Smartphone information behaviour: a study of the use of smartphones in searching and evaluating online information for everyday life and for academic purposes.

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Dedication

I dedicate this work to my dad and my brother

I wish you were both here, you are dearly missed. Sleep well!!!

Acknowledgement

I would like to thank all my colleagues PhD students at the School of Information Studies. Especially Aaron for reading through my dissertation, Hawa, Banafshet and Anna for their friendship.

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Abstract

After over a decade of smartphone use, the technology has enhanced access to information everywhere and at all times. Information searching has been part of peoples' lives for a long time. People search for information for various reasons, sometimes to enable them to do their work or to answer questions in their everyday life. In the past, online information searching could only be done on computers in specific locations. Presently, searching can be done on smartphones from anywhere, and at any time. With almost everyone in the world having access to the internet to search for information, it is interesting to examine what people's information behaviour looks like with smartphone technology.

This research, therefore, set out to determine how often smartphones are used in information search for everyday life and academic purposes relative to the computer? Is information found on smartphones evaluated? If so, how is information evaluated? If not, then why not? Why does someone choose one device (smartphone or computer) over the other?

The study adopted a mixed methods approach in answering the research questions. Participants for all parts of the study were undergraduate students aged 18-24. The survey was emailed to all undergraduate students at McGill University, yielding 3565 responses. Survey questions asked participants how often they use smartphones and computers to search for information for everyday health, news, leisure, and academic purposes. Interview data was collected using semi-structured interviews with 27 participants. Questions focused on the reasons for searching for information on their smartphones, the type of information they searched for, how the information was evaluated and why they selected one device over the other to search for information.

The study findings show that undergraduate students use their smartphones for all four topics (health, leisure, news, and academic information search). However, usage varies across topics. Students use the smartphone more frequently than computers for leisure, news and to some extent health. For academic information search, students use computers more frequently.

Information found on smartphones was usually not evaluated for credibility. Evaluation of information differed across topics with some similarities among the categories of health and academic information purposes. Leisure information was mostly not evaluated. In cases where it was evaluated, it was done mainly through recommendations and reviews. In relation to news, most users said they were not concerned about the credibility of the source. Rather, they were concerned about fake news or real and inherent biases that a source might be known for, since most media houses were politically aligned when it comes to topics of interest. Academic related information found on smartphones were mostly not evaluated. Respondents mentioned that they limited the usage of smartphones for academic purposes to definition of terms and concepts or for accessing course related information found on their university website.

The smartphone and computer continue to be used interchangeably among users. The present study and previous studies have found that both devices are used interchangeably for many purposes. Results from the study suggested that the purpose or context (e.g., health, leisure, news, or academic) of information need might influence the choice of device used. The device used for searching affects aspects of information behaviour of users as they apply more diligence when using the computer than when using the smartphone.

This study has shown that smartphones play an important role in people's information search behaviour and has provided insights into smartphone use for information searches. It has identified issues related to the evaluation of information found on smartphones and the link

between the device used and information behaviour. Theoretically, the present study contributes

to the existing literature on information behaviour by shedding new light on smartphone

information behaviour. This study showed that some of the activities depicted in Wilson's (1997)

revised general model can be found in smartphone information behaviour, thereby suggesting

that Wilson's model remains relevant in the smartphone era. The revised general model is

detailed and includes all aspects of the information user's processes, from identifying their

information need to seeking the information and consequently processing it for use. However,

the present study also identified the role of an additional intervening variable – device

affordances— to recognize the influence of the device, and its characteristics, in information

behaviour

Résumé

Après plus d'une décennie d'utilisation du téléphone intelligent, la technologie permet d'avoir accès à des informations partout dans le monde, et à tout moment. La recherche d'information fait partie de la vie des gens depuis longtemps. Les gens recherchent des informations pour diverses raisons telles qu'effectuer leur travail ou répondre à des questions de la vie quotidienne. Auparavant, la recherche d'informations en ligne ne pouvait être effectuée que sur des ordinateurs situés à des endroits bien spécifiques, alors qu'aujourd'hui, elle peut être effectuée sur un téléphone intelligent en tout temps et en tout lieu. Puisque la majorité des gens ont accès à internet pour la recherche d'information, il serait intéressant d'étudier leurs comportements de recherche en lien avec l'utilisation de leur téléphone intelligent. Cette recherche vise donc à déterminer la fréquence d'utilisation du téléphone intelligent pour effectuer des recherches d'information traitant de la vie quotidienne ou de nature académique comparativement à l'utilisation de l'ordinateur ? Est-ce que la pertinence ou la fiabilité des informations trouvées à l'aide du téléphone intelligent est évaluée ? Si oui, comment, et si non, pourquoi ? Enfin, pourquoi privilégie-t-on le téléphone intelligent plutôt que l'ordinateur ou vice versa ?

Pour répondre aux questions de recherche, cette étude a privilégié une approche de méthodes mixtes : sondage et entrevue. Les participants étaient des étudiants de premier cycle âgés entre 18 et 24 ans. Le sondage a été envoyé par courriel à tous les étudiants de premier cycle de l'Université McGill; 3565 réponses ont été reçues. Pour le sondage, les questions portaient sur la fréquence d'utilisation du téléphone intelligent ou de l'ordinateur pour effectuer des recherches sur des sujets liés à la santé, à l'actualité, aux loisirs ou à des recherches académiques. Les données d'entrevues ont été recueillies à l'aide d'entrevues semi-structurées

auprès de 27 participants. Les questions ont porté sur les raisons justifiant l'utilisation du téléphone intelligent pour la recherche d'information, sur le type d'information recherchée, sur la façon dont les informations trouvées ont été évaluées et sur la raison pour laquelle le participant a privilégié un appareil plutôt qu'un autre.

Les résultats de cette étude démontrent que les étudiants de premier cycle utilisent leur téléphone intelligent pour trouver des informations sur des sujets liés aux domaines de la santé, de l'actualité, des loisirs et d'ordre académique. Toutefois, l'utilisation varie selon les sujets de recherche. Le téléphone intelligent, comparativement à l'ordinateur, est davantage utilisé pour des recherches liées aux loisirs, à l'actualité, et dans une certaine mesure, à la santé. Pour les recherches d'ordre académique, les ordinateurs sont plus fréquemment utilisés.

Pour les recherches effectuées à partir d'un téléphone intelligent, en général, la fiabilité des informations trouvées n'était pas évaluée par les participants. Toutefois, lorsqu'évaluée, elle différait selon les domaines de recherche avec des ressemblances en ce qui a trait à la santé et aux recherches académiques. La plupart des informations liées aux loisirs n'a pas été évaluée, bien que lorsqu'évaluée, elle l'a été principalement par le biais de recommandations ou de critiques. En ce qui concerne les informations sur l'actualité, la plupart des participants était davantage concerné par des nouvelles erronées ou par des informations biaisées que par la fiabilité de la source puisque l'information provenant des maisons de presse est souvent assujettie à une opinion politique. L'utilisation du téléphone intelligent pour des recherches liées au domaine académique se limitait généralement à des définitions, de termes ou de concepts, ou, en lien avec les cours suivis, à des recherches d'information sur le site Web de l'université. La fiabilité de ces informations n'était donc généralement pas évaluée.

Le téléphone intelligent et l'ordinateur continuent d'être utilisés de manière interchangeable au sein des participants. La présente étude et des études antérieures ont démonté que les deux appareils étaient utilisés de façon interchangeable à de nombreuses fins. Les résultats de cette étude démontrent que l'intention et le contexte de la recherche d'information influent le choix de l'appareil utilisé par le participant. Certains aspects du comportement du participant varient selon l'appareil utilisé pour sa recherche d'information; il fait davantage preuve de diligence lorsqu'il utilise un ordinateur plutôt qu'un téléphone intelligent pour ses recherches.

Cette étude démontre l'importance qu'accordent les gens au téléphone intelligent pour les assister lors d'une recherche d'information, et elle fournit également des renseignements sur son type d'usage lors de cette recherche. Cette étude a identifié des problèmes liés à l'évaluation des informations trouvées à l'aide des téléphones intelligents et au lien existant entre l'appareil utilisé, l'information trouvée et le comportement des participants. La présente étude contribue à la recension des écrits sur les comportements de recherche des utilisateurs du téléphone intelligent et lui ajoute une nuance.

Il a été constaté que certaines des activités décrites dans le modèle Wilson (1997) peuvent être trouvées dans le comportement d'information des téléphones intelligents. Le modèle, qui a été créé en 1997, est toujours d'actualité à l'époque des téléphones intelligents. Les points focaux qui incluent les types de recherches, les variables intermédiaires et les mécanismes d'activation dans le modèle ont été décrits comme des activités qui sont également présentes dans le comportement des informations des téléphones intelligents. Il a cependant été constaté qu'il existe un besoin d'une variable intermédiaire supplémentaire pour le dispositif. Depuis l'appareil joue un rôle important dans le comportement d'information des personnes.

