

"I use the tablet more than I use the computer. It's convenient and easy. It's something I always have with me." (P44)

"I like my phone because it can be right with me." (P47)

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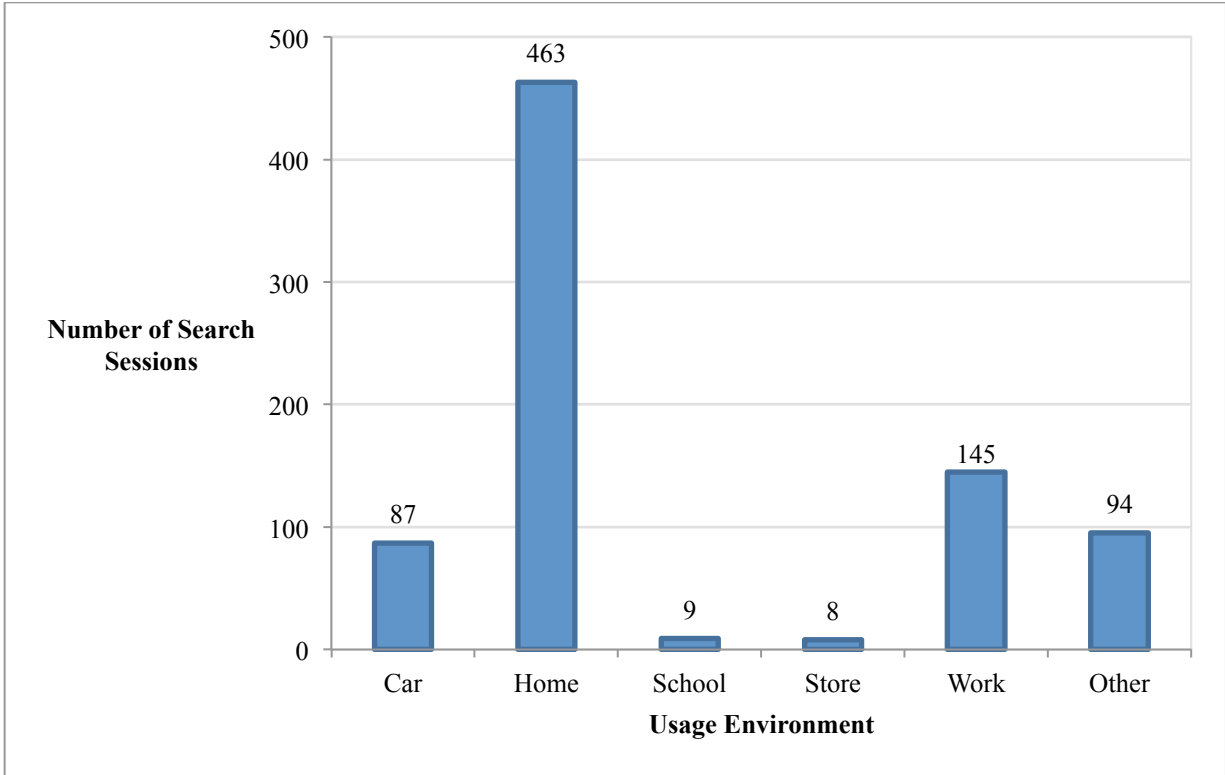
Figure 4.6 Mobile Device Usage Environment Comparison

When comparing environmental context between YB and OB (see *Figure 4.7*), OB utilized their mobile device more within a home environment (64%) when performing search activities compared to YB home usage (54%). However, YB used a mobile device more at work (20%) compared to OB (15%).
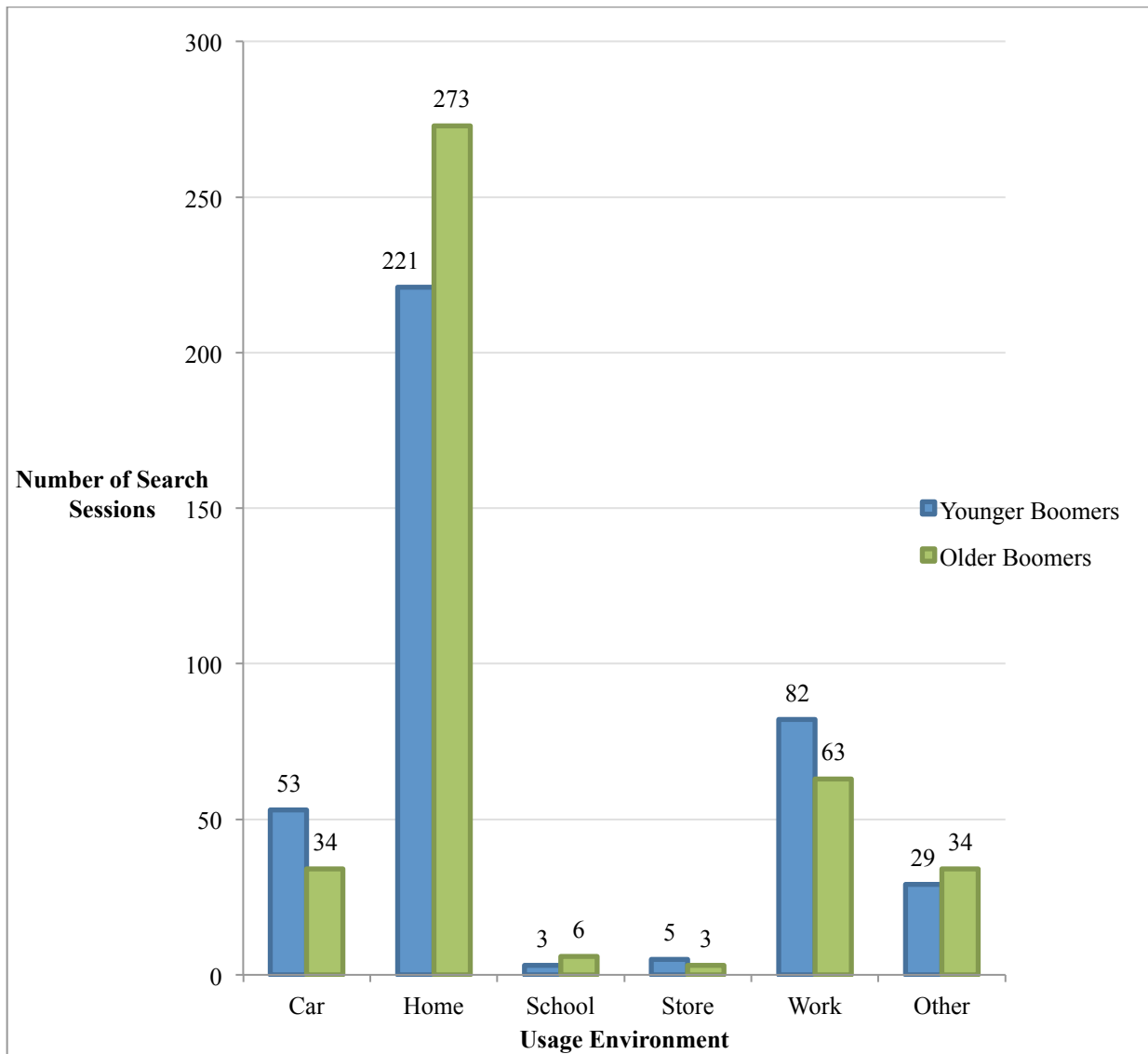
Figure 4.7 Younger Boomer and Older Boomer Environment Comparison

4.1.3 Types of information

Participants specified on the questionnaire how often they thought they used their mobile device(s) performing a search activity. A majority (82% N= 40) indicated they would use a mobile device more than 7 times a day while 14% (N=7) would use a mobile device 4-6 times a day, 4% (N=2) was 2-3 times a day and 2% (N=1) only would use their mobile device once a day.

The questionnaire asked the participants what types of search activities they believed they performed on a mobile device throughout a particular day. More than 50% (Mean=35.71) of the participants believed they performed the following 7 search activities more often: Directions (74% N=37), Email (82% N=41), Entertainment (70% N=35), Finances (52% N=26), Other Information Searching (80% N=40), Shopping (66% N=33), and Social Media (76% N=38). The top four search activities they believed they performed on a mobile device were Email, Other Information Searching (e.g. personal information, government, health information, browsing), Directions and Social Media (*See Figure 4.8*). The Mean number of different search activities the participants believed they performed on their mobile device per day was 6.23, SD = 2.63. Two participants indicated they would engage in 13 different activities compared to two other participants who stated they would engage in only 2 activities a day on their mobile device.
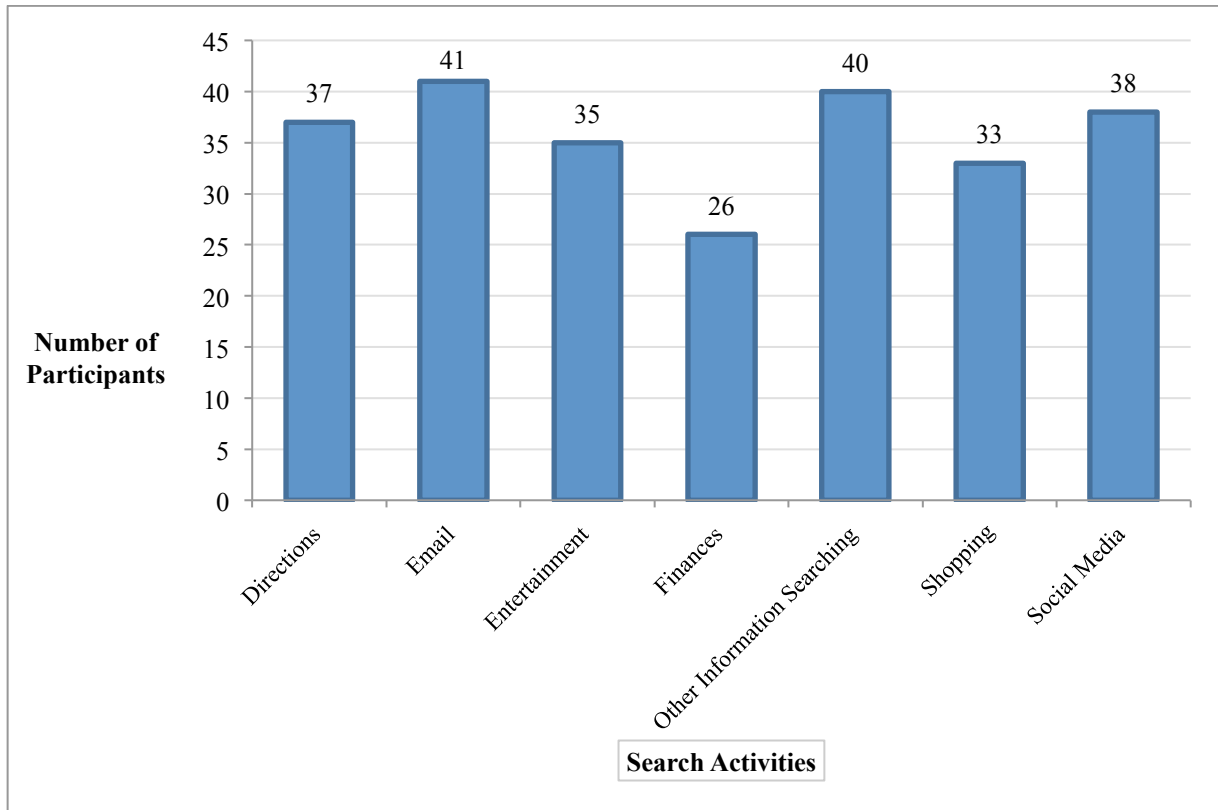
Figure 4.8 Indicated Search Activities from the Questionnaire (N=50)

In the participants' interviews, the participants responded how often they used their mobile device(s) a day to search for information (see *Figure 4.9*). 34% (N=17) specified they utilized their mobile device 6 to 10 times a day, 28% (N=14) specified they utilized their mobile device 11 to 20 times a day, 16% (N=8) indicated 21 to 30 times a day, 10% (N=5) specified 1 to 4 times a day, and 6% (N=3) specified they utilized their mobile device either more than 30 times or day or they would use it every other day 6% (N=3). The search activities did not include phone calls or text messages that would be typically found on some mobile devices.
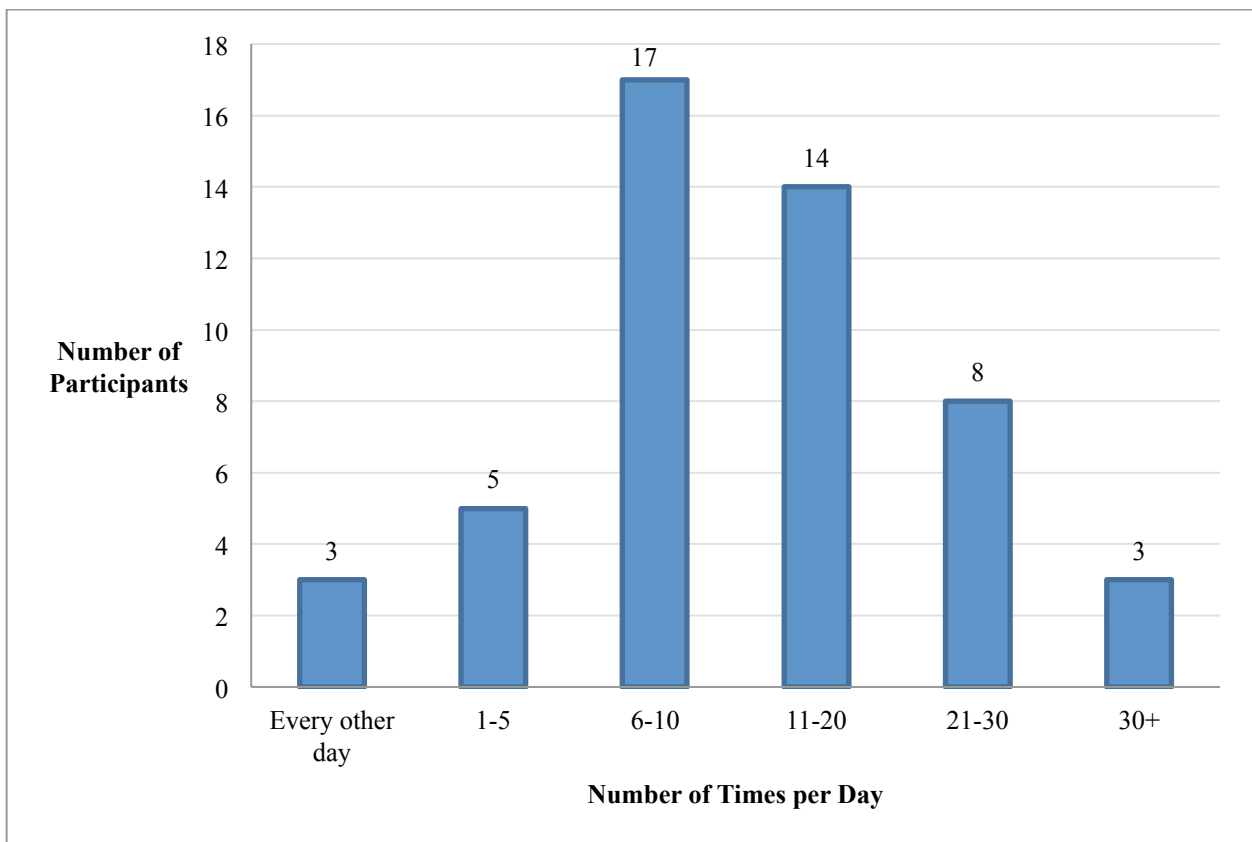
Figure 4.9 Mobile Device Usage per Day (N=50)

When comparing how many times a day YB performed search activities on their mobile devices with OB, most of the YB participants (76%) stated they utilized their mobile devices for search activities 11 times a day or more. Compared to a majority of the OB (72%) who stated they performed only 1-10 search activities a day on their mobile devices (see *Figure 4.10*).
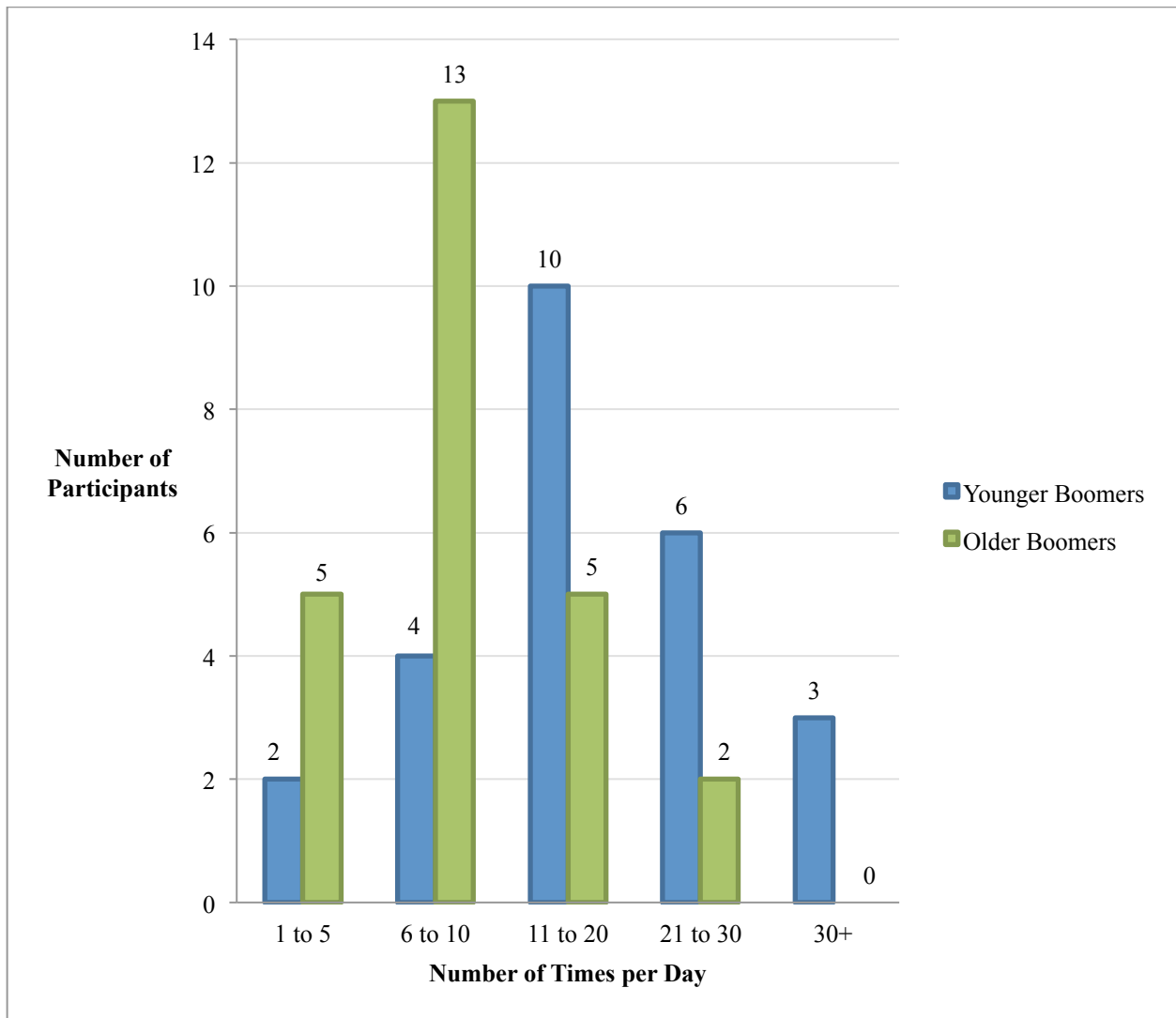
Figure 4.10 Younger Boomer and Older Boomer Comparison of Mobile Device Usage Per Day