Statement of responsibility

This thesis is an original work and distinct contribution to the field information behaviour and information literacy. All chapters of this thesis are the work of Cynthia Henewaa Kumah, the PhD candidate with extensive guidance from Prof. Joan Bartlett, the supervisor. Data for this thesis were collected as part of two SSHRC funded projects. The first SSHRC funded project on information behaviour and information literacy is examining how millennials search and use information for academic and everyday life purposes (Insight Development Grant fund number: 430-2016-00598). The second SSHRC funded project on information literacy, in the context of subjective well-being, is studying the design criteria for developing information systems to support the process of information seeking, evaluation and use of information among undergraduate students (Insight Grant fund number: 435-2016-1326). The candidate was a research assistant on both projects and worked in collaboration with the Principal Investigators for each project to include an aspect on technology use (i.e. smartphone use). Data on technology use was solely for this thesis.

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Chapter 1: Introduction

Information searching is a human activity which has been with us long before libraries and other memory institutions, the internet and search engines were invented. People search for information for various reasons. Sometimes it is to enable them to do their work or to answer questions in their everyday life. Over the years, searching has evolved from print to electronic format. With the change in the format of information comes changes in information search behaviour[1] as has been documented in the literature. The ways in which electronic information is searched has changed with smartphone[2] technology. In the past, online information searching could only be done on computers (i.e., laptops and desktops) in specific locations. Presently, searching can be done on smartphones from anywhere and at any time. The International Telecommunication Union (ITU) 2018 report indicated mobile-cellular subscription had exceeded the world's population. The mobile-cellular subscription for Canada for the same period was at 85.9% (ITU 2018, p.33).

With almost everyone in the world having access to the internet to search for information, is interesting to examine what people's information behaviour looks like with smartphone technology. In order to explore people's information behaviour in the smartphone era, it was useful to study a group of people who use the smartphone extensively. One such group of people are undergraduate students, specifically those between the ages of 18 to 24. They are at the tail end of the millennial generation (people born between 1981 to 1999) who believe "it is cool to

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[1] The study adopted Wilson (2000, p. 49) definition of information search behaviour "Information Searching Behavior is the 'micro-level' of behavior employed by the searcher in interacting with information systems of all kinds. It consists of all the interactions with the system, whether at the level of human computer interaction (for example, use of the mouse and clicks on links) or at the intellectual level (for example, adopting a Boolean search strat-egy or determining the criteria for deciding which of two books selected from adjacent places on a library shelf is most useful), which will also involve mental acts, such as judging the relevance of data or infor-mation retrieved"

[2] In the context of this research, the term smartphone device is used to refer to any hand-held device, used to communicate, access and use digital information

be smart, and are fascinated by new technology" (Oblinger, 2003, p.30). This group of people grew up with major technological advancement in history such as the internet, smartphones and social media. Unlike previous generations who had to adapt to these technological advancements, technology is inherent in the life of millennials. They consider technology as a sixth sense through which they get to know and interact with the world (Hershatter & Epstein, 2010). They are heavy users of smartphones, with 98% of 18-24 year-olds owning a smartphone (Nielsen, 2016), and are so dependent on these devices that on an average day, they interact more with their smartphones than they do with other human beings (Hill, 2016). While the millennials use smartphones for a variety of purposes, including texting and voice/video calls, access to the internet and social networks is dominant (89% and 75% respectively) (Anderson, 2015). Undergraduate students are a convenient population for this study because they perform the activities the study focused on such as searching for information for everyday life (e.g., health, leisure, and news) and for academic purposes. They could potentially transfer information behaviour and information literacy skills they use for academic purposes to everyday life purposes as well.

This research study is grounded in the tradition of information behaviour research. Information behaviour is one of the most researched sub-fields of information science. This area of research focuses on the interconnection between people and information. Wilson (2000) defines information behaviour as "the totality of human behaviour in relation to sources and channels of information, including both active and passive information seeking, and information use. Thus, it includes face-to-face communication with others, as well as the passive reception of information, for example, watching TV advertisements, without any intention to act on the information given" (p.49).

Historically, research in the area started as library user studies. Here, the focus was on how people used libraries. Overtime, studies in the area also changed. The introduction of computers engendered a new research focus. Research further changed with the introduction of the internet. Thus, it is important to further explore and examine why research in this field changes with technology. Changes occur whenever there is new technology because of the human centredness of research in this area. People's information behaviour changes as new approaches to searching and using information emerge. The current smartphone technology is no exception. Previous technological changes led to changes in people's information behaviour. Changes in information behaviour often led to changes in information service delivery for users. With the technological changes that have occurred over the years, information services providers such as libraries, archives and other related information service centres have also had to rethink, reform and adjust service provision for their users. These information services providers have harnessed the advantages of each technological advancement through information behaviour research.

Early research on information behaviour was work related, meaning the focus was on the information people needed to enable them to do their formal work. This research addressed the needs of researchers, academics, scientists, students and other professionals. For example, research on work-related information needs of students mostly addressed their use of information for academic purposes. However, in recent years, research has shifted to focus on non-work-related information behaviour as well. These non work-related information needs have been termed everyday life information. Everyday life information covers information that people search for to answer questions that do not relate to their formal work. These include information for health, leisure, news, finance and so on. Unlike work-related information that is needed to get

work done, everyday life information is needed to take care of oneself. Just as people need

credible information to execute their work, people also need credible information to make the

right decisions in their everyday life.

As technological advancements kept changing the information behaviour of users, it also

changed the way information is produced and made available. Previously, information was

produced by only a few organizations. However, the advent of the internet expanded information

provision and publicity to everyone with technological knowledge. This led to a plethora of both

credible and incorrect information on the internet. The vast availability of information online

puts the burden of evaluation on the user. The user must be able to assess information and

information sources for reliability, credibility and accuracy in a way that they did not do in the

past.

1.1   Statement of the problem

Lately, it is very common to see people gathered but not socializing with each other.

Rather, you see people standing in groups with each person on their smartphone. This constant

scene makes one wonder what people are really doing on their smartphones all the time? This

behaviour is especially prevalent among young adults. Previous research has shown that

communication, accessing social networks and the internet are the main activities people conduct

on smartphones. It is obvious the smartphone will be around for a long time as the technology

continues to evolve and is useful for many purposes, including information searches.

The smartphone has achieved an unprecedented level of utility in information search and

use, for example, in the finance and the entertainment industry. As such, there is the need to

know what users are specifically doing on the device in relation to information searches and how

the information they find is evaluated for credibility. There is also the need to know what

influences people to choose the smartphone over the computer to search for information online. To address these needs, the research study sought to answer the following questions.

1.2 Research questions

1. How often are smartphones used in information search for everyday life and academic purposes relative to the computer?

2. Is information found on smartphones evaluated?

   - If so, how is information evaluated? If not, then why not?

3. Why does someone choose one device (smartphone or computer) over the other?

1.3 Chapter outlines

Chapter two provides an overview of the literature on information behavior, information literacy and mobile information behavior. Chapter three presents the methods employed for this study. It covers the data collection methods, the research site, participants, analysis and ethics approval. Chapter four is divided in two parts and presents the results of the study. The first part is the survey results and the second part present interview results. In chapter five the findings of the study are discussed. Chapter six presents a summary, contributions, limitations, conclusions and future research.

Chapter 2: Literature review

2.1 Introduction

This chapter reviews the literature on information behaviour with a focus on selected foundational information behaviour models. It also includes selected literature on information literacy and on smartphone use in searching.

2.2 Information behaviour

In this section selected literature on information behaviour models and relevant literature is reviewed. The concept "information behaviour" has its roots in library practice and dates back to 1876 when Samuel Green advised librarians to "mingle with library users and help them in every way" (as cited in Bates, 2010, p. 2382). Bates (2010) points out that the five laws of librarianship by Ranganathan (Ranganathan 1931) were centered on the user. Wilson (1994, p.19), however, dates the origin of the term on McDiarmid's "The Library Survey", which reviewed studies on how people used the library from 1916 through to the 1920s and 1930s. Wilson indicated that the research on information behaviour gained momentum after the Royal Society Conference in 1948, and the follow up conference ten years later termed "International Conference on Scientific Information". Initially, studies in the area now called information behaviour were referred to as studies of information needs and uses, information seeking and gathering, use studies, information seeking behaviour and so on. These studies initially focused on scientists and scientific information. They were later extended to other fields such as the social sciences, the humanities, business and management. In the 1990s, scholars widely adopted the umbrella term information behaviour to reflect the various branches of the field, despite some objections.

Information behaviour has since become the most widely used term (Bates, 2010). As the field gained attention with several specific user-centred projects and studies, a plethora of models emerged. However, none of these models were ever developed into a theory. Each researcher identified a way of understanding the information user, and how to ultimately serve that user. Some of the selected models can be broadly grouped under information need based models (e.g Sense-Making (Dervin, 1983), and Anomalous State of Knowledge (ASK) (Belkin, 1980)), information seeking models (e.g., berry picking (Bates, 1989) David Ellis's model (Ellis, 1987), Information Search Process (Kuhlthau, 1983)), and general models (e.g., Wilson, 1981, 1997).

2.2.1   Information needs

Central to the research on information behaviour is information need. Information need is the action which activates the search for information. The need is sometimes difficult to express. Taylor (1968) identified four levels of how information need could be expressed. These include: visceral need (this need is expressed in the form of vague dissatisfaction), conscious need (that is expressed in the form of ambiguous rambling statements), formal need (that is in the form of concrete terms), and compromised need (which is translated in the form of how users approach the organization of information in a system). Cole (2011) describes information need as a black box, which many human information behaviour researchers have not been able to adequately explain. Unlike the need for food or shelter which can be physically expressed, there is no easy way to express information need. Two selected models which focus on information need are the anomalous state of knowledge and sense making.

Anomalous State of Knowledge model

The Anomalous State of Knowledge (ASK) model was first proposed by Nicholas Belkin in 1980. The model is based on the premise that a user comes to consult an information system

because of their realization of a need for information, which Belkin (1980) calls an anomaly. This anomaly or need for information can be described as a situation where a person's state of knowledge lacks something. It is this lack of knowledge that pushes the person to seek information to correct what is missing in their knowledge base. It is therefore not realistic for the system to require the user to specify that need accurately in the formulation of their request. In essence, users would not be searching the system if they knew what they needed. The ASK system sought to remove the specificity of information retrieval systems to create a more interactive user-oriented information retrieval system (Belkinet al. 1982).

In view of the need for interactive user-oriented information retrieval systems, Belkin (1982) proposed an information provision mechanism design based on distributed problem treatment (DPT). The idea behind this approach was to break down the various elements of problems into sub-problems, which will then be easier to solve, rather than tackling the problem as a whole unit from the onset. This framework was to enable the easy design of information systems to support people with problems. The problems could then be solved with an information system which took into consideration the variety of behaviours exhibited by users when searching for information (Belkin et al. 1993).

Sense making model

Sense making is a model which was developed by Brenda Dervin (1983). This model describes how people make sense of information or situations in which they find themselves. The underlying concepts of the sense making model demonstrate that meaning is derived from the context in which the information is needed (Dervin, 1983a). The core concepts of the model assume that "reality is neither complete nor constant but rather filled with fundamental and pervasive discontinuities or gaps" (Dervin, 1983, p.4). Also "information is not a thing that exists

independent of and external to human beings but rather is a product of human observing"
(Dervin, 1983, p.4). In essence, sense making views information as subjective, which means that
meaning or sense is made of information, based on the person or the situation at hand, as well as
the knowledge of the person to make sense of what is presented to them. Dervin (1983) defines
these key elements of the sense making model as:

- **SITUATIONS:** The time-space contexts at which sense is constructed.
- **GAPS:** The gaps seen as needing bridging, translated in most studies as "information needs" or the questions people have as construct sense and move through time-space.
- **USES:** The uses to which the individual puts newly created sense, translated in most studies as information helps and hurts. (p.9)

The user is seen to be in a situation where they experience gaps due to lack of
information about the situation. When that user gets information to overcome the gaps and
derives meaning from the situation, then the user has used the information. In other words, the
model sees the ordinary person as a theorist involved in developing ideas to guide their personal
understanding as well as that of the community as a whole.

2.2.2 Information seeking

Information seeking models describe the processes that users go through while searching
for information to satisfy information need. These models identify specific methods users
employ in their efforts to find information. Examples of such models include the berry-picking
model, Elis's model, and the information search process model.

Berry-picking model

The berry-picking model of information search behaviour was introduced by Bates (1989). The model integrates searcher's behaviour with how an information retrieval system should be designed. Bates (1989, 2002) argues that the model represents the real-life approach to searching online by searchers. The model was different in the sense that it considered the nature of the query as evolving rather than static and unchangeable. With this search process, the searcher is seen as following a berry-picking pattern. The searcher begins searching with search terms that they believe will retrieve the information they want, but after examining the result, they realize the search term is not producing the result they want. To address that, they decide to modify the search term, and conduct another search. This cycle continues until they retrieve all the information they are looking for. This is akin to what happens when an individual goes out to pick berries. The berry-picker starts from one bush and when they realize they are not getting enough berries, they decide to try other bushes until they get enough berries.

In this case, the searcher searches and retrieves relevant information from different sources rather than a single best source. In addition, in this model, the search techniques change throughout the process and the sources change in both form and content. In the berry-picking model therefore, everything from the query to the final document may evolve from the original query until all the relevant information is retrieved. The model also includes typical search techniques such as footnote chasing, journal run, area scanning, citation searching, and author searching. For example, in footnote chasing, Bates (1989) recommended that the interface should be designed to allow the user to get an overview of a document's chapter or section, full text of documents and references, and the ability to jump back and forth between text and references. For another technique like citation searching, the interface should have the ability to

scan lists of citing references, make simple single step jumps, and make jumps in any direction without any limit.

To enable users to search freely from one source to another, Bates (1990) identified four levels: user level, user interaction level, system interaction level and system level which need to be considered in designing information retrieval systems.

Information search process (ISP)

ISP is a six-stage model, which takes into consideration the 'holistic experience' of information seeking from the user's perspective. The stages are initiation, selection, exploration, focus formulation, collection and presentation. Each stage of the model involves three experiences; which include affective (feelings) cognitive (thoughts) and physical (actions), (Kuhlthau,1991, 2009). The model demonstrates that in the process of searching for information, users go through different stages from initiation to presentation.

At the initiation stage, searchers might feel some level of uncertainty and could have vague thoughts due to their limited knowledge on the topic. This uncertainty is eventually replaced by satisfaction at the end of the process. Over the years, the model has progressed with continuous research. This model forms the basis for the new framework of Guided Inquiry design (Kuhlthau, Caspari & Maniotes, 2012). The guided inquiry provides guidelines for thinking, learning and teaching which change the school environment into a collaborative community of inquiry.

Ellis's model

David Ellis' (1987) model was based on research on the information seeking patterns of social scientists. The focus of the model was to identify and characterize patterns that people

exhibit in the process of searching for information. The characteristics of the model include

starting, chaining, browsing, differentiating, monitoring and extracting.

The model, at this point, did not include the categories verifying and ending; these

categories were added after the research was repeated with physicists and chemists (Ellis, Cox, &

Hall, 1993). Similar results emerged with engineers, scientists and academics (Ellis, & Haugan,

1997). Unlike Kuhlthau's ISP, the characteristics or patterns identified among searchers did not

follow a particular order, nor did all participants exhibit the same characteristics.

2.2.3   General information behaviour

A general model incorporates all aspects of information behavior in its design. Unlike the

information needs model which elaborates on user needs, the general model includes user needs,

seeking, and use in the same model.