The participants performed 14 different search activities on their mobile device(s) that they recorded in their diaries (see Figure 4.11). More than 50% (Mean = 35.14286) of the participants performed the following most prevalent 7 search activities: Directions (54% N=27), Email (100% N=50), Entertainment (78% N=39), Other Information Searching (98% N=49), News/Sports (62% N=32), Shopping (60% N=30), and Social Media (80% N=42). The actual recorded top 3 activities were Email, Social Media and Entertainment. One Participant recorded 11 different search activities on a single day compared to one participant only engaging in 5 different search activities.
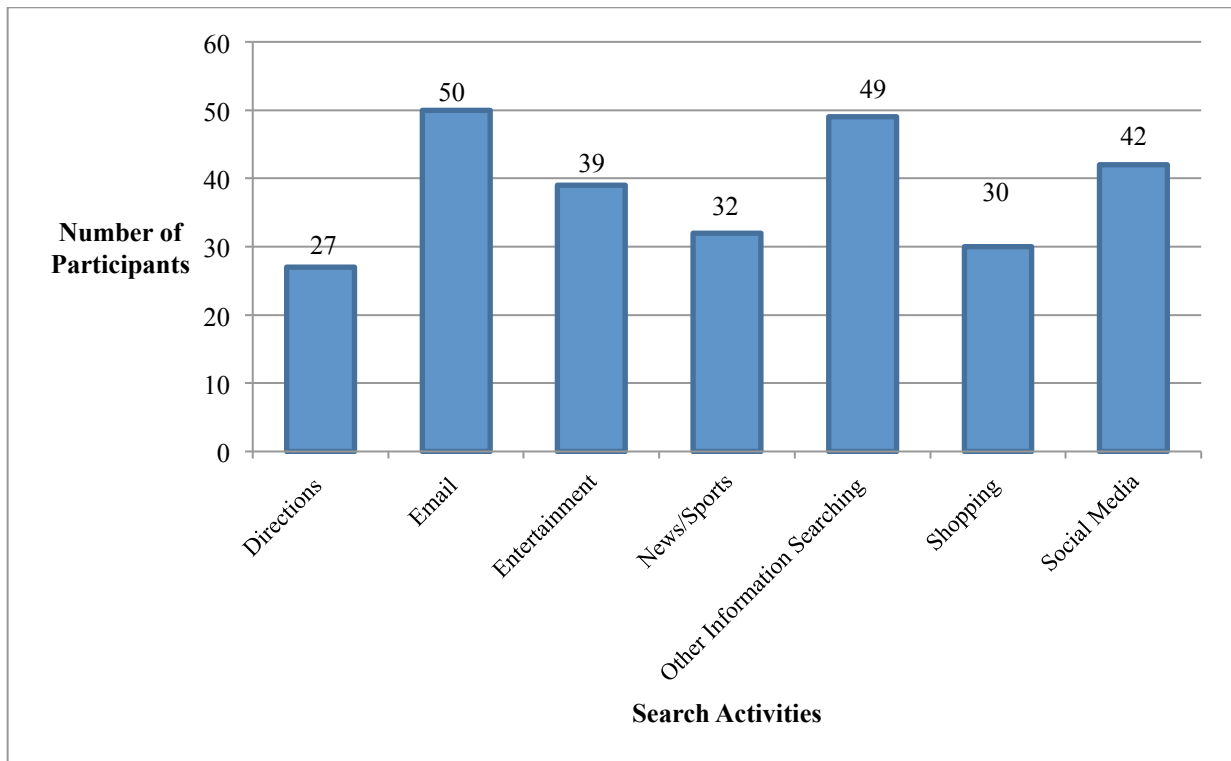
Figure 4.11 Diary Performed Search Activities (N=50)

Figure 4.12 compared questionnaire indicated search activities and the actual diary activities performed by the participants. Interestingly, the participants believed they performed certain activities on their mobile devices. However, the search activities documented in the diaries were not as prevalent. This was noted in the search activities of Finding Directions, Educational information, Finances, Recipe searches, Shopping, Travel, and Weather information. Participants believed they performed those search activities on their mobile devices more than what they actually documented in their diaries. Participants documented performing Email, Social Media, News/Sports information, Entertainment, and Other types of Information (e.g. personal information, government, health information, browsing) search activities the most in their diaries compared to other types of search activities.
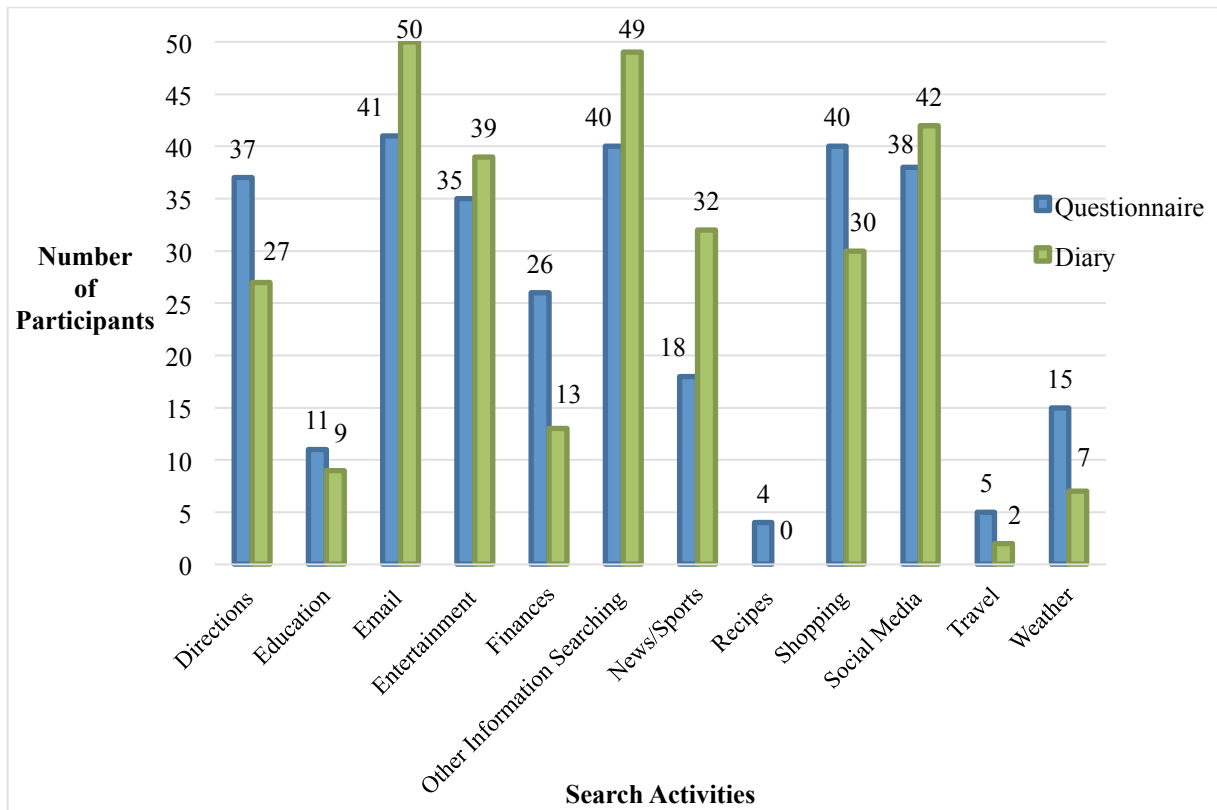
Figure 4.12 Questionnaire and Diary Search Activity Comparison

The 50 participants documented a total of 1275 out of the 1750 potential recorded diary search activities with responses to the diary questions. When comparing YB and OB actual documented search activities, each participant could have potentially documented 35 search activities during the 7-day period. YB recorded an average of 27.52 search activities and OB recorded an average of 23.48 search activities during the 7-day diary period. Table 4.2 has a comparison of YB and OB number of search activities performed during the 7-day period with YB performing a greater number of search activities than OB on their mobile devices.

Table 4.2

Comparison of Younger Boomers and Older Boomers Range of Search Activities for 7 days

	Range of Search Activities Recorded							
	1-5	**6-10**	**11-15**	**16-20**	**21-25**	**26-30**	**31-35**	**Total # of Participants**
Younger Boomers	1	0	1	1	6	7	9	25
Older Boomers	0	1	1	7	6	5	5	25
Total	1	1	2	8	12	12	14	50

The participants recorded the first five different activities performed over a 7-day period. Frequency and time spent searching and retrieving information was measured to understand user engagement in the search process. A frequency distribution (*see Figure 4.13*) was conducted on the number of search activities participants performed on their mobile devices. The number of search activities has been illustrated on the x-axis and the number of participants (N=50) on the y-axis. Only 16% (N=8) of the participants recorded 5 different activities for 7 seven days for a total of 35 activities. Participants recorded a Mean of 25.5 with a SD of 7.465 during the 7-day diary period. Participants varied on the number of different search activities they performed on their mobile devices throughout the 7 days.
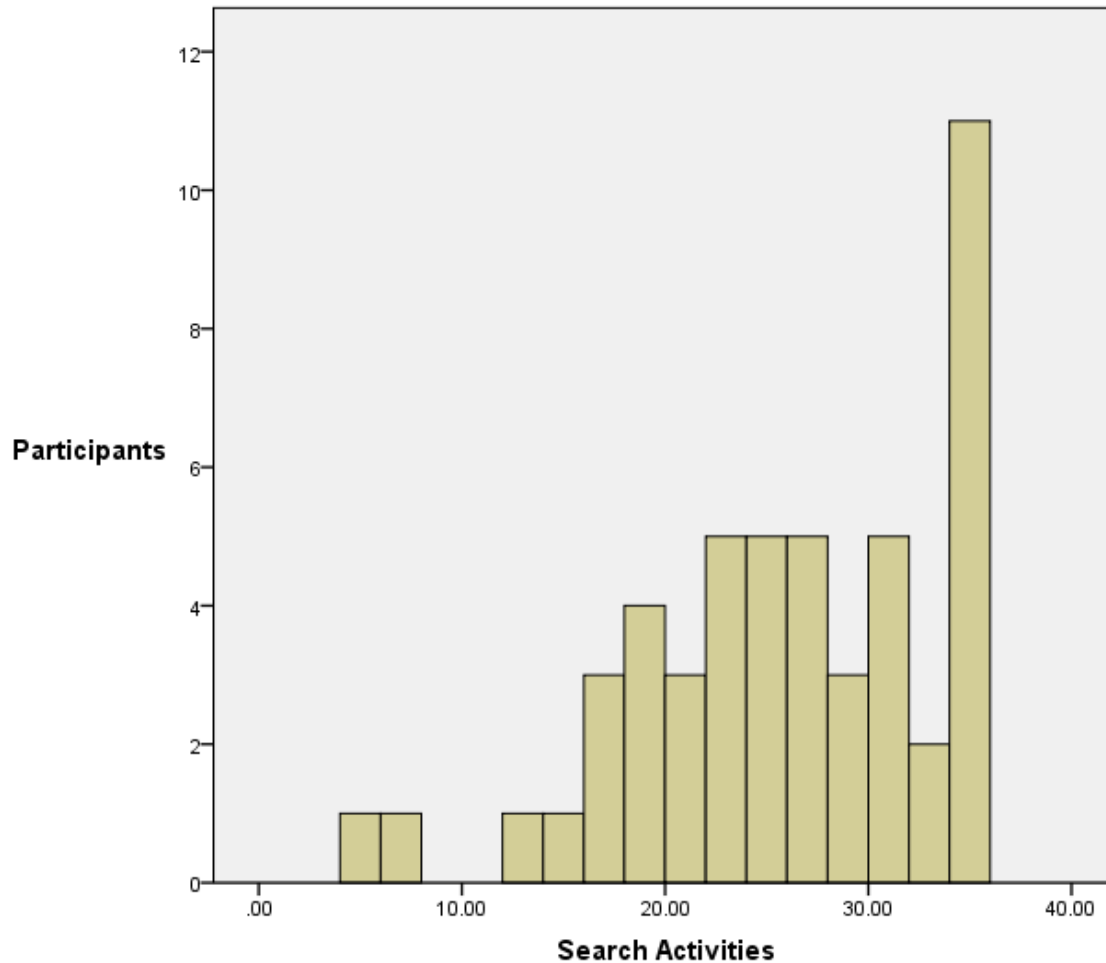
Figure 4.13 Frequency Distribution of Diary Search Activities

When comparing YB and OB total number of search activities documented during the 7-day diary period, OB checked Email 9% more frequently than YB during the 7-day period. OB also performed 14% more Entertainment search activities. On the other hand, YB performed 13% more Social Media search activities and a greater number of searches for News/Sports (8%) than OB (see Table 4.3).

Table 4.3
Younger Boomer and Older Boomer Comparison of Search Activities

Activity	Younger Boomers		Older Boomers	
	Number of Times Searched	Percentage	Number of Times Searched	Percentage
Email	244	28%	250	37%
Entertainment	143	16%	205	30%
Social Media	277	32%	129	19%
News/Sports	118	13%	36	5%
Other Information Searching	97	11%	64	9%
Total	879	100%	684	100%

Participants performed a greater number of search activities (56%) that took less than 15 minutes on their mobile device (see Table 4.4). Nine of the participants (19%) spent more than an hour performing search activities. However, a greater number of participants, 66% (N=34), spent less than 30 minutes on their mobile devices performing search activities.

Table 4.4
Minutes Utilizing Mobile Device(s) for 7 Days (N=50)

Minutes	Total Number of Search Sessions	Percentage
1 - 5	182	23%
6 – 10	151	19%
11 - 15	116	14%
16 - 20	72	9%
21 -30	32	4%
31 - 40	73	9%
41 – 50	29	4%
51 – 60	6	1%
61-90	76	9%
90+	69	8%
Total	806	100%

When comparing the number of minutes that YB and OB took to perform their search activities, YB and OB performed comparably the same number of activities with little difference in the amount of time performing search activities on their mobile devices. 52% of YB search sessions were 15 minutes or less compared to OB (59%) (see Table 4.5).

Table 4.5
Younger Boomer and Older Boomer Comparison of Number of Minutes for Search Activities

Number of Minutes per Search Activity	Younger Boomers Search Sessions	Percentage	Older Boomers Search Sessions	Percentage
15 Minutes or Less	234	52%	215	59%
16 Minutes +	146	48%	211	41%
Total	380	100%	426	100%

More than 60% (N=30) of the participants utilized 2 or more mobile devices during the 7-day period to perform search activities. Participants did not however, utilize a certain mobile device more frequently than another mobile device for their search activities. For example, for the top mobile devices owned by the participants (cellphones and tablets), participants performed activities in 4 minutes or less on a cellphone, just slightly more often (55%) than on a tablet (45%). Interestingly, some of the participants explained how they did not realize how often they used their mobile device until they recorded their search activities for this study. One expressed concern about the time spent utilizing the mobile device for search activities.

> "It's surprising to me how much time I used it (smartphone) when I was doing your study. I didn't know how much time I really spend on it. Is this a good use of my time?" (P23).

The previous sections examined how Baby Boomers used mobile technology to retrieve information looking at the types of mobile technology, the types of search activities, where the Baby Boomers performed the search activity, the frequency and the duration of the mobile search activities. The following section examines the challenges and factors affecting their mobile device usage.

4.2 What are the challenges concerning Baby Boomers utilizing a mobile device in searching for information and their affecting factors?

When Baby Boomers wanted to seek information on the Internet, they typically utilized a device that was convenient for them to use at the time. With the increased availability of mobile

devices, many Baby Boomers have a mobile device to use to search for information. However, with the varying characteristics of Baby Boomers, different factors and challenges could arise that would determine whether the mobile device would be used or could influence or affect their interaction with the mobile device. The data analysis in this exploratory dissertation study identified the following major categories and sub-categories with 10 types of challenges that participants encountered in their interactions with mobile technology. The 10 types of challenges have been represented in 5 categories (see Table 4.6): 1) inability to initiate search activity, 2) instability of connection, 3) inability to perform the search, 4) inability to solve the problem and (5) inability to find information/solution.