Figure 1: Wilson's first general model of information (1981, p.3)
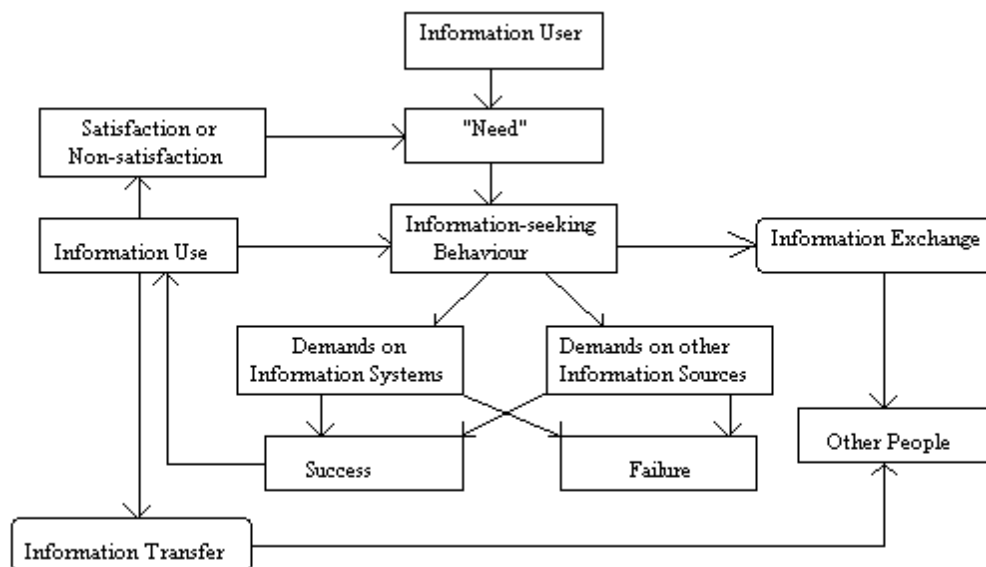
Wilson's initial general model (Figure 1) consisted of twelve (12) components. This

model begins with an information user who has a need. This need is what leads the user to

information seeking behaviour. Information is sought by making demands on information systems or other information sources. Success is achieved if the relevant information is found and used. Failure is encountered if the right information is not found which might lead to "non-satisfaction" that can trigger another cycle of information search. However, when success is achieved, the user uses information and transfers the information to other people. This act of transfer leads to information exchange.

Figure 2: Wilson's revised general model (1997, p.569)
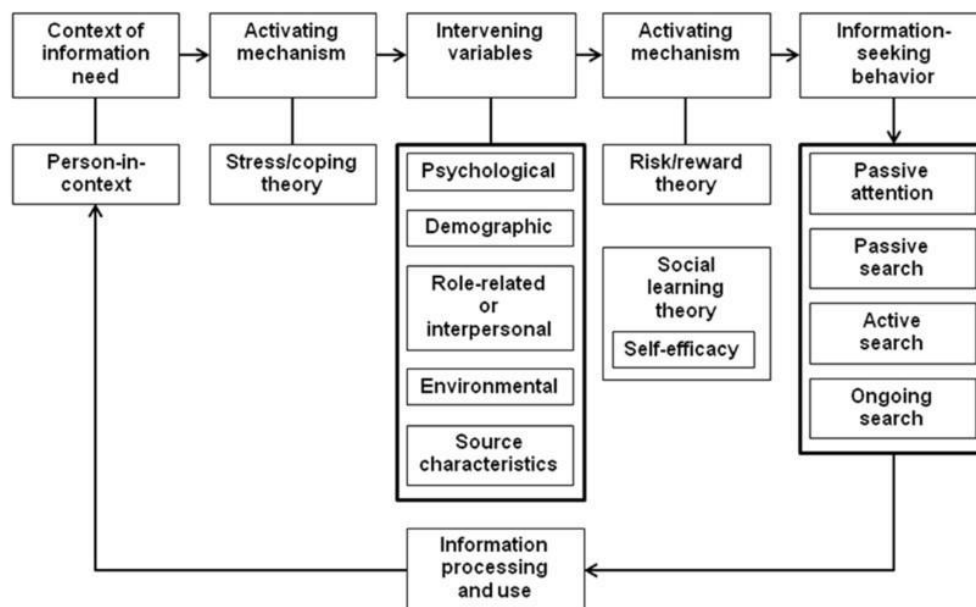
Wilson developed a revised version of the model (Figure 2) in 1997, which incorporates the universe of knowledge (user context, system context and the resources) and the different information needs and roles of the information user which could affect information seeking.

The model was based on two propositions: the first proposition posits that information need is not a primary need but a secondary one. The second proposition introduces the idea of barriers that an individual may encounter in their effort to discover information to satisfy the basic need. The context within which any of these basic needs arise could be the person himself

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or herself, the role demands of the person's work or life as well as the environment within which the person works or lives. He also suggests the barriers that the person may encounter in the search for information may arise out of the same context within which the person finds himself or herself at the point of information need (Wilson, 1997;1999).

The revised model Figure 2 identifies twenty (20) components. Wilson explains that the person in context still remains the focus of information need in this model just as the first one. Wilson (1997) invokes explicit theories to explain the following aspects of information seeking,

- Why some needs prompt information seeking more than others (stress /coping theory)
- Why some sources of information are used more than others (risk /reward theory)
- Why people may or may not pursue a goal successfully based on their perception of their own efficacy (social learning theory).

Wilson's activating mechanism can be seen as motivators. Motivators indicate what prompts a person to search for information, how they do it, and to what extent they go. The motivators are affected by the intervening variables, which are psychological, demographic, role-related or personal, environment and source characteristics. In addition, Wilson identifies information seeking behaviour as involving more than an active search to incorporate passive attention, passive search, active search and ongoing search. This implies that one might be involved in information seeking by just being exposed to relevant information as opposed to actively searching. Information processing and use reflect what happens after relevant information is retrieved (Wilson, 1999). Wilson's (1997) revised general model was selected as the conceptual framework to guide this study. The model was chosen because unlike previous models, which focused on particular aspects of information behaviour (e.g., Dervin, 1983; Kuhlthau, 1983), the revised general model is detailed and includes all aspects of the information user's processes,

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from identifying their information need to seeking the information and consequently processing it for use.

Everyday life information seeking (ELIS).

Most of the research on information behaviour mentioned above has been concentrated on academic or peoples work based information behaviour. However, people seek other types of information that are not only based on work or academics. They seek information in response to needs that may arise from their everyday life situations. The body of literature which addresses this less researched area of information behaviour examines how people look for information to answer questions in their daily life, their problems and encounters. One of the key researchers in this area is Savolainen. He defines ELIS as "the acquisition of various informational (both cognitive and expressive) elements which people employ to orient themselves in daily life and to solve problems not directly associated with the performance of occupational tasks" (1995, p. 266-267). He explains that the area is based on two main concepts: "way of life" and "mastery of life". He defines way of life as "the order of things" (p. 262), which might be based on both work and non-work activities taking place in a person's life. For instance, some people see their work as a social activity, which helps them keep order in their life. For such people, their way of life cannot be studied without regard to their daily work routines and practices. A person's way of life can also be studied through the analysis of their hobbies and their time management structures. In that case, one will be looking at what a person does for leisure and how much time they devote to certain activities within a day.

Mastery of life is defined as "a general preparedness to approach everyday problems in certain ways in accordance with one's values" (Savolainen 1995, p.264). This concept basically looks at how people manage their situations in times of disorder based on their experiences,

values and preparedness. Mastery of life is influenced by the way people orient themselves in times of crisis and seek information to handle that situation. This orientation can be based on a topology of mastery of life and is analyzed based on two main dimensions, cognitive versus affective and optimism versus pessimism dimension. Based on these two dimensions, Savolainen (1995) describes four scopes of mastery of life, which may impact an individual's information seeking behaviour in times of crisis. These are: optimistic-cognitive, pessimistic-cognitive, defensive-affective and pessimistic-affective.

Spink and Cole (2001) present another model of ELIS (Figure 3), which illustrates the relationship between occupational related information seeking and ELIS. The two perspectives of research on human information behaviour are illustrated as two different parts of a whole. On one hand, information searching and retrieval for ELIS begins as coherence, and the information retrieved at the end of the search is used for mastery of life. In other words, the information retrieved for ELIS empowers the searcher to take control of their everyday situations. On the other hand, information searching and retrieval for work related purposes begin as gaps, and the information retrieved is used to write reports, essays and so on.

Figure 3: Everyday life information seeking in context Spink & Currier (2006, p. 189).
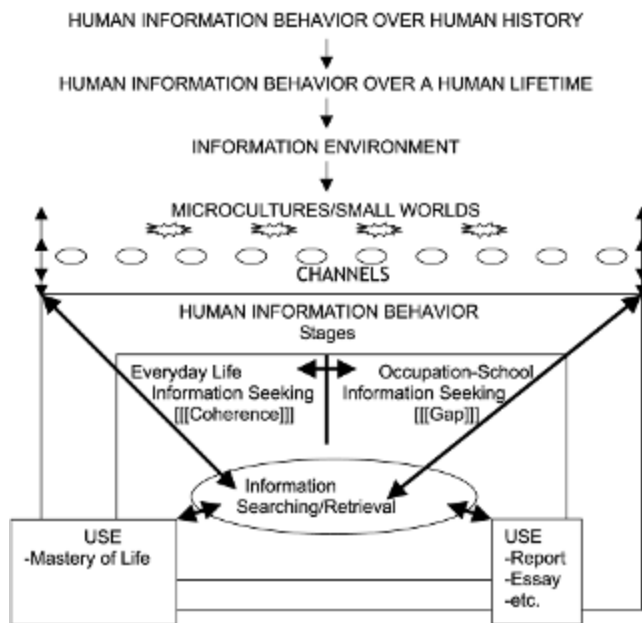
McKenzie (2003) modeled information practices based on the everyday life information behavior of pregnant women. The model describes the various modes of information seeking, which includes active, non-active, non-directed and by proxy. Each mode further incorporates connecting with people or information sources and interacting with these sources in a way that helps the individual information seeker achieve their information goals. The model illustrates some common features of information seeking for everyday life purposes which could better explain user behaviour in relation to everyday life environment than other information behaviour models. For instance, someone may receive relevant information they have not solicited for based on their physical appearance as in a case of a pregnant woman. Someone who have given birth before may give a pregnant woman information relevant information on how to manage pregnancy and newborns just by seeing them. Such information practices are usually not mentioned in information behaviour models. Whiles information behaviour models focus on what the user needs, information practices studies other ways users get information both based

on their needs and are seeking information; and instances where they receive information without actually searching for it.

Another important research sub-section under everyday life is leisure, Hartel (2010) identified three types of leisure; casual, project based and serious. Hartel (2010 p. 3264-3267), describes casual leisure as doing things that comes to mind naturally during one's free time. Project based leisure is a short-term, moderately complicated, either one-shot or occasional, though infrequent, creative undertaking carried out in free time. Serious leisure is "the systematic pursuit of an amateur, hobbyist, or volunteer core activity that people find so substantial, interesting, and fulfilling that, in the typical case, they launch themselves on a career centered on acquiring and expressing a combination of its special skills, knowledge, and experience" (Hartel, 2010, p. 3267).

2.2.4   Information behaviour of undergraduate students

The focus of everyday life information behaviour research on students is to identify instances where students search and use information for their non-academic life. Here researchers study information behaviour of students in relation to how the look for information to support decision making in their daily life circumstances.

Everyday life

This section reviews selected literature on everyday life information behaviour of students. Students have been the subject of information behaviour research for several years. Most of the studies on students have focused on their academic related information behaviour. In recent years, researchers have also studied their everyday life information related behaviour. These studies describe the sources, types, and channels for information. One example of research on young people has found that family and friends are the main people that young adults consult

in finding information for everyday life decisions (Bartlett, Kumah, Couch, & Beheshti, 2018).

In relation to non-people sources, the participants in another study (Agosto & Hughes-Hassell, 2005) considered the telephone as the most preferred source. A study of college students on 25 campuses in the United States found that the main source of information for everyday life information seeking was search engines. Young people used these search engines as much as they used family and friends. The type of information they look for covers several topics: school related, weather, gossip, leisure activities, popular culture and others. Although this particular study was on everyday life information behavior of young people, the researchers found that information for schoolwork was one of the main questions for which participants sought information (Agosto & Hughes-Hassell, 2005; Head & Eisenberg, 2011).

In spite of the popularity of search engines and social media as the main source of everyday life information for young people, other researchers have also found that young people use both print and online news sources for their everyday life information. This is contrary to popular views that young people do not use print media (Williamson, Qayyum, Hider & Liu, 2012). A related study found that the main sources of everyday life information for international students were search engines, social network sites, new friends, printed resources, and traditional media (Sin, 2015).

A study by Sin and Kim (2013) found that participants considered social networks sites like Facebook as a channel for interaction and not as a reputable news source. Despite this finding, the authors also discovered that social network sites played a major role in the everyday life information seeking of these students. In searching for information, participants indicated the challenges encountered include irrelevant materials, non-credible sources, and outdated information (Head & Eisenberg, 2011; Sin & Kim, 2013).

Academic

Research on students' information behavior has centered on students' use of library resources and services. Researchers in the area have found that students of different disciplines such as arts, law and engineering have different perceptions of the library. Researchers found that students who had a positive attitude towards the library tended to benefit from taking advantage of the resources provided, while students who had a negative attitude towards the library did not take advantage of the resources provided (Bennett 2006; Eckardt, 2014; Fulton, Kerins, & Madden, 2004; Kadli & Hachinal, 2015; Khan & Bhatti 2012).

Research has also focused on the changing landscape among students when searching for information for academic purposes on the internet. Some studies have reported the dominance of Google as the main search engine among students. Students were found to use Google to search for information more times than the library. Studies have also found that students use internet websites instead of electronic databases that have been purchased by their academic institutions. Research findings suggest that students have diverse information needs and use a wide range of information sources. Students have also been found to use university and government websites, wikis, blogs and forums for academic information (e.g. Beheshti, Bartlett, Couch, & Kumah, 2018; Chung, & Yoon, 2015; Griffiths, & Brophy, 2005; Van Scoyoc, & Cason, 2006).

In addition to library resources and internet websites, researchers have found that students use social networks such as Facebook to search for information to support educational information needs. They use the platform to ask questions and give advice on matters related to their academic work. (Hayman, Smith, & Storrs, 2019; Oyinloye, Dangwaran, & Kantiok, 2016).

Other studies were interested in identifying ways of predicting the information behavior of students. The study results show that self-efficacy, gender, discipline and enjoyment in

seeking information are significant variables in predicting students' information behaviour (Tella 2009).

Further studies on students' information behavior found that students consider themselves capable of retrieving relevant information for academic purposes and tend to use easily accessible sources which may not be credible (Karas & Green 2007).

Summary

Research in information behaviour has looked at various ways through which people search, receive, find and use information for different reasons and from different sources. However, the literature review shows there is limited studies on the role devices play in information behaviour research.

2.3   Information literacy

This section reviews relevant selected literature on information literacy standards and relevant related literature. The Association of College and Research Libraries (ACRL) defines Information Literacy (IL) as "a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (ACRL 2000, p.2). From the late 20th century onwards, researchers recognized the role of information in the life of individuals, especially with the explosion in information creation. This recognition centered on the essence of continuous advancement of an individual's knowledge base both in and out of school. Especially in an age where there is an upsurge of information, people need to decipher what information to consume in order to increase their knowledge base. This could be achieved through information literacy (Bundy, 2004). It therefore became crucial to redirect educational curricula and techniques to produce information literate graduates. In order to train people to be information literate, there was a need for guidelines

which ensure that the required skills are taught. This led to the creation of information literacy standards by institutions, associations and individuals (e.g., ACRL, 2011; Bundy 2004; Eisenberg, Lowe & Spitzer, 2004; IFLA, 2011; SCONUL, 2011).

These guidelines served as roadmaps in the effort to train people to become well informed citizens of the 21st century. The act of determining the credibility of information is a key pillar in all information literacy standards or framework. Although most of the information literacy frameworks have been revised over the years, the core principles of access, evaluate and use effectively have been maintained. In 2018, CILIP redefined the term, stating that "information literacy is the ability to think critically and make balanced judgements about any information we find and use. It empowers us as citizens to develop informed views and to engage fully with society" (CILIP, 2018, p. 2). Critically thinking and making a balanced judgement about a piece of information is not restricted to information found in print or on a computer but applies to all types of media for information.

2.3.1 Information literacy standards

Several IL standards are currently in use, for both higher education institutions and high schools.

The Information Literacy Competency Standards for Higher Education by Association of College and Research Libraries (ACRL, 2000) contains five standards and twenty-two performance indicators. According to ACRL, the standard reflects the needs of students at all levels. It also includes outcomes that provide guidance for discipline and context specific content development as well as assessment tools. The ACRL standard was revised in 2015 and adopted in 2016

Another framework is the Australian and New Zealand Information Literacy Framework:

principles, standards and practice (Bundy, 2004). This framework is an adaptation of ACRL. It

has six core standards, with several learning outcomes under each standard as well as

corresponding examples of the outcomes. This framework is the second edition of the initial

work published in 2001.

The 2001 SCONUL seven pillars of information literacy: core mode for higher education

is another framework that is widely used in information literacy courses. This framework

consists of a three-dimensional circular model which defines the cyclical nature of information

literacy. The seven pillars represent the building blocks of IL. Each block consists of statements

that explain the understanding and competencies of an IL individual. IL learning is portrayed as a

progression from novice to expert.

A guideline on information literacy for lifelong learning was created by IFLA for those

libraries and institutions that wanted to introduce information literacy programs in their

institutions. It is a three basic competency standard which is based on all the standards

mentioned above (Lau, 2006). Like the others, it has statements under each standard describing

how each skill or attribute is exhibited in an information literate person. Though different

institutions created the above standards, the core attributes are similar. In essence, each standard

depicts the information literate individual as being able to access, evaluate, and use information

in an ethical manner.