Table 4.6
Categories and Types of Challenges

Challenging Categories	Types of Challenges
Inability to initiate search activity	Inability to initiate search activity - Perception of information need Inability to initiate search activity - Perception of search task Inability to initiate search activity - Perception of mobile device
Instability of connection	Instability of connection - To get connected Instability of connection - To stay connected
Inability to perform the search	Inability to perform the search – On the mobile device Inability to perform the search - To satisfy information need Inability to perform the search – Social influences
Inability to solve the problem	Inability to solve the problem - On the mobile device
Inability to find information/solution	Inability to find information/solution - To satisfy information need

Participants encountered the different types of challenges 243 times. These challenges occurred in 16% of the 1,563 search activities that the participants performed on their mobile devices. *Figure 4.14* has illustrated the number of the types of challenges identified in the study. Among them, the inability to initiate search activity (27%) and the inability to perform the search (41%) accounted for the most frequent type of challenge that participants encountered.
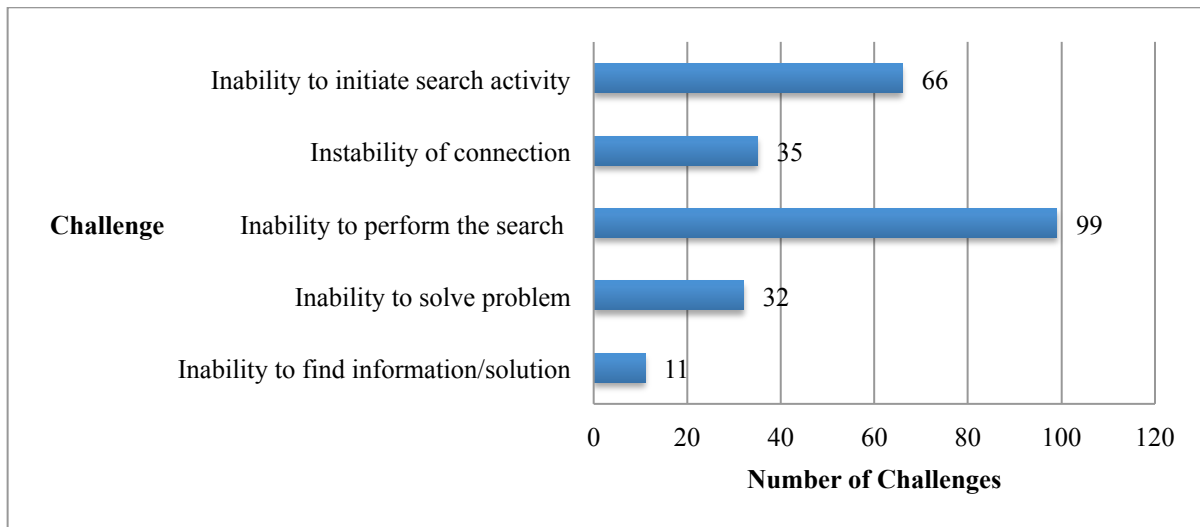
Figure 4.14 Number of Different Types of Challenges

Additionally, the study revealed 23 factors that were significant in the participants' encounters with their mobile devices. The 23 factors represented 10 categories: 1) physical ability, 2) personal behavior, 3) personal emotion, 4) personal knowledge, 5) previous experience, 6) task aspects, 7) device aspects, 8) personal context, 9) social relationships, and 10) economic situation. The factors with their respective definitions have been represented in Table 4.7. The types of challenges were identified from participants' diaries and interviews recorded by the researcher. The following examples have quotes related to the types of challenges encountered and the factors are underlined with the appropriate abbreviation specified.

Table 4.7
Types of Factors and Definitions

Types of Factors/Abbreviation	Definition
Physical ability (PA)	Participant's body ability and activity
Personal behavior	Participant's interaction with the mobile device
Behavior intention (BI)	Participant's effort needed to perform the search task
Behavior activity (BA)	Participant's information seeking action
Personal emotion	Participant's feelings of confidence and comfort in utilizing the mobile device
Comfort level (CL)	Participant's feeling of enjoyment, frustration using a mobile device
Self-efficacy (SE)	Participant's confidence to use a certain mobile device and perform a task
Personal knowledge	Participant's knowledge and skills related to information retrieval
Domain knowledge (DK)	Participant's knowledge on the topic
System knowledge (SK)	Participant's knowledge on the mobile device
Retrieval knowledge (RK)	Participant's knowledge on searching for information
Previous experience (PE)	Participant's previous experience searching for information on a mobile device
Task Aspects	Attributes that define a search task
Task requirement (TR)	Special condition for a search task, such as time
Task type (TT)	Different types of search task, such as entertainment communication, information, etc.
Task complexity (TC)	Difficulty level to perform the search task
Device Aspects	Attributes related to the mobile device
Device design (DD)	The design of the mobile device in relation to size, interface features, display, etc.
Device convenience (DC)	The availability of the mobile device in relation to the user
Device performance (DP)	How the mobile device performs when performing the task
Device applications (DA)	Software applications on the mobile device used to perform certain tasks
Device ease of use (DE)	The usability of the mobile device in regards to the interaction with the device and accomplishing the task.
Device security (DS)	Participant's perception of privacy and security of doing task on the mobile device
Personal context (PC)	Location, environment or destination of the individual
Social relationships	Participant's social relationships with others, cultural norms
Social perception (SP)	Participant's perception of others' thoughts and opinions about utilizing a mobile device
Personal perception (PP)	Participant's perception of self about utilizing a mobile device
Social ageism (SA)	Cultural norms in how a participant views self
Economic situation (ES)	Monetary cost and value of device

4.2.1 Inability to initiate search activity

Participants typically become aware of a lack of knowledge or understanding of a certain topic, which would initiate the information retrieval (IR) process. Participants in this study defined themselves as intermediate or expert users in searching for information on various technological devices. However, the first type of challenge found among the participants was the inability to initiate the search activity. Initiating the search activity would typically involve an action of the participant. The results found four situations where participants experienced an inability to initiate the search activity: related to the participant's perception of their actual need; the participant's perception of the task they would have to do on the device; the participant's perception of the mobile device they would use for the task and the perception of the importance of using a mobile device for the search activity.

4.2.1.a Inability to initiate search activity - Perception of information need

Participants would initiate a search activity when they wanted to understand or find out more about a topic. A participant's perception of their need determined whether he or she started the search activity. Domain knowledge of the topic and the participant's feelings or comfort level have been important in the IR process. However, a lack of domain knowledge and a feeling of discomfort was a reason why some participants did not start the search activity. In addition, participants experienced a lack of system knowledge and how to conduct the search on the device also played a role. If participants only knew certain functions on the device, then the search activity was not started.

"If we get separate accounts, then I don't know how to share photos." (P13)
PP/CL/DK

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"I learn it if it is something I'm looking for it to do for me. Ok, yes there are functions I
                        SK/RK
have never touched because they don't interest me, so I don't dwell into stuff that don't
                        DD/BI
interest me." (P19)

"I don't ever really learn more than I need." (P34)
            BI/SK/DK/RK

4.2.1.b Inability to initiate search activity - Perception of search task

Participants' perception of what they had to do to accomplish the task determined

whether a mobile device was used. A person's feelings performing an activity could play a role

of not initiating the search activity on the mobile device. Some participants felt a lack of comfort

utilizing a device due to the device design and therefore was responsible for not initiating the

search activity.

"I like having the tactile experience of reading. I am tired of looking at the light of the
                                    BA/DD/CL
screen and I enjoy the book thing." (P15)

A small number of participants stated they would not use their mobile device because it would

take too long or acquire too much effort to accomplish the task. This behavior occurred because

of the type of search task or how difficult the search task the participant felt would be to

accomplish on the mobile device. If a participant believed the mobile device would not be easy

to use to do the task, then the participant was not motivated to initiate the search activity on the

mobile device. In addition, a participant's physical ability to perform the task on the mobile

device was also a factor. If the participant had difficulty physically performing the task on the

device, then the search activity was not initiated.

"Something I would do on my laptop would be to download and print pictures. On my
phone, it's just not as fast." (P23)
        TT/TR

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"So I end up going back and popping into my laptop and <u>I am able to whip through my</u>
<center>BA/TR/TC</center>
<u>blog in record time. But if I tried to go to it on my iPad, it will not do it</u>. It's not
<center>BI/DP</center>
<u>user- friendly</u>." (P3)
<center>DE</center>

"<u>I have not picked up the "thumb" typing method so typing on a mobile device is time</u>
<center>PA/SK/TR</center>
<u>consuming</u>." (P32)

Certain tasks could be performed on a mobile device. However, a lack of system knowledge

affected some participants initiating the search activity on the mobile device. This could have

been due to the type of task that needed to be performed.

"…one of the things that <u>drives me crazy is I haven't yet figured out how to send a</u>
<center>CL/SK</center>
<u>group email</u> from an Apple product." (P29)

Participants mentioned how they were able to learn the mobile device system to accomplish the

task, though some believed age was a factor in the learning process.

"<u>I honestly think my age made a difference that new technology takes longer to learn as</u>
<center>SA/TC/SK</center>
<u>you get older</u>." (P49)

"<u>We have to work to keep up with it (technology). We are one of your (laughs) bad</u>
<u>elderly people</u>." (P30)   SE/SK/SA

The participants' environment also played a role in search activities. Mobile devices have been

typically used because of the convenience of doing search activities anywhere and anytime.

However, some participants did not use a mobile device if they had a computer close by in their

environment that would accomplish the particular search activity.

"<u>If I'm at home, I would rather use my computer</u>. The reason I say this because <u>I am not</u>
<center>PC/CL</center>
<u>sure if it's a function of my phone</u>." (P28)
<center>SK/DA</center>

"I like using my computer at work. I have worked on it all my life." (P48)
                                    PC/CL/PE

4.2.1.d Inability to initiate search activity – Perception of device

Participants' perception of a mobile device affected whether they would ever use the

device for search activities. The perceptions from the participants varied with a lack of comfort

with the mobile device design, how economical it would be to have the mobile device or it was

due to a lack of system knowledge to know whether the mobile device could be used to satisfy

their IR need.

"I would never use a smartphone, I would have a problem with its small size." (P2)
                                    CL/DD

"I do not own a tablet. Haven't justified the expense." (P38)
                                    ES

"I have never used a tablet. Not sure what I would use it for." (P5)
                                    PE/CL/SK

Participants' perception of how secure the mobile device also affected the situation. If the

participants were not comfortable and believed the mobile device did not provide enough

security for their personal information, then a different device was used and/or the activity was

not initiated on the mobile device.

"Shopping is done from my landline computer. I just personally don't feel safe doing it
from a mobile device." (P10)
            CL/TT/DS

"Oh, I don't bank, don't pay bills online because of safety concerns." (P46)
                        CL/TT/DS

"When I first started, I got very upset. I didn't know about all the features. It wasn't the
                                    CL/SK
device. I was trying to be safe. (P3)
                DS

One participant had mixed feelings on utilizing a mobile device for their search activities.

> "It's the greatest and worst thing ever. It's at once fun and convenient but also addicting
> CL
> and demanding, if you let it be." (P12)

Participants expressed a lack of importance of the mobile device in performing search activities.

They did not feel the need to use a mobile device due to either their environmental location or

because they simply wanted a break from the technology and didn't feel like using it.

> "When I am out and about, I'm just carrying my phone. I'm not necessarily doing
> PC/DC   BA
> searches. I mean it's not like when you watch your kids say every time they turn
> PP
> around they are checking their phones." (P36)

> "I do not use it on a daily basis and I don't use it much at home. We mostly use it to
> BA/PC
> travel." (P18)

> "I know a lot of people that spend so much time surfing the net. I try not to do that. I
> don't want to get into the habit playing around with mobile devices." (P21)
> PP/BI

Other participants mentioned their age as a factor in not utilizing the mobile device for search

activities.

> "I guess I sound like a dinosaur but the other thing is I work all day on the computer
> SA
> and I have a lot of volunteer endeavors, and I spend so much time on them, it's kind of
> like I need a break." (P11)
> BI/CL

> "I'm still a little old fashioned that way. (laughs) I would rather print it out to see it
> SA   BA/SE
> (document) then look at it on a device." (P6)

A number of participants commented how they just did not use their mobile devices often or

owned a certain mobile device, such as a smart phone, because they would rather communicate

in-person with other individuals. Some typical examples have been noted below.

"There's just not enough face-to-face time. I don't own a smartphone. I don't even

                 PP

want to text. " (P11)

"I am a little concerned that this generation is so involved with mobile devices that we are getting worse with communication and human interaction." (P13)

                 PP

"I'm not good with the phone. I don't like the phone. I'm better eye-ball to eye-ball

                 SK/PP

with people." (P19)

I appreciate where technology is going but I still find value in the…and the face-to-face interaction." (P41)

    PP

A number of participants commented how they did not own more than one mobile device due to economical factors. Below would be a few typical examples.

"I think it's me strictly budgeting my money." (P22)

                 ES

"I kind of grew up being frugal. I'll use a device until it breaks." (P25)

                 ES

"A smartphone serves my needs and the cost of the tablet is prohibitive." (P39)

                 ES

4.2.2 Instability of connection

Participants usually accessed information electronically through a Broadband connection. These connections would be important in utilizing a mobile device in different environments. Without a good Internet connection, participants experienced difficulty performing search activities.

4.2.2.a Instability of connection - To get connected

A lack of stability to establish a connection affected the participants' frustration and usage of their mobile devices for search activities. The participants noted it could have been due to the device or the environment, which caused the instability of the connection.

"Like for instance, the <u>iPhone sometimes has a difficult time connecting to the wireless</u>."
(P20)   DP/PC/CL

"<u>The Wi-Fi wouldn't connect. I had to go into settings and Undo, then rejoin the school's</u>
                                          PC/CL
<u>Wi-Fi.</u>" (P24)

4.2.2.b Instability of connection – To stay connected

The instability to stay connected electronically within different environments was

responsible for some participants' usage of their mobile devices. Having a slow or intermittent

connection made it difficult for the participants to satisfy their information need.

"I had problems reading the newspaper online today because <u>the (WiFi) reception was</u>
                                                           PC
<u>not good</u> in the break room at work." (P37)

"WiFi is intermittent at work. <u>The device sometimes loses the signal and stalls until it</u>
                                          PC
<u>regains the signal</u>." (P33)

4.2.3 Inability to perform the search

Participants performed tasks on a mobile device to satisfy their IR need. Accessing and

retrieving information could include the user having the necessary skills to perform the task on a

mobile device. Participants experienced issues performing search activities on certain mobile

devices or problems occurred due to a physical issue.

4.2.3.a Inability to perform the search - Due to certain mobile device

Participants' knowledge and skills about a system would help them to perform a search

activity on a mobile device. Having system knowledge would be important to search for

information effectively while using a mobile device. The inability to perform a task was noted by

some of the participants due to a lack of system knowledge of their mobile device or difficulty in

using the device software.

"Well I'm not very well versed in it. I don't know how to download an app, you know."
(P22)   SK/SE/DA

 "I probably just don't know how to use my iPad correctly!" (P50)
                        SE/SK

"I don't know if it's because we are older or what, it (mobile device) doesn't seem to
                                        SA, SE, SK
take what we are trying to put into it." (P3)

Some participants had difficulty preforming the task on the mobile device due to the search

activity they were trying to perform. The inability to perform the search on the mobile device

had participants using another form of technology. Participants expressed how the mobile

devices were not easy to use for performing some IR tasks.

"There are some hoops you have to jump through to find it (archived emails) on your
                                TC/BA/CL/SK
phone. They don't make it easy." (P48)
              RK/DE

"I usually use my computer to shop online, do Facebook, etc. since all options are easier
to see on the same screen. You have to hunt for sidebars to find private messages or
                                            BA/DE/TT/SE
actually logout on a mobile device." (P49)

 "Couldn't sign in on my device so I used a laptop instead with no problems." (P32)
        DP/SK

"There is too many steps on the phone so it's much easier to do on the computer." (P20)
              SK/RK/SE

Other participants expressed how it was not because they could not learn the mobile device

system, but instead due to not having the time or interest to learn all the system capabilities.

"I know I don't use the phone to the capabilities that I could, but I just haven't taken
                                SK/BI
the time to learn them." (P46)

"I know there are many things I can do with my phone, but I'm not using it for
                                SK, BI
everything it could be used for though." (P16)

In addition, one participant commented about others' perceptions of adults midlife and older.

> "I frequently hear that younger people think older people are not tech savvy. While
> SP
> it's true we did not grow up with technology, we use it as easily as anyone else if we
> PP
> choose to." (P38)

However, some participants had lower self-efficacy in learning the mobile device functions

stating they needed a longer time to learn the system.

> "As long as you take it slow and learn a little at a time." (P10)
> SK/SE

> "It's harder for me to learn technology as I get older." (P50)
> SK/SE

Additionally, the security about their mobile devices affected the participants' ability to perform

certain tasks on their mobile devices. Banking was the primary concern on a mobile device as

well as search activities that involved passwords.

> "My husband does all the online banking on the laptop, and frankly I don't trust the
> TT/DS
> mobile device security." (P2)

> "I'm old-fashioned, I don't do banking on my device…I feel more secure if I call and
> SA/TT/DS
> figure it out that way." (P45)

> "I won't save my passwords on my phone. You can easily crack a phone than a
> TT/DS
> computer. It just gives me some sort of safety net." (P7)

> "I don't do banking on my phone…I feel like my laptop is on a more secure Internet."
> (P31)   TT/DS

4.2.3.b Inability to perform the search - To satisfy information need

Participants chose certain mobile devices to use depending on the search activity due to a

physical challenge of not seeing the text on a mobile device display. 58% (N=29) of participants,

who used more than one mobile device, chose to use a larger mobile device, such as an iPad, to

perform search activities or a computer was chosen (entertainment activity, reading the news,

etc). Participants indicated they felt they would not be able to see as well on their cellphone

display.

> "My eyes are so bad that the smaller screen is the only issue. I was shocked when they
> PA/DD
> came out with the iPad mini and not a bigger iPad." (P17)

> "It allows me to search the Internet a little easier and get my news on a iPad because
> BA/DE/DD/TT
> it's a bigger screen making it more easier to read." (P25)

> "I would use my laptop because it is easier to see the script?" (P14)
> BI, PA

Other participants stated it was a dexterity issue that affected them from performing the search

activity.

> "I do not have dexterity in my hands. I have the typing aid that allows me to type. I have
> PA
> some reluctance to move into smaller display pieces like smartphones because of this."
> (P11)   SE/DD

4.2.3.c Inability to perform the search - Social influences

Participants indicated an inability to perform the search tasks on their mobile devices due

to a lack of system knowledge in performing certain functions on their devices. Participants

communicated how the people around them had an impact in regards to their mobile devices

since they had not learned all the necessary functions to perform certain tasks.

> "I have an iPhone because my kids wanted me to have one. And there is probably 85%
> SP
> of the phone that I don't know how to use." (P42)
> SE/SK

> "My kids go through everything so quickly and they take it (phone) out of my hands
> SP/SE
> and they do it for me. Then I haven't learned anything." (P46)
> SE/SK

4.2.4 Inability to solve the problem

When searching for information in an electronic environment, users sometimes have problems in utilizing the system or finding the information. Participants experienced challenges in solving the problem that occurred when they were searching on their mobile devices. These issues dealt with the mobile device functions and features that would enable the participants to navigate effectively while searching for information.

4.2.4.a Inability to solve the problem - On the mobile device

Participants experienced difficulty figuring out how to solve problems that arose when performing a task on their mobile devices. A lack of system knowledge was found to be a factor, which affected their comfort level in solving the problem on the mobile device.

"I can't change the font, I can't change the color. I don't know why it doesn't stay that
                    TC/SK   CL/SK
way in the settings." (P27)

"The phone is harder to learn because unless it is exactly the same, all phones have
                    CL/SK/PE/DD
different features." (P10)

Some participants believed it was their lack of knowledge that they could not solve the issues with the mobile device expressing a higher anxiety over not figuring out the problem.

"This time I must have screwed it up…I have been unsuccessful in rectifying the
                    SE/CL/DK
problem." (P38)

"I have problems getting some of the options to work. One example is iMessage. It
                    SE/SK
works for some of my contacts and not for others." (P21)

"I don't use some apps. I don't know how they get there. Somebody tapped it into my
                    SE/DA
phone because I didn't do it." (P48)

4.2.5 Inability to find information/solution

Searching and retrieving information has been an important aspect to having a satisfying experience with an electronic system. Participants would search for information to satisfy a need on a particular problem or topic on their mobile devices. Participants found it challenging when they were unable to find the information due to a lack of retrieval skills or due to the specific mobile device.

4.2.5.a Inability to find information - To satisfy information need

Some participants experienced frustration when they could not find the information they needed on their mobile device. Not having the correct digital literacy skills led the participants feeling less confident in performing the search activity due to their lack of knowledge.

> "It was frustrating that I didn't know how to navigate through the pictures in an efficient
> CL/SE/RK
> way." (P46)

> "I could see chapter 7 showed how to bookmark, but when I hit that line (bookmark link)
> and then tried the chapter link, neither took me to the correct page." (P9)
> CL/RK

Certain mobile devices hindered participants' search activities due to the device software on the system. The mobile device was not able to perform the particular task if the function was not on the system.

> "The mobile devices I have are not suitable for accomplishing the kind of work I do."
> (P33)   DA

However, sometimes the mobile device had the function, but the participants were unaware of the feature and became frustrated until another individual disclosed how to perform the particular search activity.

> "I have stopped at US Cellular for advice. It takes them ½ a second to show me how to
> do something (features) that I spent hours on trying to figure out." (P37)
> SE/SK/DA

These challenges and affecting factors illustrated that Baby Boomers had problems either initiating the search activity, performing the search activity or finding a solution or the information when they performed a search on a mobile device. Chapter 5 discusses the findings in relation to the research questions.

Chapter 5. Discussion

The previous chapter discussed the findings from the data gathered from the participants' diaries and interviews. This chapter contains a discussion of the results in relation to the research questions: *How are Baby Boomers utilizing a mobile device to search for information in terms of the mobile device types, the environmental contexts and the types of information searched? and What are the challenges concerning Baby Boomers utilizing a mobile device in searching for information and their affecting factors?* including theoretical, practical and methodological implications. In this exploratory dissertation study, the Baby Boomer participants were divided into 2 groups, Younger Boomers (YB) and Older Boomers (OB) to examine comparisons and differences between the 2 age groups, which have been discussed in relationship to the types of mobile technology used, the environment where the mobile search occurred, the frequency, duration and the type of search activities performed on a mobile device. There were no notable distinctions between YB and OB discovered in the findings and therefore the Baby Boomers were not divided into 2 separate groups when discussing the factors and challenges of utilizing a mobile device.

5.1 Theoretical implications

The Baby Boomer participants had varied perceptions on mobile devices, which affected their use to conduct search activities. Surprisingly, some participants did not utilize a mobile device more than a few times or even at all during the 7-day diary period. Participants had varying reasons for non-use of the device, such as the screen size on the mobile device was too small or their physical dexterity impeded proper use. These reasons corresponded with earlier studies, which concluded that users could have difficulty utilizing mobile technology and

therefore would choose not to utilize mobile technology to perform search activities (Chae &

Kim, 2004; Sears & Young, 2003).

Almost all of the Baby Boomer participants owned an Internet-enabled cellphone. This

was much higher than the Pew Research Center (PEW) study (Zickuhr, 2011) on American Baby

Boomers. However, the PEW study findings revealed comparisons to other aged adults and in

this exploratory dissertation study not all of the participants had a cellphone but did have another

type of mobile device to utilize for search activities. The majority of Baby Boomer participants

had a college degree, which suggested that the participants could be more affluent than other

Baby Boomers in society and therefore could have been exposed to information technologies

including mobile technology. This could explain why most of the Baby Boomer participants

owned a cellphone or another mobile device. This study also did not gather socio-economic

status information, which could be a factor in owning and using a mobile device. Further

research would be needed, examining Baby Boomers with various education levels, socio-

economic statuses and mobile device ownership and usage.

Not surprisingly, the most used mobile device was an Internet enabled cellphone, which

closely resembled the recent PEW (2014) Mobile Technology Fact Sheet study on accessing the

Internet from a cellphone device. Notably, participants complained about the size of the screen

on the cellphone being too small for certain activities. However, the cellphone was utilized more

than other mobile devices, such as a tablet that has a larger screen. This could be because of the

certain search activities reported in the diaries were not search activities that required extensive

reading or scrolling; or the participants used the cellphone more out of convenience (Hu &

Meier, 2011; Ruthven & Kelly, 2011) since it was more readily available than their other

devices.

Remarkably, there were a small number of OB that did not have their own separate mobile devices, but instead shared a mobile device with a spouse. This could be because of economic issues experienced by the participants or that other types of communication were used instead (Kurniawan, 2008) so the participants felt there was not a need to have more than one mobile device. Socio-economic indicators were not gathered for this study, therefore a comparison of mobile device ownership and economic status could not be reported in the findings. This would be an area where research would be needed to explore if a mobile device were shared among Baby Boomers was because of economic status. In addition, participants who shared a device expressed varying degrees of ageism with technology, (Cutler, 2005) laughing and joking about their use and non-use of their mobile devices compared to other aged adults with many mobile devices. Due to the small sample size of this dissertation study, further exploration of a correlation between ageism, Baby Boomers and mobile device usage would require a larger sample size.

Almost half of the participants expressed a reason for using a mobile device instead of another information technology because it was more convenient to use in searching for information. This was similar to the findings of Nylander, Lundquist & Brannstrom (2009) that noted participants' (ages 20-55) common reasons for using their cellphone to access the Internet was speed and convenience. However, very few participants in this study used a mobile device to search for information because the device was faster than other forms of information technology. Only a handful of participants expressed the reason that they used a mobile device to search for information because they could find the information quicker than if they used another device and the ease of use of the mobile device. This finding was different than Martyn & Gallant's (2012) study of adults over 50 that indicated the ease of use of technology was one of the major themes

of technology usage. Xie's (2003) study found an information retrieval (IR) system needed to be easy to use to be an effective retrieval system. This would be an area for future research examining mobile devices and their ease of use among Baby Boomers and other older adults.

Many of the Baby Boomer participants were comfortable using information technology with none of the participants expressing that they were novice users in their self-assessment in using a technological device. This was different than Karavidas et al.'s (2005) and Piper et al.'s (2009) studies that suggested older adults underestimated their actual computer knowledge. The self-identification of technology usage in this study covered all types of technology and not just mobile technology. This suggested that other types of Baby Boomers, specifically novice users, could have even greater difficulty searching for information, which could decrease their comfort level using a mobile device. The higher comfort level reported by the participants in utilizing information technology could also be because most of the Baby Boomers in this study have continued to work and were exposed to information technologies. Further research would be needed exploring Baby Boomers, specifically looking at novice users, employment status, including retired Baby Boomers, and comfort level using a mobile device searching for information.

Most of the participants utilized their mobile device(s) within their home environment. This was interesting since almost all of the Baby Boomers were still working outside of the home and most reported that they did not utilize their mobile device(s) at work. OB used their mobile device more often at home than YB when comparing the two age groups. The types of occupations were not noted in the study, which could be a factor in not utilizing a mobile device in the workforce. Verkasalo (2009) found that mobile phone usage was more "on the move" than within a home environment, which was the opposite of the results from this study. This could be

due to the types of search activities the participants recorded or because some of the participants had a computer device at work and did not feel the need to use their mobile device when another form of technology was readily available. However, most of the participants also had a computer at home, which suggested that the mobile device has its own role for information searching inside and outside of the home environment. Future research would be needed to examine certain types of search activiities, environmental context, and Baby Boomer computer and mobile device usage to determine if there would be significant differences between the 2 information technologies, specific search activities and the environment.

Furthermore, that the majority of participants who utilized their mobile device at home did so because of connection issues (Joseph, 2009) outside of their home environment. A stable connection would be important for performing productive search activities. The findings illustrated that OB performed the majority of their mobile device searching within their home environment. This suggested that the OB could feel that a more stable connection would be within their home environment than in other environmental contexts. Future research would need to examine a larger number of YB and OB examining their mobile device search activities in different environmental contexts. In addition, the findings in this study revealed participants using a computer more than the mobile device for their search activities since they believed it had a more stable connection. Future studies would need to explore Baby Boomers and their search activities with mobile devices and other computer technologies to determine if there would be significant differences on the type of technological devices used for search activities and the age of the Baby Boomer.

It was interesting to note that a majority of participants would rather communicate face-to face than using the mobile device to find out the information. Some of the participants expressed

they did not want to be connected all the time to technology. Therefore, when they were home, they did not pick up their mobile device. These findings were in line with Lindley et al.'s (2009) study that found keeping in touch was important using technological and non-technological means. However, Lindley et al.'s participants' felt that constant communication with other individuals was not needed. The findings in this dissertation study illustrated that email was a search activity performed by all of the participants on their mobile devices every day and searching on a social media site was in the top 3 search activities performed by the majority of the Baby Boomer participants. The findings also noted that OB checked email more often while YB utilized more social media networking sites. This illustrated how communications with others was an integral part of the Baby Boomer participants' information seeking process (Xie, 2000; Rieh, 2007). However, for some of the participants, this search activity was not a priority. This would be an area for future research studies that would examine a larger number of YB and OB and their searching communication activities with or without a mobile device.

The most frequent search activities performed on the mobile device by the Baby Boomer participants were email, social media and entertainment. This was different than the PEW Generations Online study by Zickuhr (2010) that indicated YB and OB were more likely to search for government and health information than other search activities. Only a small percentage of mobile device search activities were on health related topics in this dissertation study. These factors suggested to the researcher that the participants were relatively healthy. The participants were able to perform the search activities on the mobile device and report the information in the diaries. Additionally, some reported they were in different environmental locations when performing the search activities. The findings also showed participants only some minor physical issues.

The participants' activities were similar to Hanson's (2011) findings of academic student activities. However, information searching activities in Hanson's study were much higher than the entertainment activities among the student participants compared to the Baby Boomers in this dissertation study, which could be because of the students' academic environment. When examining the younger generations compared to the Baby Boomers, Zickuhr (2010) found email as the top search activity on the Internet, which corresponded with the findings in this study. However, for adults under 45, social networking was conducted more often than by Baby Boomers. This was notably different than this study's findings, which indicated social networking as one of the top search activities. However, YB did search more on social networking sites than OB participants suggesting a difference in social networking activities between the Baby Boomer groups. This would be an area for future research exploring the differences between search activities and Baby Boomers as well as younger adults to determine if age is a factor in search activities, specifically looking at social networking sites.

Interestingly, the participants indicated they would perform more navigational, financial and shopping activities than they actually documented performing in their mobile device diaries. This could be because when they were outside of their home environment, the participants did conduct more navigational search activities. However, this was still relatively small compared to other reported diary search activities. In addition, there were many participants who did not utilize their mobile devices for financial or shopping activities due to expressing concerns similar to Boyles, Smith and Madden (2012) on security and privacy issues with mobile devices. The findings in this study revealed that most of the search activities were performed within a home environment, which suggested that the Baby Boomers felt that their mobile device was not

secure. This would be an area for future research exploring Baby Boomers, mobile devices and security issues.

Additionally, only half of the participants recorded 25 or more activities in the diary, with most of those participants being YB. This could be because some of the participants did not utilize their devices every day and some participants indicated they just did not do a lot of search activities on their mobile device. For instance, the participants indicated a cellphone was used more for phone calls and text messages, which were not reported as part of this study. This was similar to the PEW findings of Cell Internet Use (Duggan & Smith, 2013) that indicated only half of Baby Boomers who owned cellphones accessed the Internet. Another explanation could be that the participants could have forgotten to document the search activities since the diary was for 7 days. According to Pew's Generations and Their Gadgets, Zickhur (2011), OB were less likely than YB to perform search activities, which aligned with the participant activities in this study. However, some differences between the OB and YB search activities were found in the data, with YB performing more activities on their mobile devices per day than OB even though OB utilized their mobile devices more than YB. This would suggest that YB could be more comfortable utilizing their mobile devices more than the OB, therefore they performed more search activities. Overall, only a few of the Baby Boomer participants documented 35 activities during the 7 day period of the diary. Most of the Baby Boomers were still in the workforce, which could be why the participants did not perform a lot of activities on their mobile device. Other adults midlife and older (AMO) who have retired or are not in the workforce could have more time to perform search activities. Future studies need to examine Baby Boomers, both within the workforce and retired, regarding search activities performed on a mobile device.

A little over half of the participants spent only a short amount of time performing search activities on their mobile devices. This could be because the top 2 recorded activities were checking email and social media sites, which would suggest that it did not take a lot of the participants' time. This finding was different than Connaway et al.'s (2008) study that noted Baby Boomers used Google for quick searches more than Millennials (younger adults) and was secondary to seeking information from another person. The quick searches by the participants could be attributed to the fact that most of the participants searching was informational and very little browsing was performed in this study. This has raised a question that if the search activities on a mobile device were short in duration among the Baby Boomer participants, would search activities also be short in duration among younger adult participants? This would suggest that functions and software on a mobile device could be limiting the types of searching among users. However, if younger adults were performing more browsing activities, might it be because they have more knowedge, skills and exposure to information technologies than Baby Boomers? This could suggest more of a digital divide among mobile device users. This is an area for future research comparing Baby Boomers and young adults specifically looking at informational and browsing searching activities.