In addition, individual authors have developed models that present their view on the skills

that an information person should possess. For instance, Bruce, Edwards et al. (2006) designed

the six frames for IL education. The frames include: the content frame, the competency frame,

the learning to learn frame, "the personal relevance frame, the social impact frame and the

relational frame" (p. 1). Each frame represents the context within which information literacy is

taught. Each frame also denotes the orientation taken in teaching the course. For instance, the social impact frame approaches the teaching of IL on the benefit of IL on society. Thereby focusing on how it will affect the community in their efforts to solve problems. An example of this frame draws "learners' attention on various issues and values associated with problems surrounding the digital divide, and proposes tasks related to policy, technology or training designed to assist in bridging that divide" (p. 5).

Also, Eisenberg, Lowe and Spitzer (2004) developed the Big Six skills of information literacy framework, which illustrate the six steps that an information literate person takes in acquiring and synthesizing information, both for personal use and for academic purposes. These steps include: task definition, information seeking strategies, location and access, user of information, synthesis, and evaluation. Evaluation here does not refer to the evaluation of the information found, but rather, the evaluation of the whole process from task definition to synthesis.

2.3.2   Information literacy: evaluation

The evaluation of information is a core standard in all the published information literacy standards (e.g., ACRL, 2000; Bundy 2004; Eisenberg, Lowe & Spitzer, 2004; IFLA, 2011; SCONUL, 2001). The ability to critically evaluate information sources before using information is stipulated in all the information literacy standards documents. According to SCONUL, to evaluate, one must understand the context of information, the credibility of information sources, the role of information evaluation in the personal evaluation process, consistency in data collection, and the citation context of the information. Apart from understanding, information literacy standards further state what must be done to illustrate that evaluation has taken place. That is, a person evaluates when they are able to distinguish different information sources and

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what these information sources provide. They also have to select relevant materials based on appropriate criteria. They have to conduct an assessment of quality, accuracy, relevance, bias, reputation and credibility of found information resources. They also have to identify key points, relate the information to the search strategy, appraise their findings and know when to stop looking for more information. This description of evaluation is not limited to SCONUL pillars. All the other information literacy standards or frameworks articulate similar outcomes in evaluating information. This indicates the importance of evaluation in information searching and use.

2.3.3   Information literacy and students

Many information science researchers have conducted research and identified the lack of information literacy among students. One example is a study that used action research to introduce students to information literacy education. From the pre- literacy assignment and post-literacy assignment, researchers noticed a change in student's views on the topic. They found information literacy to be very beneficial and likened it to the next big skill employers will require. This observation has been confirmed by several research studies on the topic (Webber & Johnston, 2000).

Several authors have reported a change in students' attitude after being introduced to library resources that have been made available to them to enhance their educational experiences through information literacy courses. (e.g., Bennett 2006; Eckardt, 2014; Fulton, Kerins, & Madden, 2004; Kadli & Hachinal, 2015; Khan & Bhatti, 2012). Such courses are taught in collaboration with faculty, whereby faculty members invite librarians to teach information literacy courses in their classes. Some faculty allocate part of their time at the beginning of the semester for these sessions. In some institutions, information literacy is a one credit required

course (e.g. Brancato, Chan, & Contento, 2016; Douglas & Rabinowitz, 2016; Reisner, Vaughan, & Shorish, 2014).

Some researchers advocate for the consideration of information literacy as a soft discipline. This is because the field has achieved the relevant milestones often attributed to soft disciplines. For example, there is the existence of professional associations and journals, there is an emergence of an international community, academic departments exist in this field, the topic has gained popularity among graduate students as a topic for research, several researchers identify with the discipline, and there is a clear knowledge and research base (Webber, & Johnston , 2006). Others, for instance, Tuominen, Savolainen, and Talja, (2005), argue that literacies cannot be separated from the sociocultural context within which they are formed. Literacy skills teaching should therefore be incorporated into the contextual aspect of the society within which the individuals inhabit. In their view, current practices are unconcerned about the role that information and other artifacts play in the accomplishment of simple activities in working and learning environments. They advocate for the inclusion of aspects such as the process involved in the way documents are created, selected, processed and used in practice.

Researchers have also looked at the implementation of information literacy courses in various institutions to identify elements and to ensure best practices, which will foster the success of information literacy education. Implementation takes different forms in different institutions. However, to ensure the expected change, information literacy courses need to be integrated into the practices of the user communities. Such integration will act as a catalyst to transform today's society into a learning society for the future (e.g., Bruce 2003; Ishimura, & Bartlett, 2009).

Some researchers have criticized the use of information literacy frameworks in information literacy education. The use of the word "literacy", some authors believe, casts the term information literacy as a new form of literacy without recognizing the inherent connection between the present term and its previous use. For instance, there are similarities between ACRL standards and Evidence-Based Practice (EBP). However, EBP has gained more acceptability in much professional training unlike IL standards (Adams, 2014; Beatty 2013; Buschman 2009). According to Swanson (2005), "these standards shortchange the impact information literacy can have on students by oversimplifying a complex process" (p. 66). This, he argues, is due to the lack of a critical pedagogical process in the teaching of IL and the over dependency on the standards.

Summary

The review found information literacy standards dominates information literacy education among students. Information literacy education in some universities has helped changed students' attitude towards libraries. However, there was limited research focused on information literacy education related to smartphone use.

2.4   Smartphones

The section reviews selected literature on smartphone use for information searches across various topics. The smartphone, as we know it today, is not just a telephone but a multipurpose and easy to use personal computer which can be carried anywhere without realizing its weight. Mobile telephony dates back to the 1970s when researchers conceptualized a device which combines the features of telephone and computing (Islam & Want 2014). The innovative idea took several years of research with gradual progress through the 1990s. At each stage of development, major improvements were made. One such progress of mobile telephony was

achieved with the launch of 3G networks in the 2000s, when mobile devices were finally able to be used for communicating as well as have faster data transmission in the form of emails. The launch of the first iPhone in 2007 defined the new standard of computer integrated telephony. A key milestone was the introduction of the applications store (Apps store) by Apple and the subsequent release of Android by Google, which was adopted by other smartphone handset makers worldwide.

2.4.1   Smartphones and health information

A study by Fox and Duggan (2012) found that 52% of smartphone owners in the United States gather health information on their smartphones. The majority of health websites are mobile friendly, but few are optimized for reading of online health information (Cheng & Dunn, 2017). Research on smartphone use in health is dominated by the use of applications on the device for many health-related purposes. This includes its use in the management of specific diseases, its use by professionals in communicating among themselves and their patients as well as its use in accessing information while working or studying. Pandey, Hasan, Dubey, and Sarangi (2013) evaluated cancer related applications for their content and potential usefulness in healthcare delivery to patients. Their findings show that applications developed by healthcare agencies are more likely to contain scientifically accurate information when compared to applications produced by other organizations. However, they also discovered that the majority of applications produced for general use were not by health care agencies. This could lead to patients getting inaccurate information.

Jeon, Park, Min, and Kim,(2014) analyzed the quality of information management applications developed in Korea and found the following: the purpose of many applications was to provide information on weight control; the most used application intervention was for

information on exercise management; and the most commonly used applications are free applications. Their findings suggest that the quality of information provided by applications in the health domain needs to be evaluated to prevent misinformation.

Furthermore, Bert, Giacometti, Gualano, and Siliquini, (2014) reviewed literature on the use of mobile applications in health promotion and found that mobile applications have been used in the field of nutrition to keep track of calorie intake and to maintain food dairies for people with food allergies. They also found that applications have been used for physical activities, to provide tips on lifestyle changes, to help in the prevention of falls among elderly people, as well as in the prevention of sexually transmitted diseases. Similarly, BinDhim, Shamen, Trevena, et al. (2014) studied the use of smartphone applications to deliver depression screening tools across different countries. Their findings suggest that applications have the potential to be used for disease screening, self-management, monitoring and health education among young adults. In a similar study, Higgins, (2016) studied smartphone use for health and fitness and found that applications can better help patients achieve their health and fitness goals if the right applications are used. The study identified applications that incorporate evidenced based behavior change techniques such as motivation, encouragement and reminding as more likely to be effective than those that do not incorporate those techniques.

In the professional work and training of health care practitioners, mobile devices were used even before the technology became popular. A study by Tenopir (2004) reviewed information services, which were already available to Personal Data Assistance (PDA) and BlackBerry users. At the time of her writing, PDAs were already popular among medical practitioners such as doctors and nurses. She predicted the adoption of these devices by students and faculty in the near future to access high quality information online. A decade later, a study

conducted on medical students and faculty of four Canadian medical institutions found a high

adoption of mobile devices in medical information search among participants in spite of

encountering problems such as slow wireless connectivity, library authentication and so on

(Boruff & Storie, 2014).