Along with the data findings described above, a qualitative methodology was used in interpreting the data through finding patterns and rich descriptions between the data gathered. During the grounded theory process, after the initial open coding of the qualitative data; the axial coding created categories and factors by different attributes, with examples. Interpretation of the meaning of these factors and categories occurred during the selective coding process. *Figure 5.1* illustrated the types of challenges and affecting factors found within the gathered data that led to

these situations for Baby Boomers. The results of this dissertation have theoretical, practical and

methodological implications.
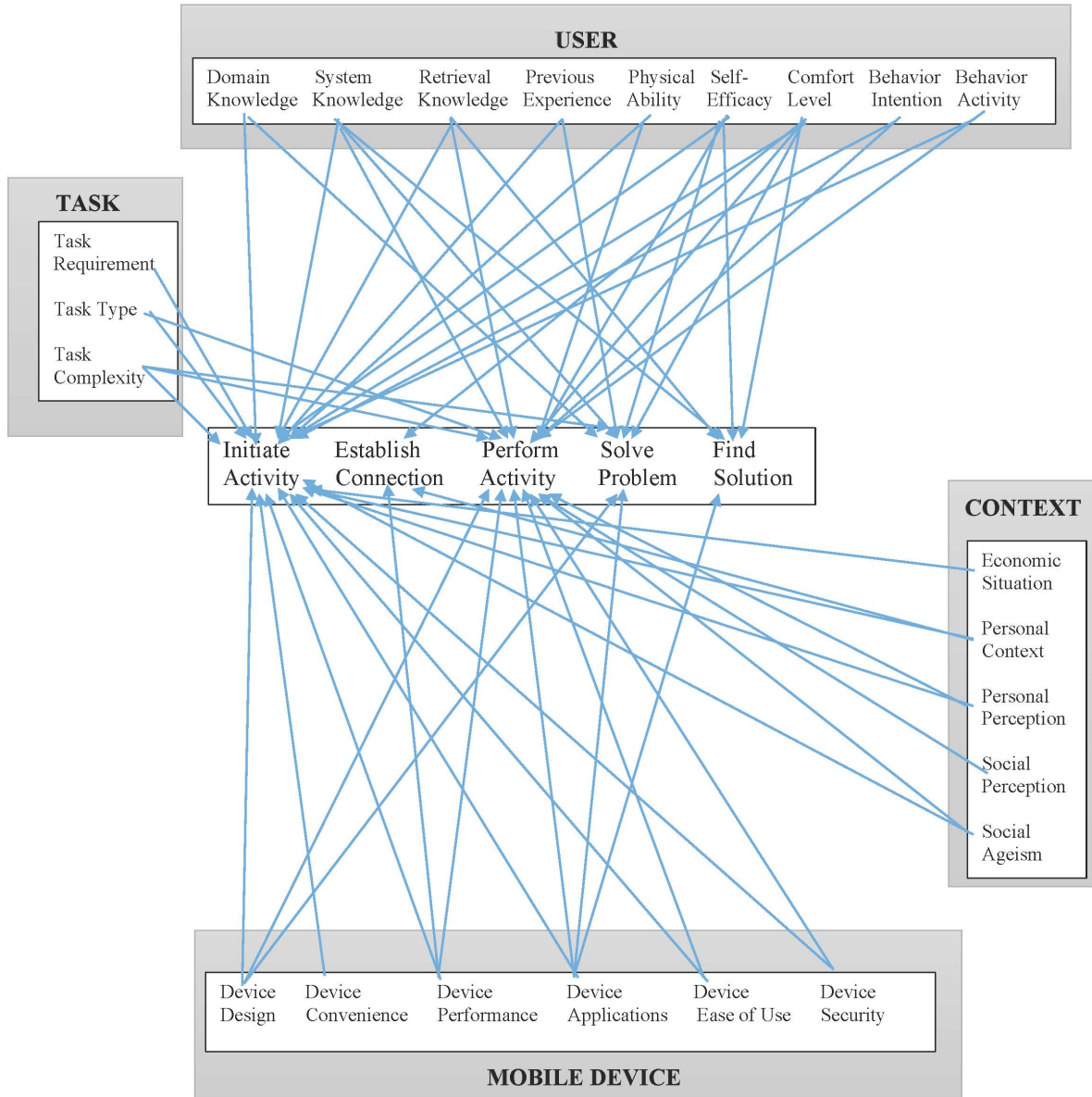
Figure 5.1 Baby Boomer Model of Challenges & Affecting Factors

5.1.1 *The Baby Boomer Mobile Device Information Searching Model*

Based on the results, the Baby Boomer Model of Challenges and Affecting Factors was

developed to illustrate the types of challenges and the factors involved in utilizing a mobile

device when accessing and retrieving information on the Internet. In this exploratory dissertation

study, Baby Boomers' multiple types of search activities, challenges and interrelated factors affected their use of mobile technology. In the IR process, Baby Boomers needed to initiate the search activity, establish a connection, perform the search activity, solve the problem and find a solution/information. The findings illustrated that multiple types of factors influenced the use of a mobile device. More importantly, the perceptions of the Baby Boomers played a significant role in the IR process.

The model would begin with the Predisposing Factors, factors that affected the participant's tendency to perform a search activity. The Predisposing Factors would be the perceptions of Baby Boomer participants, which affected their use of a mobile device. This included the perception need (behavioral intention, motivation), the personal perception of themselves (confidence, physical ability, comfort level, knowledge & experience), the perception of the mobile device to be used (design, availability, performance, ease of use, security), the perception of the search task (complexity, type, difficulty) that needed to be accomplished and the perception of the context (socio-economic, cultural, location, connection). These interrelated Predisposing Factors determined if the search activity was initiated. After the activity was initiated, the Intermediary Factors and Transactional Factors affected how the participants performed the search activity on the mobile device, solved any problems with the search or with the mobile device and if a solution to the problem and/or the information was found. The Intermediary Factors would be the factors that affected the participant's interaction with the mobile device. The Transactional Factors would be the factors that affected the interaction with the mobile device and the ability of the participants to solve a problem or find information or a solution. Table 5.1 has the types of Predisposing, Intermediary and Transactional Factors and

Figure 5.2 has an illustration of the types of challenges and the 3 categories (Predisposing,

Intermediary and Transactional) derived from the affecting factors.

Table 5.1
Predisposing, Intermediary and Transactional Factors

Predisposing	Intermediary	Transactional
TC, TT, TR, DK, SK, RK, ES, PA, SE, CL, BI, BA, DD, DC, DP, DA, DE, DS, SA, PP, PC	TC, TT, SK, RK, PA, SE, CL, BI, BA, DD, DP, DA, DE, DS, SA, SP, PP, PC	TC, TT, DK, SK, RK, PA, PE, SE, CL, BI, BA, DD, DP, DA, DE, DS, SA, SP, PP

FACTORS

PREDISPOSING   **TRANSACTIONAL**
                INTERMEDIARY

Initiate Activity	Establish Connection	Perform Activity	Solve Problem	Find Solution
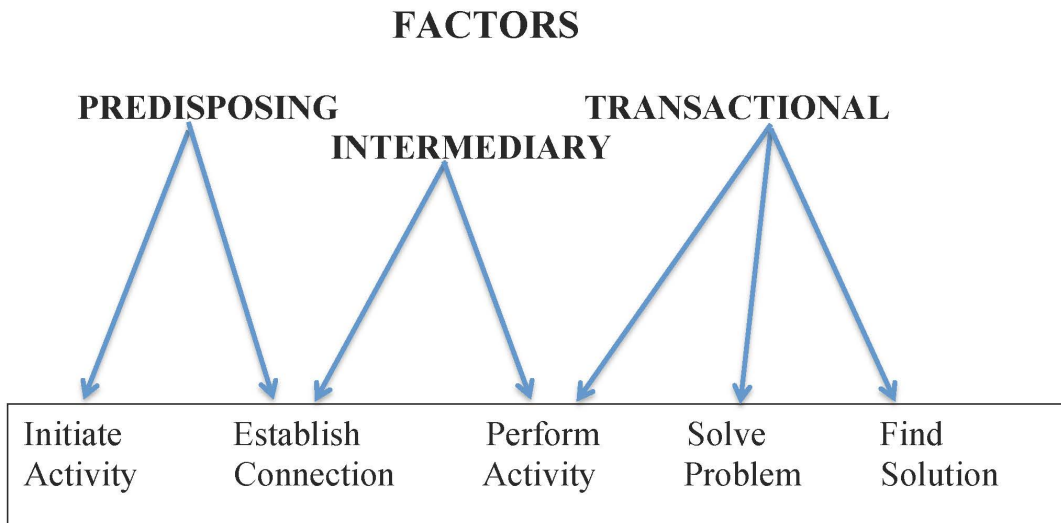
Figure 5.2 Categorical Factors and Types of Challenges

The user would be the central component in the IR process, with the challenges and

factors affecting the interaction with the mobile device, the search activities, and the search task

within the socio-economic and cultural context. *Figure 5.3* has a depiction of the Baby Boomer

Mobile Device Information Searching Model.
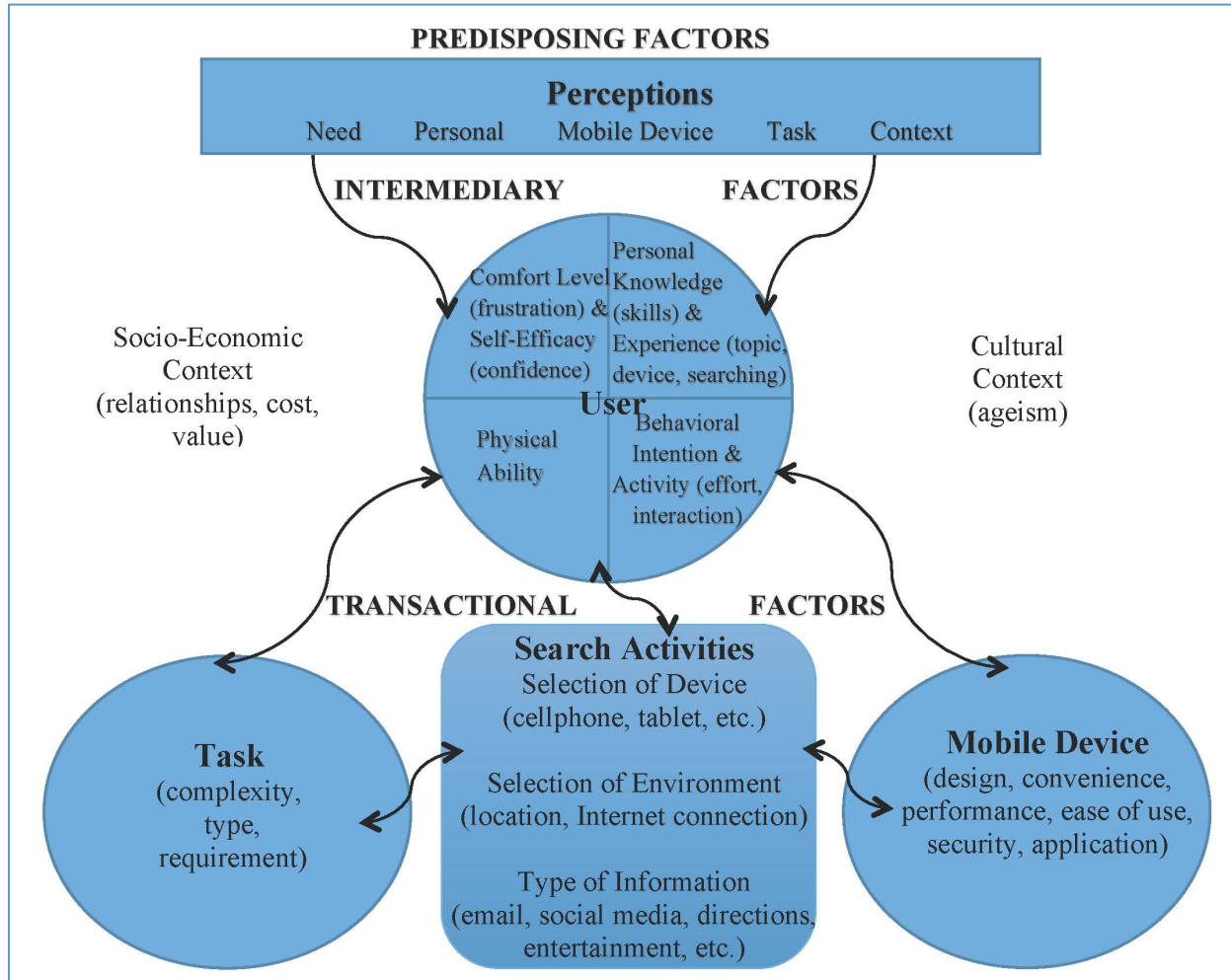
Figure 5.3 The Baby Boomer Mobile Device Information Searching Model

The Baby Boomer Mobile Device Information Searching Model has arrows that represent the challenges that could occur during the interactive IR process. This would not be a straight path but curved like a bend in the road, similar to Bates (1989) Berry-picking approach when information searching. The challenges Baby Boomers face could cause a bend in the road or a change in the process as the user moves through the process of searching for information. At the beginning of the model, the user's perceptions would play a key role with the Predisposing Factors determining whether or not to initiate the search activity. The Baby Boomers' perceptions all interacted together leading to the IR decision process to initiate the search activity. For instance, if the Baby Boomer decided to use a mobile internet-enabled cellphone to

search for and read an e-book, the Baby Boomer's behavioral intent could change to deciding not to utilize the cellphone to search for an e-book to read because the print of the e-book could be too difficult to read on the small screen of the mobile device. On the other hand, if the Baby Boomer was not familiar with the process of downloading an e-book onto the cellphone, this could cause anxiety using the mobile device to search for the e-book and the Baby Boomer would question whether to use the mobile device for the e-book search activity. These instances could cause a bend in the road or a change in the IR process. The arrows leading from the Predisposing Factors revealed in the model travel in one direction towards the Intermediary Factors indicating the search activity has been initiated on the mobile device. The arrows in the Intermediary and Transactional Factors represented in the main body of the model illustrate that the user-system interaction moves between the factors. Each area could affect the other depending on the user's personal knowledge and experience, physical ability, behavior, and comfort level/confidence in utilizing a mobile device, the type of search activity chosen, the type of mobile device, the search task, and the type of environment in which the search activity would take place. These would be situated with the socio-economic and cultural context. An example of how the information searching process could change would be if a Baby Boomer was utilizing an iPad to search for information about the local news and the connection was not sufficient. The Baby Boomer could decide to use another device (mobile or non-mobile), or keep using the mobile device and become frustrated about the connection. The factors discovered in the data from this exploratory dissertation study were interconnected and varied, depending on the Baby Boomer participant and the different type of challenge.

The participants' personal information infrastructures, such as the domain, system and retrieval knowledge (Marchionini, 1995; Xie, 2012), as well as their past experiences with other

IR systems, particularly with mobile devices, played a significant role in the types of challenges that occurred in the IR process. This is similar to past IR and information seeking models, which indicated that cognitive behaviors of the users affected the IR process. The findings in this study identified most of the Baby Boomer participants as college graduates, which could suggest a digital divide among mobile device users depending on educational level attained. A lack of digital literacy skills could affect mobile device information searching skill level. This would call for more research, exploring different mobile devices and Baby Boomers with a variety of education levels. This could determine whether there are significant differences between YB and OB regarding education levels and mobile device(s).

Additionally, these infrastructures also affected the participants' perceptions utilizing the mobile device. Participants' perceptions of the device used was affected by the perception of the information need, perception of the search task that needed to be performed, the participant's comfort level and confidence in using the mobile device, and the user's physical abilities in accomplishing the search activity. In addition, participants' context that included the perception of the locations where the search activity would take place and the perception of themselves in relation to the social/cultural context in using the mobile device all interacted together to determine whether the search activity would be initiated on the mobile device. Past IR models (Vakkari, 2001; Wang et al., 2000; Wilson, 1996) and past information seeking models (Bystrom & Jarvelin, 1995; Krikelas, 1983; Savolainen, 2002) examined the user's perception of need and task. Past studies by Seeholzer & Salem (2011) examined student perceptions of the mobile Internet, Kim & Sin (2007) examined student perception of information sources, and Chae & Kim (2004) examined the young adult's perception of the mobile device. This study extended these past models and studies since the findings suggested the Baby Boomer's perceptions of

need, task, mobile device, context and personal perceptions all were factors in the start of the IR process. This also corresponded with Xie's (2008) discussion of Ingwersen's (2007) modified version of the IS&R model (Ingwersen & Jarvelin, 2005), which identified the user's perception of the work tasks and interest, cognitive and emotional state of the user, the problem situation/goal, the search task/information need, information behavior and the user's assessment and use of the information objects. All of these perceptions would be affected by the user's social, cultural organizational context and the system. However, the IS&R framework has not been tested in a large-scale study. Baby Boomer's perceptions and the relationship between search tasks, information need, mobile device and the context is an important area for future research studies, especially with mobile and non-mobile device using Baby Boomers.

Mobile devices that had unknown functions, design issues such as inadequate size or lighting, poor performance and usability difficulties as well as unknown device securities caused a number of challenges during search activities. Past research studies examined the interactions with the user and the computer interface (Fidel & Pejtersen, 2004; Ingwersen and Jarvelin, 2005; Saracevic, 1997). However, this dissertation study suggested differences with the search interaction between the Baby Boomer and the mobile device, such as security issues and size of the mobile device affecting the search interaction. In addition, the lack of knowledge regarding the different mobile device functionalities could be a factor that would need to be explored further in future studies since the majority of Baby Boomer participants had college degrees and could have been exposed to different types of information technologies that include mobile devices.

Furthermore, since socio-economic status was not gathered in this study, there is no way to determine if the Baby Boomer participants were affluent members of society with more access

to mobile technologies than other individuals. This is one possible explanation for participants'

comfort in using certain functionalities on their mobile devices for information searching.

However, it raised questions, if other individuals who have not had as much exposure to

information technologies, specifically mobile devices, were to attempt these tasks or searches,

would the comfort level be different between Baby Boomers of differing socio-economic status'

and would there be differences between the types of searches and functions performed? Future

research is needed examining specific mobile devices and their functions, Baby Boomer's

perceptions, knowledge structures and digital literacy skills, socio-economic levels, and types of

information searching activities.

Physical ability was a factor for some participants' utilizing a mobile device. This study

extended previous studies by Wang et al. (2000) and Smith et al. (1999), which examined

human-computer interaction between students and between older adults. Baby Boomer

participants in this study had difficulty with the smaller mobile devices and experienced vision

issues because of screen size or lack of physical dexterity due to the smaller features on the

mobile device, which caused different types of challenges. These issues caused the participants

to either use another device or experience frustration using the mobile device. The relationship

between physical ability and specific mobile devices utilized by Baby Boomers is an area for

future research.

This study extended previous research on uncertainty behavior (Belkin, 1980; Dervin,

1983; Ingwersen & Jarvelin, 2005; Krikelas, 1983; Kuhlthau, 1991; Vakkari, 2001) in

information seeking, especially in the perception of the information need when utilizing a mobile

device. This study found many Baby Boomers were uncertain when utilizing their mobile device

while performing certain search activities. This affected their comfort level throughout the IR

process. Most of the search activities performed by the Baby Boomers were short in duration. The comfort level of the participants or their feelings of uncertainty could have been the reason they did not spend longer periods of time using their mobile devices for search activities.

In addition, physical and cognitive abilities affected some participants' comfort level utilizing a mobile device, which caused uncertainty behavior before or during the mobile device search interaction. These findings would suggest, given that the majority of participants were college graduates, the Baby Boomer participants were still uncertain about using a mobile device for some search activities. However, would Baby Boomers with other education levels feel more uncertain? Would this cause the Baby Boomers to not even use a mobile device for search activity because of uncertainty? Feelings of comfort in using a technological device could increase as digital literacy skills and knowledge increase, which could affect the time spent performing search activities. This is an area that merits further examination, looking at Baby Boomers' education level, digital literacy skills, feelings of uncertainty and time spent performing search tasks with a mobile device.

Additionally, the findings in this exploratory dissertation study did not find a notable difference between YB and OB search activities or uncertainty behavior, even though YB performed more search activities than OB. This suggests that OB could have more uncertainty behaviors since they did not perform as many search activities on their mobile devices. Pew's study on Baby Boomers and Technology, Rainie (2012a), noted a digital divide between OB and YB in regard to search activities. This would raise the question as to whether there would be an actual digital divide or distinction between YB and OB. Future research is needed with a larger group of Baby Boomers to determine if a digital divide exists between YB and OB regarding

information searching and feelings of uncertainty when performing search activities on a mobile device.

Changes in cognition and a lack of digital literacy skills could also cause anxiety and a reduction in confidence or lower self-efficacy (Bandura, 1977, 1986; Czaja et al, 2006; Eshet-Alkalai and Amichai-Hamburger, 2004; Johnson, 1997; Savolainen, 2002; Wilson, 1996). The findings in this study were comparable to previous study findings in that users had varying levels of self-efficacy in regards to information technology. As noted previously, none of the participants self-identified as novice users. However, the participants' motivations to learn about and use of a mobile device for different activities was comparably different. Participants described themselves as confident utilizing their mobile devices when conducting certain search activities and said that they only learned what they felt they needed to know in order to use their mobile devices. Motivation to learn other functions was not a high priority. This lack of motivation to learn could have been due to the lack of digital literacy skills specific to a mobile device. Because socio-economic information was not gathered in this study, it is possible that digital literacy skills and self-efficacy levels among the Baby Boomers in this particular study are not representative of Baby Boomers as a whole, but instead represent a subset of this large group, due to the study participants' greater exposure to technology. This confidence was clearly shown in the participants' self-assessment of information technology usage in the questionnaire, describing themselves as intermediate and expert users of information technology. Future research is needed examining Baby Boomers from diverse socio-economic backgrounds and different information technology levels, including novice users looking at user motivation to perform certain search activities on specific mobile devices and self-efficacy levels to determine whether there is a relationship between income levels and digital competence.

Dimensions of search tasks or activities examined in this study were similar to Xie and Cool (2009) that identified differences about ways in which task complexity, task requirements and task type affected the IR process. This study extended previous research on tasks that were conducted on non-Baby Boomer populations (Bystrom & Jarvelin, 1995; Fidel & Pejtersen, 2004; Pharo, 2004; Xie, 2008). This study also examined Baby Boomers performing a variety of search activities and how the user's thoughts and feelings affected the IR process. For instance, when confronted with a complex search activity on their mobile device, participants' digital literacy skills, knowledge, comfort, anxiety levels and behavior were factors affecting the different types of challenges. This study did not examine specific types of search tasks when using a mobile device. However, most participants indicated their searches were for specific information and that they engaged in very little browsing on their mobile devices. This finding is similar to that of Wobbrock (2006), whose research described how browsing on a mobile device was difficult due to the smaller screens and the buttons, which made navigating more difficult on a mobile device. This could account for the reason participants did not engage in many browsing activities. The area between browsing and specific search activities using a variety of mobile devices by Baby Boomers is another area for future research.

Social, cultural and organizational contexts (Dervin, 1983; Ingwersen & Jarvelin, 2005; Pharo & Jarvelin, 2004; Saracevic, 1997; Spink & Jansen, 2004; Wang et al., 2000; Xie, 2008) were important interactive factors in this exploratory dissertation study of the IR process. However, this study extended these previous studies by examining Baby Boomers and the digital environment of a mobile device. Environmental location and having a sufficient Internet connection for the mobile device caused some challenges for the participants. This had not been considered in previous IR studies. Lack of a connection or stable connection could cause issues

for Baby Boomers whose economic status prevents them from obtaining a reliable Broadband connection at home. This was not examined in this study. Most search activities were performed within a participant's home environment, which would suggest that Broadband affordability was not a factor for participants in this study. However, if Baby Boomer participants could not afford a Broadband connection within their home environment, a stable connection at different locations would be a high priority. Previous research has shown that users rely on the library in their communities to provide a stable Broadband connection for access and searching needs (Saunders et al., 2012). This would raise further questions on whether Baby Boomers were using libraries for Broadband connections and if the diverse characteristics of Baby Boomers would be a factor in their usage of these services. Baby Boomers with diverse socio-economic levels, specific locations, Internet connectivity and mobile device use and non-use are also areas for future research.

The social context, similar to Chatman (1999), Fisher et al. (2005), Johnson (1997), Savolainen, (1995), Taylor, (1967) and Wilson's (1996) research, as well as the above scholarly work on context, was noted as a factor in this study. However, this study extended these previous works by examining Baby Boomers IR searching and seeking behaviors as well as a technological mobile digital device within the social context. The findings in this study noted that the participants' perception of other individuals when they used a mobile device and/or their own personal perception of themselves was a significant factor in the different types of challenges, especially in regard to social ageism (Cutler, 2005). Stereotyping of self has been examined in the sociology, psychology, gerontological and other various fields. Very little research has been conducted on ageism in the Library & Information Science (LIS) field, especially research examining ageism and mobile devices. The findings of this exploratory

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dissertation study suggest that some Baby Boomers have varying perspectives regarding ageism. This was found among YB and OB in regard to themselves and mobile technology. The relationship between ageism, mobile device usage, and Baby Boomers merits future exploration and research.

The economics owning a mobile device was a factor expressed by study participants. Some participants had not purchased mobile devices. They were gifts from other family members. This unexpected factor was found, but not further investigated within this study to determine if the participants only had the mobile device because others wanted them to have it and not because they needed or wanted the device for themselves. Interestingly, the demographic data would suggest that the participants could be a part of a more affluent society since the majority were college graduates. However, some of the participants did not purchase the mobile device themselves. The findings illustrated that about ¼ of the participants only owned one mobile device, with cost of the device stated as a key factor. This could raise the question as to whether non-mobile device users of lower socio-economic status were at a greater disadvantage. Does this create or widen an already existing digital divide among Baby Boomers with different socio-economic situations? The relationships between socio-economic factors and mobile device use and non-use among Baby Boomers would be an area for future research.

As previously stated, participants used their mobile devices the most within their home environments, which was surprising considering that a mobile device could be used anywhere. Additionally, most of the participants were still in the workforce and employed outside of the home. With the small number of participants in this study, it was interesting to note that only a small number of Baby Boomers were retired. Typically, retired Baby Boomers would be still active in today's society, which could affect the context of where search activities would take

place and whether they would be in other places besides a home environment. This is an area for future research looking at mobile device usage and the relationship between age, search activities, employment status and the environmental context. Additionally, studies are needed to examine mobile device usage and specific search activities performed by Baby Boomers within a work environment.

In this exploratory dissertation study, participants were divided into 2 groups, YB and OB. When comparing the two groups throughout the data analysis process, no notable distinctions were found between the two groups. Therefore, at this point, the Baby Boomer Mobile Device Information Searching Model can be applied to all Baby Boomer participants. Future research examining a larger group of Baby Boomers to determine whether the Baby Boomer Mobile Device Information Searching Model would fit all types of Baby Boomers and whether there would be significant differences between the factors affecting YB and OB would be needed.

5.2 Practical implications

The following section has been divided into design implications and library service implications for system, designers, LIS professionals and organizations, and for others outside of the LIS field. As previously stated, the data did not identify a distinction between YB and OB, therefore the practical implications have been suggested for all Baby Boomers.

5.2.1 Design implications

The findings of this study have offered suggested insights for interface design improvements of mobile devices. Types of challenges, affecting factors and design implications have been illustrated in Table 5.2. Affecting factors representing those factors that occurred most frequently among the Baby Boomer participants during a particular type of challenge are noted.

Table 5.2

Summary of Types of Challenges, Affecting Factors and Design Implications

Types of Challenges	Affecting Factors	Design Implications
Inability to Initiate Search Activity	*CL, SE, DK, *SK, RK, PE, DD, DA, DS, DC, DP, DE, BI, BA, *PA, SA, TT, TR, TC, PP, PC, ES	• Expand the help section • Options for increased font sizes on interfaces pages • Ensure text is not frozen and can be adjusted by the user • Eye-catching icons • Avoid low contrast backgrounds • Create brighter screens • Have visual, auditory or text choices • Develop low cost device with limited functions and Applications
Inability to Establish Connection	CL, DP, PC	• Create short videos for faster downloads and easier access • Expand 3G services • Offer continuous service coverage • Enhance mobile traffic capacities
Inability to Perform the Search	CL,*SE,*SK, RK, DD, DA, DS, DP, DE, BI, BA,*PA, SA, TT, TC, PP, SP	• Create an intuitive interface design • Double-space all body text • Avoid unnecessary animation • Use icons consistently • Provide more natural language features • Provide easy to follow directions • Limit items on the interface screen, background music, pop-ups & moving logos • Minimize scrolling in programs • Create a virtual keyboard on a flat surface for easier typing • Project a virtual large screen image on the wall for better visual display
Inability to Solve the Problem	*CL,*SK, PE,*SE, DD, DK, DA, TC	• Provide visual, animated as well as text tutorials • Build in instructional procedures • Create better organization and flow of information on interface page • Provide information on external help
Inability to Find Information/Solution	*CL,*SE, SK,*RK, DA	• Provide examples for dealing with unsatisfying interactions • Provide more interactive feedback • Provide tips on interface page • Provide feedback right away • Provide short video segments

Each type of challenge had numerous factors that affected that particular situation.

However, a participant's cognitive behavior, such as system knowledge, retrieval knowledge and

domain knowledge played key roles in successfully starting and performing a search on a mobile device. Along with the participant's knowledge, physical ability and a participant's thoughts and feelings about his or her digital literacy skills was also significant. As previously mentioned, these key factors have been noted within Table 5.2 and are discussed in more detail below.

A main reason for challenges with a mobile device was the Baby Boomer's lack of knowledge especially system and retrieval knowledge. Providing help topics that would be available in different types of formats would enable Baby Boomers with different physical issues or learning capabilities to utilize the mobile device effectively. Expanding the help section to include animated videos that depict solutions to common errors could alleviate anxiety about using the mobile device. Instructions about performing various functions on the device or providing tips on the interface page could be built in for better ease of use. Having a more interactive experience with the mobile device would create more satisfaction with the system (Xie, 2008) and less anxiety performing different search activities on the mobile device. Building in instructional procedures to help solve problems could help adults who have cognitive issues as a natural process of aging (Fiske, 2009). This could help alleviate anxiety and increase confidence about using mobile devices. Providing easy to follow directions of what to do for certain search tasks could help alleviate cognitive load for the user, especially as applied to learning new types of systems (O'Brien & Rogers, 2013) and increase the user's domain and system knowledge. Some Baby Boomers in this study only learned what was needed on their mobile device and didn't know all the capabilities or functions of the mobile device. Others would wait until the mobile device stopped working before owning or utilizing another mobile device. A typical reason stated by participants was that they did not want to have to learn another new system. Providing substantial help features that give feedback right away would enable

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Baby Boomers and other older adults to experience less anxiety about learning a new system when a sufficient help system was built into the device. Decreasing anxiety would increase the user's comfort level in using a mobile device for different types of search activities.

Besides a participant's knowledge, thoughts and feelings affecting mobile device searching, a Baby Boomer's physical ability to perform various functions on a mobile device was important in the IR process. This warranted discussion because of the prevalence of this factor among the Baby Boomer participants. Vision and dexterity of some participants caused different types of challenges when searching on a mobile device. Developing options to increase font sizes or ensure that the font could be adjusted and not frozen on the interface would help Baby Boomers with vision issues. Providing spacing between text on the interface page or using eye-catching icons would lessen cognitive load of the user when performing a search. However, information could be limited on smaller mobile devices so the user would not be over stimulated. It would also minimize scrolling (Charness & Boot, 2009).

Furthermore, participants typically stated they used a computer instead of a mobile device more often when browsing for information or whether more steps were involved in performing a search activity on a mobile device. This would suggest that the participants had difficulty seeing the information on the screen, or that the size of the functions on the mobile device made it difficult to accomplish all the steps needed to find the information. Minimizing these issues on the mobile device or creating a virtual image or keyboard on a flat surface would encourage Baby Boomers to utilize a mobile device more often for all their search activities.

One important finding that has not been addressed in previous studies was connection issues participants had when utilizing mobile devices. Having a stable, low-cost Internet connection was a significant factor for mobile device usage, especially in accomplishing

different search activities. Most participants used mobile devices in short increments, which could be due to the possibility of losing the connection during an activity. Creating short videos for faster downloading and quicker access to helpful information would be beneficial to Baby Boomers encountering different types of challenges. In this exploratory dissertation study, participants used mobile devices only for certain search activities. Developing a cost-effective mobile device with limited functions, which AMO typically use to perform search activities on their mobile devices (Kurniawan, 2008), would be an alternative for the economically minded Baby Boomer and shorten the learning time for new functions on a typical newer device.

To further aid in mobile device design, Baby Boomers could be consulted about the different types of challenges and factors that affect mobile device usage in searching for information. By soliciting input from this age group, designers could develop functions and capabilities for an aging population that would aid the search interaction between the AMO and the mobile device.

5.2.2 Library service implications

These exploratory dissertation study findings also have practical library service implications for the LIS field. It would be important to obtain feedback from Baby Boomers in the library community to ensure that library services and programs would be effective and useful for this age group. This could be accomplished by having Baby Boomers on committees that discuss library programming and services offered, or by conducting studies (such as surveys) asking for input and feedback. It would also be important to consider these needs in the library budget. Dedicating and allocating money for services to Baby Boomers and other older adults would help to fulfill the needs of aging library community members. According to Marshall and Marshall (2010), the library community would need to examine not just the number of Baby

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Boomers in the library community, but also socio-economic status, education and workforce participation. Research has shown that most individuals over age 50 have been active and in the workforce. This was also reflected in the findings of this dissertation study. Creating policies and practices to serve this diverse, growing community would be needed for libraries and other cultural institutions.

This exploratory dissertation study found Baby Boomers encountering different types of challenges with mobile devices. Providing instructional classes on different types of mobile devices would increase comfort and lessen anxiety in using a mobile device. Consider providing a mobile technology zoo of different mobile devices to help encourage more use and comfort in searching for information with the different mobile devices. Some Baby Boomers have not been able to afford certain mobile technologies. Having different mobile devices available would give community members the opportunity to utilize a mobile device to keep current on updated technology advances as well as providing the opportunity to use a mobile device to search for information before purchasing a new device. Additionally, economic factors in using a mobile device could be a factor with disadvantaged Baby Boomers who do not have handy access to a Broadband connection to perform search activities. Access to a stable Broadband connection at a public library could be important to perform certain search activities without disruptions of service (Jaeger et al., 2007; Kinney, 2010; Wang et al., 2009).

Lack of domain and system knowledge was a key factor in the different types of challenges participants encountered in this study. Providing a place where Baby Boomers and other older adults feel comfortable in a learning environment would be a good start to increasing digital literacy skills. Programs and instructions about mobile devices given by peers would allow for social support and more comfort in learning (Ng, 2007). However, as noted, Baby

Boomers comprise a diverse set of users, therefore, providing alternative methods of support such as one-on-one instruction, tutorials, printed instructions or intergenerational programs could allow for accommodation of different types of users since some AMO do not want to be categorized into a certain age group. Moreover, consider providing programs that offer the opportunity to search for different types of information (such as e-books) on a mobile device that could assist Baby Boomers and other adults feel more comfortable and confident about using mobile devices. Surprisingly, most of the Baby Boomer participants in this study were unaware of public library e-book offerings and other digital materials, and few had accessed their public library website from a mobile device. Consider marketing in a variety of venues, such as social networking sites and electronic newsletters focusing on Baby Boomers and other older adults to promote public services and programs that encourage the use of mobile technology. These programs could assist Baby Boomers as well as other adults in the community to consider the benefits of mobile technology in their daily lives.

Participants in this study indicated that they still wanted and were capable of learning about mobile devices. However, some of participants experienced frustration when they were unable to find a solution to a problem. Consider creating programs that would emphasize learning by doing an activity. Programs that provided a working example (Atkinson, Derry, Renkl, & Worthham, 2000), that stated a problem, give step-by-step instructions on how to solve the problem and arrive at the resulting solution would help to reduce both the cognitive load of the user and anxiety about using a mobile device. Another possible alternative would be to set up community partnerships between the library and other organizations, such as conducting free workshops at the library on specific mobile devices to assist Baby Boomers in the utilization of various functions to perform search activities. The significance of the library's role within the

community could increase as the library offers programs and services that promote lifelong learning and interactive participation from their library community.

Social ageism played a key role among the participants in this exploratory dissertation study. Providing intergenerational opportunities and interactions with the younger generation could be beneficial for both age groups to help diminish stereotypes. In addition, providing programming that creates a new perspective and broadens understanding on aging in society, such as art exhibits and community forums, could provide different opportunities for reflection and dialogue offering a new set of images and ideals that would be different than some of the stereotypical depictions of AMO.

5.3 Methodological implications

This exploratory dissertation study used a qualitative grounded theory approach in addressing the research questions about Baby Boomers, which led to the development of the Baby Boomer Mobile Device Information Searching Model. User studies on Baby Boomers, as well as studies pertaining to mobile technology, have remained limited in the LIS field. This study offered a model for future LIS user research as well as user research in other fields of study examining Baby Boomers and mobile devices. This innovative model has illustrated the importance of the user perceptions before an Internet search activity would be initiated as well as the incorporation of the user's behaviors, thoughts, skills, feelings and physical ability with the search activities, the search task, and the context affecting the interaction with the mobile device.