A review of mobile devices and applications available for healthcare professionals

(Ventola, 2014) identified four main topical areas for which mobile devices are being used by

professionals. These are information management, time management, health record maintenance

and access, and communication and consulting. In addition, the author identified corresponding

applications for each area. Others have found smartphones to be effective and efficient in

transmitting health information among professionals (Ana & Humphery, 2013). The literature

confirms mobile device use in health care delivery and information search and use. Some of the

studies point to the lack of high-quality information for users. To ensure that high quality health

information is being used in the smartphone era, we need to understand the extent of usage as

well as how people evaluate such information in their everyday life as they seek information on

their health.

As online searching increased, researchers studied ways of evaluating online information

to ensure that credible health information is being used. One of the initial studies was directed

towards producing high quality health information (Guard, Perveiler and Renner, 1997). They

identified the following criteria: credibility, content, disclosure, links, design, interactivity and

caveats as necessary in assessing the quality of health information online. Similarly, Price and

Hersh (1999) used relevance, credibility, bias, content, currency and value of links to develop a

prototype automated system for online health information evaluation. In spite of past research,

recent studies found that low health literacy has effects on evaluating online health information.

Diviani et al (2015), argue that this may influence patients' decision making. There is, therefore, the need for health professionals to be aware of possible influences when discussing health conditions and treatments (Chen, Li, Liang & Tsai, 2018). In an earlier study, Hesse et al. (2005) found that although a higher majority indicated that they trust health information from their physicians more than online sources, 48.6% of adults in the United States reported going online first for health information. Though users know the resources that can be trusted, they usually do not use these resources. They believe credible resources are difficult to understand and may not reflect the needs of users (Bartlett, Bowen-Ziecheck, Kumah, & Beheshti, 2019).

2.4.2   Smartphone and leisure

The primary purpose of the mobile phone was for communication between people. This purpose changed with internet capabilities as this allowed for information searching. However, some research shows that communication is still one of the major activities that the smartphone is used for. For instance, a study conducted by Aharony (2017) found voice communication with family and friends as the topmost use of the smartphone, followed by online communication, social network sites, emails, reading e-books, watching films, videos, television and reading academic material as the least activity. This indicates the device is used for leisure activities more than any other activities. Similar findings have been reported in other studies (e.g., Al-Daihani, 2018; Reese Bomhold, 2013). In a related study, Hahn (2010) found that the majority of undergraduate students' Wikipedia searches on iPod touch were for recreational purposes.

While communication continues to be an important part of smartphone use, research shows the internet capabilities of the device is enabling people to get access to information quickly in the absence of a network computer to answer questions. It is also enabling access to social media sites and conducting online shopping (Kassab & Yuan, 2012; Yeh, 2014). Another

study found informational, geographical and personal information management as types of information needs which lead to searching on mobile devices. The needs are also context dependent as the context within which the individual fines himself or herself defines the type of information that they search for on their devices (Church, Smyth et al., 2007; Reis, Church et al., 2012).

Leisure information search is sometimes prompted by the need to share information with others in a social group. Reis, Church et al. (2012) looked at the ethical implications of mobile communication. Their investigation focused on the decisions one makes in communicating with others via mobile phones. For instance, the decision to call or text someone is something that is taken for granted in mobile communication. Their findings show that these decisions on the individual level may provide insight into social order (Ling & McEwen, 2010). In a related study, Green (2002), found that the temporality of mobile usage may impact on rhythms of device use, rhythms of everyday life and rhythms of institutional change.

2.4.3   Smartphone and news

The Pew 2018 media study showed that over 93% of Americans receive news information online either by smartphone or desktop. While advertising revenues on mobile technologies rose from about USD10.6B in 2013 to about USD 60B in 2017; revenues on desktop decreased from USD 32 billion in 2013 to USD 29.6B in 2017, which indicates how much news information is being consumed on smartphones. Smartphone use for news has been studied from different angles since the technology gained widespread adoption world over. In a recent review, Westlund (2015) identified five main themes emerging from research on the use of smartphone devices for news. They include pattern, people, places, participation and preferences. Westlund's article focuses on the first four themes. Patterns of use were different

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from one jurisdiction to the other. In some places, mobile news was reported to be more than legacy news media, while in other places mobile news was complementary to legacy news. People of all ages were found to be users of mobile news, the most significant determinant of who use mobile news are age and educational level (Sasseen et al., 2013).

Researchers have studied online news impact on printed newspapers leading to the use of paywalls in some countries. Also, researchers have studied the displacement of traditional news media among age cohorts and found users belonging to the 1980s and 1990s cohorts are single media users via mobile devices (De Waal, Schoenbach, et al. 2005; De Waal, & Schoenbach, 2010; Westlund & Färdigh, 2015). Similarly, Chan (2015) found high mobile news usage among young people and predicted that a continuation of this pattern could lead to smartphone devices playing a leading role in the provision and consumption of news.

Others have found that the smartphone had an impact on political and civic participation around the world, especially how it was used to report news from the middle east during the Arab spring (Howard & Hussain, 2013). Shim, et al. (2015) found that mobile users perceive political news as equally suitable to access via mobile devices as entertainment news. Similarly, Li (2013) found news affinity as a significant predictor of frequency and length of usage of mobile phones as news devices.

In their 2017 news report, Newman, Fletcher, et al. (2017) indicate that users believe that the lack of rules and viral algorithms are encouraging the spread of fake news. The report also suggests a connection between people's distrust of media and perceived political bias in many countries.

2.4.4   Smartphone and academic related information

Smartphone use for academic purposes has been dominated by research which has focused on devices being used to access academic resources provided by libraries. Librarians around the world have studied how to adequately adopt technology in service delivery and information sharing (Palumbo, 2014). Library researchers have found that users were accessing electronic resources and reading e-books on their mobile devices. Users also said they would use their devices to access library catalogues when the service was introduced (Cummings, et al., 2010; Pažur, 2014; Spires 2008). In a related study, Little (2011) found that major electronic database providers were developing mobile friendly versions of their services to meet user needs.

Others have studied policies surrounding smartphone usage in libraries and found that different libraries have different policies for its use (Lever & Katz, 2007). Some library's policies were found to be stringent and hinder collaborative work among students using library spaces for teamwork (McEwen & Scheaffer, 2012). There was, therefore, the need for information professionals to recognize the role mobile phones play in computer supported collaborative work. This observation calls for continuous and frequent reassessment of information policies and spaces to reflect current practices.

Research has also been conducted on enabling access to library content on mobile devices to read e-books (Smith, et al., 2010; Tenopir, 2004). Others have suggested adopting cloud computing to enable libraries to host digitized content on cloud services. Having content on cloud infrastructure will enable access to materials easily via mobile devices. Also, with cloud hosting of content, users would not have to worry about not having enough storage space on their devices (Ning, 2015).

Research on mobile use in education found success in the utilization of mobile phones in the Philippines, Mongolia and Bangladesh to enhance distance education through participants using SMS to interact with the instructor (Bere 2013). Others have suggested integrating WhatsApp into instructional practices to heighten collaborative engagement between lecturers and students, and among students to enhance pedagogical delivery in both formal and informal context (Valk, et al., 2010). Mobile devices have also been used to improve the communication skills of autistic students in the classroom (McEwen, 2014).

The smartphone technology has been found to allow academics to use different devices in accessing online databases, learning management systems, contribute to class discussions on controversial topics in class anonymously and so on. Usage ranges from creating content to share with these devices to reading e-books, making payments and for learning. Researchers found that smartphone users required instructional support and guidance in selecting appropriate applications for academic purposes (Chen & Denoyelles, 2013; Lippincott, 2010; Yarmey, 2011). Studies have looked at the impact of mobile technology on the academic performance of university students. These studies found no significant relationship between phone use and academic performance; though for students who used their devices during classes to search academic materials, it broadened their academic horizon (Ezemenaka, 2013). Other research has focused on mobile technology adoption by students to search for medical information in spite of encountering problems such as slow wireless connectivity, library authentication (Boruff and Storie, 2014).

2.4.5   Smartphone vs. computer

From the beginning, researchers were concerned about the screen size of the mobile device and its use for information searches when compared to computer use (e.g., Findlater, &

McGrenere, 2008; Jones, Buchanan, & Thimbleby, 2003). They found that task execution times between the desktop and smartphone were significantly different (e.g., Marcial, & Hemminger, 2011). While others found that screen size had a significant effect on task efficiency (e.g Raptis, Tselios, Kjeldskov, & Skov, 2013).