The design used in this study relied on purposive snowball sampling for recruitment of participants. Utilizing social media online was an updated version using technology for increasing the geographic variety of Baby Boomer participants. This allowed for faster exposure to a larger demographic audience than just using printed materials, thereby increasing the sample

size within a short amount of time. This design offered an innovative approach for recruitment of diverse participants who have been difficult to recruit in previous user studies (Dickenson et al., 2007).

This exploratory dissertation study's design also offered the participants a choice between print or an electronic format for the questionnaire and diary chronicles increasing comfort level in participating in the study. Creating a choice for AMO participants decreased anxiety about participating in a study; thus increasing study participation. The design of offering a choice for participants would be a method for future Baby Boomer and older adult user research.

5.4 Limitations

This study used purposive sampling and yielded a small number of participants, which limited the generalizability of the results to other Baby Boomers. Utilizing a purposive sampling method could increase research bias and could limit the external validity to other Baby Boomers. In addition, with the specific age range of Baby Boomers, this limited the generalizations to other adults older than 69 years of age as well as to individuals younger than 50.

This study used snowball sampling for recruitment of participants. Recruiting adults over age 50 has been challenging, a factor noted in past research studies. Limiting the recruitment process in this dissertation study by not advertising to find individuals who might not be known by the researcher or the researcher's friends and associates limited the generalizability of the data set. In addition, using a snowball approach could have limited the representation of individuals participating in this study, such as an equal number of gender participants. Gender differences could be a factor in mobile device usage and this study had an unequal male to female ratio limiting the generalization of the data.

Participants in this study were living in 12 different states, however most of the participants were predominantly from the Midwest or the East Coast of the United States (US). Different areas of the US could affect Baby Boomers mobile device usage. This could limit the generalization of the data to other Baby Boomers living in other regions of the US.

Furthermore, the diary was only kept for one week (7 days), thus limiting the amount of data reported. Additionally, having participants record their search activities limited the amount of information that the user remembered conducting during the search process or actually recorded in the diary. This also could have created the possibility the participants did not write down as much detail about the searches. Previous research has noted that diary studies sometimes would be disadvantaged because participants would miss recording entries (Sohn et al., 2008). However, the researcher felt it was an effective method to retrieve data in a real life situation over an extended period of time to examine real life users with real life problems/needs within real life settings.

The dissertation study questionnaire used a participant's self-assessment of information technology knowledge into one of three groups: expert, intermediate and novice users. Due to the self-assessment, the study findings were limited to intermediate and expert users with information technology. With the majority of participants still in the workforce, there could be the possibility that most of the Baby Boomer participants have been exposed to information technology, thereby increasing digital literacy skills and comfort in working with technological devices, which would limit generalizing the findings to all Baby Boomers.

Similarly, the questionnaire did not ask for socio-economic status from the participants to instill trust in the researcher and limit bias. More than ¾ of the participants had attained college degrees, which could have led to the possibility of participants being exposed to more

information technologies and having higher levels of digital literacies. This would limit the findings, and follow-up studies would be needed that include more users with varying levels of education along with varying levels of economic status to increase the generalizability of the results.

This dissertation study focused on different types of mobile devices and didn't limit what mobile device was used when documenting search activities in the diary. The choice to not limit the mobile device was needed to increase Baby Boomer participant recruitment that used a mobile device and not limit diary entries for a specific device and a specific search activity. Since the study had a small number of participants and diary question entries were limited to five activities a day, comparisons of specific mobile devices and certain search activities were difficult to attain. Additionally, due to the large number of different mobile devices and due to the small number of different devices used, comparisons were not generated between devices and the various factors. General themes emerged from this study and could be considered broadly informative providing a roadmap for future research. Additional future studies specifically examining certain mobile devices and specified tasks would be needed to generate quantifiable comparisons to generalize the findings to Baby Boomer search activities and specific mobile devices.

Chapter 6. Conclusions

The previous chapter gave a detailed discussion of the findings from this dissertation study and the theoretical, practical and methodological implications. Suggested design implications and library services were also discussed to help better serve the Baby Boomer community. This chapter summarizes key findings from the exploratory dissertation study with suggestions to system designers, researchers and information professionals within the Library and Information Science (LIS) field and others outside of the LIS field, and those interested in Baby Boomer research. Future research and directions are also discussed.

6.1 Key findings

This dissertation study was motivated by the need to further research on the Baby Boomer generation in the LIS field. Baby Boomers are a large population, with varied characteristics on use of information technology. With mobile technological devices increasing, this exploratory dissertation study provided important findings and suggestions on Baby Boomers and the usage of mobile devices during the information retrieval (IR) process by answering the following research questions: *How are Baby Boomers utilizing a mobile device to search for information in terms of the mobile device types, the environmental contexts and the types of information searched? and What are the challenges concerning Baby Boomers utilizing a mobile device in searching for information and their affecting factors?*

One of the key findings from this exploratory dissertation study and the important aspect that determined whether the Baby Boomer participants initiated a search activity on a mobile device was the perceptions the user. These included the perceptions of the task, the mobile device, the information need, the environmental, social and cultural context as well as the personal perceptions of knowledge and digital literacy skills, comfort level, self-efficacy,

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behavioral intent and physical ability to utilize the mobile device. These interrelated factors affected the Baby Boomers tendency to perform a search on a mobile device. A suggested Baby Boomer Mobile Device Information Searching Model was developed from the findings that incorporated these Predisposing Factors of the user's perceptions. Once the search activity on the moble device was initiated, Intermediary and Transactional Factors affected the Baby Boomers interacion with the search activities, the search task, the mobile device and their ability to solve any problems they encoutered or find the information that prompted the search activity. This Baby Boomer Mobile Device Information Searching Model has suggested that Baby Boomers have multiple factors that affected the use of mobile devices and their interactions with the mobile system. This would include the different challenges that could occur during the user-system interaction with a mobile device, which were unique to this age group.

The participant Baby Boomers in this study utilized an Internet enabled cellphone more than other mobile devices when conducting search activities. However, the mobile device usage by a majority of the participants was small and in some cases intermittent. This occurred when other non-mobile devices were more conveniently located to perform the search activity or they had already been on a computer device most of the day and wanted a break from information technology.

The most important search activities performed by the Baby Boomer participants were communication activities suggesting the use of mobile devices would be used primarily to further communicate with others more than other search activities. However, some of the participants would rather communicate face-to-face with other individuals and would choose not to use a mobile device. This could also explain why a majority of activities were short in duration.

YB perferred social networking more than OB who preferred e-mail when communicating with other individuals on the mobile devices. Overall, search activities were low that were performed on a mobile device, which suggested that it could be due to the participant's lack of knowledge and digital literacy skills of the different mobile device functionalities since some of the participants indicated they only understood and used certain functions on their mobile devices to perform the search activities.

Convenience or availability of the mobile device was a key factor for use in performing a search activity. If the mobile device was the closest device to the participant, then the device would be used at the time of the information need. Surprisingly, most search activities on the mobile devices occurred within the home environment. With the majority of the Baby Boomer participants still actively in the workforce, this suggested that other technological devices were being used within a work environment. On the other hand, the search activities Baby Boomers documented in the diaries could have been only the activities performed on their personal mobile devices and work related mobile devices were not utilized or documented for this study.

The majority of the interactions on the mobile devices were short in duration suggesting that the search activities were more informational searches and browsing search activities would have been conducted on other non-mobile devices. All of the participants documented search activities for the majority of the seven days and all provided a minimum number of search activities needed for this research study. However, only a small number of participants recorded all the search activities for the duration of the diary. This suggested that the Baby Boomer participants only interacted with a mobile device to perform certain search activities or the participants could have stopped or forgot to document other activities during the 7-day period.

Since the majority of the participants were in the workforce, this could have affected the availability of their time to document search activities within the diaries.

In addition, this exploratory dissertation study identified different types of challenges and affecting factors that occurred when the Baby Boomer participants interacted with a mobile device when performing search activities. The participants' lack of knowledge infrastructures played a key role in most of the different types of challenges. These structures would be domain knowledge of the search task, system knowledge of the device functions and retrieval knowledge of how to search for and find information on the mobile device. More importantly, besides the lack of knowledge and digital literacy skills, the Baby Boomer participants' physical ability also played a role in some of the challenges. Declining vision and physical dexterity issues determined mobile device usage especially with the smaller mobile devices during the IR process. These physical and cognitive abilities affected the Baby Boomers self-efficacy or confidence when utilizing a mobile device to search for information and caused more uncertainty behavior before and during the mobile device user-system interaction. Self-efficacy towards mobile device usage was evident among the Baby Boomer participants and was found throughout the different types of challenges. To build confidence, Baby Boomers need to have hands-on learning experiences using different types of mobile devices. This could provide Baby Boomers with more confidence regarding learning new functions and provide the necessary digital literacy skills when encountering other types of challenges while using a mobile device.

Furthermore, the context surrounding the Baby Boomer participants was also an important aspect for mobile device utilization especially in regards to Internet connectivity. A lack of a connection or a stable connection determined whether the Baby Boomer participant used the mobile device for the search activity. This would be important to note compared to

other computer technology, since mobile devices could enable a user to have access to information anywhere and at anytime. This however, would pose a challenge whether the Internet connection was unstable due to the location or the type of mobile device. Providing a stable Broadband connection at different locations especially in a public library environment needs to be a major priority, since community members look towards libraries to provide stable connections as more information becomes more prevalent on the Internet .

Today's Baby Boomers would not fit the typical stereotype of "older adults." Baby Boomers have interacted with information technology and have been noted to be not afraid to learn new technological devices. This was prevalent among the Baby Boomer participants. However, social ageism had many Baby Boomer participants referring to themselves as "dinosaurs" or "bad elderly folk" that could have been cultivated by society. Social ageism affected the confidence and uncertainty of some of the participants searching with a mobile device for their search activity. Positive depictions of adults midlife and older interacting with mobile technology would be beneficial for all ages of users.

Furthermore, some types of challenges were caused by the design of the mobile devices. The interface design determined the ease of use of the device for the search activity and whether the information was found. The ease of use of the mobile device affected the Baby Boomer's confidence and comfort in using the device for the search activity. A well designed interface would assist users in solving problems with the mobile device. Baby Boomers would benefit with more implicit and explicit help since it would require less cognitive load to solve a problem.

Interestingly, security was a factor in a few of the challenges that occurred with the Baby Boomer participants' interactions with a mobile device. The lack of confidence in a secure connection or the security of the information on the mobile device could be from the lack of

system knowledge and the type of environment where the search activity was going to take place. Since most of the search activities of the Baby Boomer participants were within their home environment, the lack of a secure connection was surprising. This could be alleviated by better Broadband infrastructures or mobile device design. The participants indicated that their system knowledge was limited to a certain number of functions that they needed to accomplish certain tasks, which could explain the lack of feeling secure with the mobile device. Providing opportunities to perform different search activities using different mobile devices could increase knowledge about the mobile devices and alleviate anxiety about the mobile device security.

Different types of challenges were also influenced by the search tasks the participants wanted to accomplish to satisfy an information need. Some search tasks had more requirements and were more complex than others, which would require more knowledge and digital literacy skills to perform and accomplish on a mobile device. Depending on the search task, the Baby Boomer participants' self-efficacy and comfort level affected whether a mobile device was used to complete the search task.

The findings from this exploratory dissertation study generated a model detailing the central phenomenon of how Baby Boomers interact with mobile technology, the challenges they face and the affecting factors. Baby Boomers perceptions played a significant role in utilizing a mobile device to perform search activities. During the user-system interaction different factors affected the interaction, such as the Baby Boomers knowledge infrastructures, physical ability, comfort level and confidence in utilizing a mobile device. Other unique factors discovered from the findings was the context of having a stable Internet connection to perform the search activites, security issues of the mobile device and the aspect of social ageism, which affected the Baby Boomers interaction with the mobile device.

6.2 Contributions

The overall goal for this dissertation study was to examine how Baby Boomers search for information on a mobile device and whether there were any challenges and factors that affected the use of mobile technology. The different types of challenges and affecting factors as well as the Baby Boomer search activities were put in an operational context by developing a Baby Boomer Mobile Device Information Searching Model. The model has suggested that the perceptions of the Baby Boomers would initiate the search on a mobile device and the relationship between the user, the search activities, the mobile device and the task all within the social and cultural context. In particular, the factors of perceived physical ability and perceived social ageism bring novel aspects to the models of IR and information seeking.

6.3 Future research

The results from this dissertation study, the implications and the limitations have opened the door to many different types of future research studies. The dissertation study divided the Baby Boomer participants into two age groups, Younger Boomers (YB) and Older Boomers (OB) to determine whether there were differences found between the two groups because the age range of Baby Boomers spans 19 years. The comparisons between YB and OB did not show substantial distinctions between the two groups. However, the number of participants in each age group for this study was quite small. Future research would expand the number of YB and OB age groups to determine whether there were significant differences between the two age groups in regards to specific mobile device used, the environment, the type of task performed, the frequency of use and the time spent on the particular mobile device.

The Baby Boomers in this study were still active and almost all the participants were still in the workforce. However, most search activities conducted were within the home environment.

Future studies would specifically examine Baby Boomers within the workforce, what types of mobile devices were used and the types of search activities performed on the mobile devices within a work environment. In addition, there were a few retired Baby Boomer participants, which could have been the reason the search activities were conducted in the home environment. Future studies would specifically examine retired Baby Boomers and explore the types of search activities performed on a mobile device and determine whether the environment was a significant factor affecting the search activity.

The results of the second research question focused on the challenges and the affecting factors Baby Boomers faced when utilizing a mobile device. These factors and the data discovered in the first research question led to the development of the Baby Boomer Mobile Device Information Searching Model. To improve the model and further clarify the data discovered, future research would expand the number of Baby Boomer participants so more quantifiable data could be included in the findings. This would further increase the data set by examining gender, age (YB, OB) and the relationship between mobile device, self-efficacy levels, social ageism, physical ability and comfort levels using specific mobile devices.

The perceptions of the Baby Boomers played a significant role in the use or non-use of a mobile device for the search activity. Future research would expand this topic by examining Baby Boomer's perceptions of specific mobile devices, perceptions of knowledge structures and digital literacy skills, and the relationship between performing specific search tasks and specific mobile devices.

Physical ability was a significant factor among the Baby Boomer participants in determining the use of a mobile device for specific search activities. However, specific search tasks were not predetermined in this study. Future research would examine specific search tasks

with different mobile devices to determine whether there was a relationsip between age, physical ability, search task type and the mobile device used to perform the search activity.

In addition, social ageism was another significant factor discovered in this dissertation study. However, this was not examined further in this study due to the small number of Baby Boomer participants. Future research would expand this area by examining the specific relationship between certain mobile devices, social ageism, age and gender of the Baby Boomer. An extension of this research would also compare these results to adults younger than 50 years of age to determine whether other age groups slightly younger than Baby Boomers would experience the same types of challenges and affecting factors.

The Baby Boomers in this exploratory dissertation study had factors and challenges that affected the use of a mobile device. Future research would explore Baby Boomers utilizing a mobile device interface that has incorporated some of the design implications mentioned in the Chapter 5 discussion and compare the newly designed interface usage with an interface without the design implications. Furthermore, to aid in mobile device design, Baby Boomers would need to be consulted about the different types of challenges that they have with a mobile device. Future research would encompass the development of surveys geared towards Baby Boomers, asking for input about their interactions with mobile devices, and the types of functions and capabilities needed for the aging population to have a successful user-system interaction with a mobile device.

This study specifically examined Baby Boomers and the use of mobile devices for search activities. However, this study did not explore Baby Boomers who chose not to own a mobile device. Future studies would examine Baby Boomers who choose not to own a mobile device and why they would not use a mobile device for performing search activities, specifically

looking at the perceptions held by the user of the specific mobile devices and whether the perceptions played a key role in the decision process. Further exploration would compare Baby Boomers who own a mobile device, how they received the mobile device (either self-purchased, gift, cultural pressure, etc.), search activites and frequency of usage.

This dissertation study examined real users with real tasks in real settings and did not explore specific types of search tasks performed on a specific mobile device. Future research would examine Baby Boomers conducting specific search tasks and the types of mobile devices used to perform those activities. Furthermore, research exploring Baby Boomers in specific IR environments such as online databases, digital libraries, etc., would be explored by examining the types of challenges and affecting factors within the specific IR environments on a mobile device.

This dissertation study specifically examined Baby Boomers as a unique age group with varied characterics. These characteristics could also be found in adults over age 69. Future research would expand the participants age groups to include adults ages 50 and beyond to determine whether the Baby Boomer Mobile Device Information Searching Model could also include all of adults midlife and older. Additionally, expanding this further to include Generation X individuals (younger than 50 years old) would determine whether some of the challenges and factors found in the model could be expanded to this generation of adults.

In conclusion, Baby Boomers are not afraid of information technology and utilize new technological devices, such as mobile devices for information searching activities. This dissertation study contributed to the understanding of how Baby Boomers use mobile technology for their IR needs. The data discovered in this study generated challenges Baby Boomers could encounter and the affecting factors when utilizing a mobile device. The findings of this study

yielded several insights to the design of IR systems and suggested theoretical and

methodological implications in interactive IR research, as well as practical implications in library

services to the Baby Boomer library community.

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Appendix A: Study Flyer

Mobile Technology and the Baby Boomer User
Be a Part of an Important Research Study

- Are you 50-69 years of age (born 1946-1964)? Or Do you know someone who is?

- Do you use mobile technology such as a Smartphone, Cellphone, iPad or

  Tablet, or an E-reader device to look for information on the Internet?

If you have answered **YES** to the above questions, you could be eligible to participate in a research study on adults using mobile technology. The purpose of this study is to examine the factors that influence Baby Boomers utilizing mobile technology to acquire and retrieve information. The time commitment will be for a period of 7 days consisting of a pre-questionnaire, an online or handwritten diary with pre-determined questions and a short follow-up interview. **Participants will receive a $25 Amazon Gift Card for their time.**

The University of Wisconsin Milwaukee (UWM) IRB #15.155 approved study is conducted within your own environment with a phone, face-to-face or e-mail interview at an area of your choosing.

Please email Renee Bennett-Kapusniak (PhD Dissertator at UWM) at kapusni2@uwm.edu for more information.

Appendix B: Email Letter

Dear (Friend):

I am writing to ask you to be a part of my dissertation study. I have attached a flyer that gives more information of what the study entails. It will take a small amount of your time to participate. If possible, please feel free to tell your friends and family and pass along the flyer to individuals in the appropriate age range (born 1946-1964) for the study along with my contact information. I appreciate all your help and I look forward to hearing from you.

Best,

Renee

Renee-Bennett-Kapusniak

PhD Dissertator/B2A Fellow

School of Information Studies

University of Wisconsin-Milwaukee

Appendix C: Questionnaire

1) What is your gender?   Male   Female

2) How old are you?   _____

3) What is your highest education?

   High School graduate or less   Some college   College graduate

4) What is your experience with information technology?

   Expert (I have few problems finding and retrieving information on a computer or

   electronic device).

   Intermediate (I have some challenges finding and retrieving information on a computer

   or electronic device.)

   Novice (I have difficulties finding and retrieving information on a computer or electronic

   device.)

5) What type of electronic device(s) do you currently own to access information? Please check all

   that apply.

   Tablet Computer (iPad, Kindle Fire, Nook, etc.)

   Smartphone/Internet enabled cellphone (Phone, Galaxy, Android,

   GoPhone, Blackberry, etc.)

   E-reader (Kindle, Nook, Nexus, etc.)

   iPod Touch

6) How often do you use your mobile device? Please circle one.

   Once a day   2-3x a day   4-6x a day   More than 7x a day

7) What activities do you use your mobile device for? (e.g. phone calls, text messages, email, social

   networking, entertainment, shopping, education, banking, directions, information searching, etc.)

   Please be specific.

Appendix D: Diary Questions

Questions
1) What type of mobile device did you use? (Smartphone/cellphone, E-reader, iPad/tablet, iPod touch) 2) Where were you? (Home, Car, Work, School, Store, Other) 3) What type of information did you look for? Why? Please explain. 4) How long did you use the mobile device to find your information? Please indicate minutes, hours 5) Did you find what you were looking for? Why or Why not? 6) Did you encounter any problems? Please explain 7) Did anyone help you? Who was it? 8) Why did you choose to use that mobile device to find your information?

Appendix E: IRB Approval Letter

UNIVERSITY of WISCONSIN

UWMILWAUKEE

Department of University Safety & Assurances

Jessica Rice
IRB Administrator
Institutional Review Board
Engelmann 270
P. O. Box 413
Milwaukee, WI 53201-0413
(414) 229-3182 *phone*
(414) 229-6729 *fax*

http://www.irb.uwm.edu
ricej@uwm.edu

New Study - Notice of IRB Expedited Approval

Date: December 2, 2014

To: Iris Xie, PhD
Dept: School of Information Studies

Cc: Renee Kapusniak

IRB#:   15.155
Title: Baby Boomers and Technology: Factors and Challenges in Utilizing Mobile Devices

After review of your research protocol by the University of Wisconsin – Milwaukee Institutional Review Board, your protocol has been approved as minimal risk Expedited under Categories 6 & 7 as governed by 45 CFR 46.110.

Your protocol has also been granted Level 3 confidentiality for Payments to Research Subjects per ASM Policy: 2.4.6

This protocol has been approved on December 2, 2014 for one year. IRB approval will expire on December 1, 2015. If you plan to continue any research related activities (e.g., enrollment of subjects, study interventions, data analysis, etc.) past the date of IRB expiration, a continuation for IRB approval must be filed by the submission deadline. If the study is closed or completed before the IRB expiration date, please notify the IRB by completing and submitting the Continuing Review form found on the IRB website.

Any proposed changes to the protocol must be reviewed by the IRB before implementation, unless the change is specifically necessary to eliminate apparent immediate hazards to the subjects. It is the principal investigator's responsibility to adhere to the policies and guidelines set forth by the UWM IRB, maintain proper documentation of study records and promptly report to the IRB any adverse events which require reporting. The principal investigator is also responsible for ensuring that all study staff receive appropriate training in the ethical guidelines of conducting human subjects research.

If you plan to continue any research related activities (e.g., enrollment of subjects, study interventions, data analysis, etc.) past the date of IRB expiration, a continuation for IRB approval must be filed by the submission deadline. If the study is closed or completed before the IRB expiration date, please notify the IRB by completing and submitting the Continuing Review form.

As Principal Investigator, it is your responsibility to adhere to UWM and UW System Policies, and any applicable state and federal laws governing activities which are independent of IRB review/approval (e.g., FERPA, Radiation Safety, UWM Data Security, UW System policy on

Prizes, Awards and Gifts, state gambling laws, etc.). When conducting research at institutions outside of UWM, be sure to obtain permission and/or approval as required by their policies.

Contact the IRB office if you have any further questions. Thank you for your cooperation and best wishes for a successful project.

Respectfully,

Jessica P. Rice
IRB Administrator

Appendix F: Interview Questions

1) I noticed in your diary you have a (mobile device). Do have any other mobile devices? Would you mind sharing why you don't own (mobile device)?

2) Have you ever had any difficulties or problems using your (mobile device)? If yes, could you please explain one to me?

3) Was the (mobile device) easy to use and learn?

4) Did you have anyone teach you about the (mobile device) and how to use it?

5) Are you still learning different aspects of the (mobile device)? Would you teach someone else to use it?

6) I noticed you did not indicate you performed (activities in diary). What device do you use? Why do you prefer your (information technology) and not your mobile device?

7) Do you like using your mobile device to search for information on the Internet? Why?

8) You mentioned (…) as a factor in using your (mobile device). Would you still do searching on a computer if you didn't have the mobile device? Why?

9) Do you think you use your device more for quick specific searches or more for browsing? Why?

10) Are there any search activities you don't do on your (mobile device)? Why?

11) Do you still use a desktop or laptop computer?

12) If you had a choice-which would you most likely use, a mobile device or a computer? Why?

13) How many times do you think you use your mobile device for searching in a day? 5, 10, 20 etc.…

14) Do you use your (mobile device) for an extended period of time or in short amounts?

15) I noticed in your diary that you didn't use your (mobile device) over the weekend? Is there a reason why?

16) Do you usually purchase or use new mobile devices or technology? Why or why not?

17) Do you find new mobile devices easy to learn and use? Why or why not?

18) Do you use your devices for work and at home? Where do you think you use it more? Why?

19) Is there anything else you would like to share about using a mobile device?

CURRICULUM VITAE

Renee Bennett-Kapusniak

Place of birth: Saratoga Springs, NY

Education

    Ph.D. (2015)
        University of Wisconsin-Milwaukee
        Philosophy in Information Studies

    Certification (1992)
        New York State Permanent Teacher Certification Elementary Education N-6

    M.S. (1990)
        Nazareth College
        Elementary Education Grades N-6

    B.A./Certification (1986)
        State University of New York at Potsdam
        Psychology
        New York State Provisional Teacher Certification Elementary Education N-6

    Dissertation Title: Baby Boomers and Technology: Factors and Challenges in Utilizing
        Mobile Devices

Research Areas

Information Retrieval	Information Access	User Studies
Baby Boomers	Adults Midlife & Older	Library Services
Digital Libraries	User Behaviors	User-System Interaction

Research Experience

University of Wisconsin Milwaukee, Milwaukee, WI
"Exceeded Expectations" from Faculty in All Assistantships

Research Assistant with Dr. Iris Xie (Summer 2015)
        Paper publication in progress: System support and user engagement in applying
            search tactics

Research Assistant with Dr. Joyce Latham (Summer, 2015)
        Paper publication in progress Library practitioners and research: bridging the gap

Research Experience

      Research Assistant for the Research group for information retrieval (November 2013-July 2014) Coded qualitative data

      Research Assistant with Dr. Iris Xie (Fall 2011- Spring 2014)
         Three paper publications in progress

      Research Assistant with Dr. Wooseob Jeong (Spring 2012- Spring 2013)
         Co-Created citywide survey to determine Internet access for the city of Milwaukee Quantitative analyses presented to Milwaukee City Board

      Research Assistant with Dr. Joyce Latham (Summer 2013)
         Research study with public libraries-Coded qualitative data and Co-created presentations and posters of findings at WAPL 2013, ALISE 2014, ALA 2014

      Research Assistant with Dr. Jessica Moyer (Summer 2012)
         Coded qualitative data and Co-created poster presentation of initial findings at ALISE'13

Teaching Experience

      Instructor Onsite
      University of Wisconsin-Milwaukee, Milwaukee WI (Fall 2014)
      INFOST 682 Digital Libraries

      Supervisor of Teaching Assistant (Fall 2014)
      University of Wisconsin-Milwaukee, Milwaukee WI (Fall 2014)
      INFOST 682 – Digital Libraries

      Teaching Assistant Online
      University of Wisconsin-Milwaukee, Milwaukee W (Spring 2015)
      INFOST 110 Introduction to Information Science and Technology

      University of Wisconsin-Milwaukee, Milwaukee WI (Spring 2014**)**
      INFOST 682 – Digital Libraries
      "Exceeded Expectations" from Faculty

      Teaching Assistant Onsite
      University of Wisconsin Milwaukee**,** Milwaukee WI **(**Fall 2013)
      INFOST 110 - Introduction to Information Science and Technology
      "Exceeded Expectations" from Faculty

Other Teaching Experience

 School Librarian Pre-K-6th grade (150-200 students)
 Holy Trinity School, Webster, NY (June 2003-July 2006)

 First Grade Teacher (16-22 students)
 Holy Trinity School, Webster, NY (July 1998-Jun 2003)

Field Experience

 Acquisitions Assistant (March 2008-July 2011)
 Rincker Memorial Library Concordia University Wisconsin

 Library Assistant-Circulation (November 2007-March 2008)
 Pauline Haas Public Library Sussex, WI

 Library Page (November 2007-March 2008)
 Waukesha Public Library Waukesha, WI

 Library Assistant-Circulation (January 2007-March 2008)
 Delafield Public Library Delafield, WI

 Senior Library Clerk-Circulation Supervisor (October 2005-July 2006)
 Webster Public Library Webster, NY

 Library Assistant-Circulation (October 2004-October 2005)
 Webster Public Library Webster, NY

 School Librarian-Grades K-6 (June 2003-July 2006)
 Holy Trinity School Webster, NY

Articles and Papers Published

Wolfram, Dietmar, **Renee Bennett-Kapusniak**, Jeannette Glover, Adriana McCleer, Jennifer Thiele. (2016) Planning LIS Doctoral Education Around a Focused Theme: A Report on The B2A Program. *Journal of Education for Library and Information Science,* 57(1) (publication pending).

Bennett-Kapusniak, Renee, Adriana McCleer. (2015). Love in the digital library: A search for racial heterogeneity in e-books. *Journal of Popular Romance Studies*, 5(1), 1-21. http://jprstudies.org/wp-content/uploads/2015/08/LITDL.08.2015.pdf

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Articles and Papers Published

Bennett-Kapusniak, Renee. (2013). Older Adults and the Public Library: The Impact of the Boomer Generation. *Public Library Quarterly*, 32 (3) 204-222

Jeong, Wooseob, **Renee Bennett-Kapusniak**, Hye Jung Han. (2013). The Usability Study on the Multicultural Children's Book Project of the National Library for Children and Young Adults (NLCY) in Korea. In *iConference 2013 Proceedings* (pp. 769-772)

Presentations

Wolfram, Dietmar, **Renee Bennett-Kapusniak**, Jeannette Glover, Adriana McCleer, Jennifer Thiele. (2015). Planning LIS Doctoral Education Around a Focused Theme: The B2A Approach. Juried Panel discussion at ALISE2015. January 30. Chicago, IL

McCleer, Adriana, **Renee Bennett-Kapusniak**. (2014). Love in the WPLC Digital Library: Searching for Diversity in the E-Romance Collection. Wisconsin Library Association Conference 2014. November 7. Wisconsin Dells, WI

Bennett-Kapusniak, Renee, Shannon Crawford-Barniskis, Adriana McCleer, Jennifer Thiele, Joyce Latham. (2014). Leveraging National Data to Advocate Locally. American Library Association Annual Conference 2014. June 29. Las Vegas, NV

Bennett-Kapusniak, Renee, Adriana McCleer. (2014). Love in the Digital Library: A Search for Racial Heterogeneity in E-Books. Fifth International Conference on Popular Romance Studies. June 19. Thessaloniki, Greece

Bennett-Kapusniak, Renee, Shannon Crawford-Barniskis, Adriana McCleer, Jennifer Thiele, Joyce Latham. (2014). Converging Knowledge: Networking the Gap between Public Librarians and Researchers. Poster at ALISE'2014. January 21. Philadelphia, PA

Xie, Iris, Soohyung Joo, **Renee Bennett-Kapusniak**. (2013). User Engagement and System Support in the Search Process: User dominated, system dominated and balanced tactics. Poster at 2013ASIS&T Annual Meeting. November 4. Montreal, Canada

Bennett-Kapusniak, Renee, Wooseob Jeong, Hye Jung Han. (2013). Digital Inclusion Survey: ASIS&T SIG-USE Symposium IGNITE Talk. 2013 ASIS&T Annual Meeting. November 2. Montreal, Canada

Bennett-Kapusniak, Renee, Shannon Crawford-Barniskis, Adriana McCleer, Jennifer Thiele, Joyce Latham. (2013). The Traditional, the Digital, and You: Discussing the Pew Reports and What They Mean in Wisconsin. Wisconsin Library Association Conference 2013. October 24. Green Bay, WI

Presentations

Bennett-Kapusniak, Renee, Shannon Crawford-Barniskis, Adriana McCleer, Jennifer Thiele, Joyce Latham. (2013). The Traditional, the Digital, and You: Discussing the Pew Reports. Wisconsin Association Public Library Conference. May 2. Lake Geneva, WI

Bennett-Kapusniak, Renee. (2013). Librarians' Perception of Older Adult Services: The Importance of Older Adult Programming and Outreach in Rural, Suburban and Urban Libraries in Wisconsin. University of Wisconsin School of Informational Studies B2A Lecture Series. February 5. Milwaukee, WI

Thiele, Jennifer, **Renee Bennett-Kapusniak**, Michael Zimmer. (2013). E-books and Cross Generational Perceived Privacy Issues. Poster at iConference 2013. February 13-14. Fort Worth, TX

Han, Hye Jung, **Renee Bennett-Kapusniak**, Wooseob Jeong. (2013). The Usability Study on the Multicultural Children's Book Project of the National Library for Children and Young Adults (NLCY) in Korea. Poster at iConference 2013. February 13-14. Fort Worth, TX

Moyer, Jessica, **Renee Bennett-Kapusniak**, Jennifer Thiele. (2013). Reader's Advisory Services: Have We Gotten Any Better?. Poster at ALISE'13. January 22. Seattle, WA

Wolfram, Dietmar, **Renee Bennett-Kapusniak**, Jeannette Glover, Adriana McCleer, Jennifer Thiele. (2012). Overcoming Barriers to Information Access: How E-books Help or Hinder Information Access. Panel discussion at The 2nd National Joint Conference of Librarians of Color. September 24. Kansas City, MO

Bennett-Kapusniak, Renee, Jennifer Thiele. (2012). Browsing for Leisure Reading in the Digital Environment: A Case Study. Poster at IFLA International Federation of Library Associations and Institutions World Library and Information Congress. August 13-14. Helsinki, Finland

Bennett-Kapusniak, Renee, Jennifer Thiele. (2012). Wisconsin Public Library Consortium: Access and Navigation. Wisconsin Library Association Support Staff and Circulation Services Annual Professional Development Conference. May 23. Appleton, WI

Joo, Soohyung, **Renee Bennett-Kapusniak**. (2012). Exploring User Engagement and System Support in Applying Search Tactics. Presented at SLIS/SOIS Student Research Forum. April 16. Madison, WI

Honors, Scholarships & Awards

Beta Phi Mu International Honor Society

Honors, Scholarships & Awards

Fellowship Grant (2011-2015) University of Wisconsin-Milwaukee School of Information Studies Overcoming Barriers to Information Access (B2A), Sponsored by the Institute of Museum and Library Services (IMLS) Laura Bush 21st Century Library Program

Doctoral Research Award Grant Opportunity University of Wisconsin-Milwaukee School of Information Studies
Baby Boomers and Technology: Factors and Challenges in Utilizing Mobile Devices (October 2014) $1,000 Dissertation Research
E-books and the user interface: The interactions between users and OPAC systems **(**August 2012) $500

Graduate School Travel Award University of Wisconsin-Milwaukee
Fifth International Conference on Popular Romance Studies, Thessaloniki, Greece (June 2014) $550
ALISE'13, Seattle, WA.
(January 2013) $450

Professional Services

University of Wisconsin-Milwaukee School of Information Studies Milwaukee, WI
    ASIS&T Student Chapter, Vice President (2012-Present)
    Doctoral Student Organization Committee, Executive Member (2011-2013)
    Research Committee, PhD Representative (2011-2013)
    Co-Editor PhD Newsletter (Fall 2013)

Professional Affiliations

American Library Association
American Library Association Library Services to an Aging Population Committee
American Society for Information Science & Technology
Association for Library and Information Science Education
Popular Culture Association/American Culture Association
Public Library Association
Wisconsin Library Association

Professional Conference Activities

ALA (2012-2014)	IASPR (2014)	JCLC (2012)	WLA (2008-2014)
ALISE (2013-2015)	iConference (2013)	WAAL (2012)	
ASIS&T (2013)	IFLA (2012)	WAPL (2013)	