Some researchers have studied computers and smartphones with the aim of predicting searchers' behaviour on the devices. These researchers (e.g., Kamvar et al 2009; Wang, Huang, & White, 2013) found that searchers' queries on computers and smartphones are similar. This observation is what allows searchers to transition from smartphones to computers and vice versa. They found patterns of search behavior associated with device transitions among users. The frequent use of the two devices in searching mostly leads to the interconnection of work and personal life (Karlson et al 2009). A similar study (Li, Huffman, & Tokuda, 2009) on search behavior on the two devices found that the rate of receiving the right information without having to click on a link was higher on mobile devices than on computers. Yet still, others found that information retrieval on smartphones was less successful and efficient than when done on a computer (Bergman, & Yanai, 2018). This observation casts doubts on the implicit assumption that the use of the devices was equivalent.

Other researchers have also studied smartphone and computer use in completing online surveys and found that completing online surveys on smartphones was longer with low response rates. They also found very limited differences in the mode effect between mobile survey and computer web survey (e.g., De Bruijne, & Wijnant, 2013; Wells, Bailey, & Link, 2014). Recent studies on the devices have found that young people usually preferred smartphones for playing games and preferred to perform assessment tasks over computers (e.g Adepu, & Adler, 2016; Nikou, & Economides, 2019; Bowler, Julien & Haddon, 2018).

Both computers and smartphones continue to be used for online searches around the world. A recent report by Perficient Incorporated shows that the majority of online visits were from mobile devices. The report shows a consistent increase in mobile devices for online searches in the past three years (2016-2018). However, time spent online on devices was higher on computers.

Summary

The review found the smartphone device is being used for information searches for different purposes including health, leisure, news and academic.

2.5   Summary

This study adopted Wilson's (1997) revised general model. The model was applied to study the smartphone information environment and explored how the model is applicable in that environment. The model was chosen because it incorporates all aspects of information behavior in its design. Unlike the information needs model which elaborates on user needs, Wilson's model includes user needs, seeking and use in the same model. The present study explored how the components such as information context, the person in context, activating mechanisms and the intervening variables could be identified and described in the smartphone environment.   In addition, Wilson (1997) identified information seeking behavior as involving more than an active search to incorporate a passive attention, passive search, active search and ongoing search.

In this chapter, selected literature on information behavior, information literacy and smartphone use for information searches have been reviewed. In general, most studies on smartphones focused on the use of smartphone applications for various purposes. No study was found which clearly studied smartphone use for everyday life and academic information in relation to the computer, the relationship between the device used, and information behaviour.

Previous literature on information behavior provided a useful lens to study the nature of information behaviour in the smartphone environment by studying the frequency of use of the device for everyday life and for academic purposes. More recent studies also provided clues and guidance on potential areas that affect information retrieved from the smartphone because this information is not evaluated. Finally, although some studies on smartphones illustrate how choosing devices may influence the information behavior of the information searcher, several questions remain unanswered in the literature. To address these gaps in the literature, this study examines smartphone use for everyday life and academic information in relation to the computer, the relationship between the device used (that is, whether smartphones or computers) and information behaviour.

Chapter 3: Methods

3.1   Introduction

The research adopted a mixed method approach in answering the research questions. A mixed method approach combines both quantitative and qualitative methods to conduct the research. The nature of the research questions of this study required both the quantitative and qualitative approaches (e.g., Creswell, 2014; Fidel, 2008; Tashkkori & Teddlie, 2003). Research question one (RQ1) required the use of quantitative methods to measure the extent of usage of smartphones (e.g., Hoy, 2010); as such a survey was conducted on the use of the device for information searches for health, leisure, news and academic purposes. Research questions two and three required deeper insights to understand how people searched for information, how they evaluate found information, and why they chose to use one device over the other. The best way to address these questions was through the qualitative research method. With this approach, detailed information was elicited in order to gain deeper understanding into the meaning of human actions (Creswell 2007; Denzin & Lincon, 2011, p3; Pickard, 2013, p26; Schwandt, 2001).

The target population for this study was undergraduate students. Participants were between the ages of 18-24. This group was chosen for many reasons; This age group falls within a group of people who are at the initial stages of adulthood. Most of them are away from home for the first time and are now learning to manage all aspects of their lives without their parents. They grew up with major technological advancement such as the internet, social media and smartphones. Also, they consider technology as a sixth sense through which they get to know and interact with the world (Hershatter & Epstein, 2010). This group provides a particularly interesting sample because of the characteristics they possess. For example, " they gravitate

towards group activity, spend more time doing homework and housework and less time watching

TV, believe it is cool to be smart, and are fascinated by new technology (Oblinger 2003).

The research was conducted in two parts, the first part was a survey and the second part

was semi-structured interviews. The survey was part of a SSHRC funded project on information

behaviour and information literacy in academic and everyday life. The interviews were

conducted in two parts. The first set of interviews were part of a larger SSHRC funded project on

information literacy in the context of personal well-being. The second part of the interviews were

conducted solely for this dissertation.

3.2   SSHRC projects

The first SSHRC (Social Sciences and Humanities Research Council)[3] funded project on

information behaviour and information literacy is examining how millennials search and use

information for academic and everyday life purposes. In this project, everyday life purpose was

subdivided as follows: leisure, news and health. The project, therefore, examined the resources

used, how credible the participants found the resources, how they judged credibility of online

information, databases used, how often they shared information with peers and formal training in

information literacy. While the project focused on the search and use of information for

academic and everyday life in general, this dissertation focused on how participants used devices

in conducting searches. There was a specific section in the main survey of the project on

technology use which was added solely for this study. The author of this dissertation worked as a

research assistant on the project from the beginning. She worked with other members of the

project team to design, test and send out survey instrument. She continues to be involved in

subsequent stages of the project.

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[3] Project title: Towards a model of metaliteracy for academic and everyday life information seeking and use PI: Jamshid Beheshti CO PI: Joan Bartlett. Insight Development Grant fund number: 430-2016-00598

The second SSHRC (Social Sciences and Humanities Research Council)[4] funded project on information literacy, in the context of subjective well-being, is studying the design criteria for developing information systems to support the process of information seeking, evaluation and use of information among undergraduate students. The project is also looking at challenges millennials face in the above-mentioned context and how to mitigate those challenges to ensure easy access to reliable information to support well-being. As part of the SSHRC project, the dissertation focused on how smartphones are being used by the study population for information searching. Since millennials are known to be heavy users of smartphones, the idea was to find how the device is being used in the context specified by the project. The dissertation therefore studied smartphone use in relation to information participants search for and how they evaluate found information. The author of this dissertation worked as a research assistant on this project. She was involved with the design of the initial interview guide and other data collection instruments. She also conducted and transcribed interviews. She continues to work with other research assistants on the project.

3.3   Research site

McGill University was selected as the research site because the researchers involved in the projects work there. The university's diverse population, academic disciplines and resources were an added advantage to use this site. McGill information technology (IT) websites indicate there is full WiFi coverage in all buildings on both campuses including all students' residences, as well as outdoor places around campus. Students, therefore, have unlimited access to wireless internet connectivity everywhere on campus. This allows for easy access to everything online without having to worry about the costs associated with using the internet while on campus. A

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[4] Project title: Metaliteracy for wellbeing: design criteria for information systems. PI: Joan Barlett. Insight Grant fund number: 435-2016-1326

survey conducted by McGill's Information Technology services department in 2014 found 80% of students bring their smartphones and 70% bring their laptops to school everyday. These make McGill University an ideal place to conduct research on undergraduate use of smartphones for information.

3.4 Survey

The purpose of the survey was to study the extent of smartphone use for both everyday life and for academic purposes among the study population. The survey questions for the study therefore sought to explore participants' choice of device, whether the smartphone or computer, depending on information sought and the purpose for which the information is sought.

3.4.1 Survey instrument

Survey questions for this study were part of a bigger survey on information behaviour and information literacy in academic and everyday life. The questions were developed from themes from coded interview data, focus group discussions and information literacy literature. Survey questions were divided into broad categories: information resources and use, credibility of information resources, factors that determine credibility, information access and search, sharing, technology use and information literacy instructions. Questions for each category were further grouped into four main topical areas such as health(*e.g., leg cramps, stomach ache, stress)*, leisure(*e.g., choosing a restaurant or a movie, travelling, cooking)*, news(*e.g., election, famine, war*) and academic(*e.g., preparing for class, homework*). For example; if you own a smartphone, how often do you use it to access information? for everyday health issues, for everyday leisure activities, for everyday news topics and for academic assignments. Respondents used a 5-point Likert scale for most sections of the survey responses (except for sharing and library instruction). Respondents had the option to select if they Never (1),

Sometimes (3) or always (5) perform any of the activities indicated in the questions. In between these predefined codes were 2 and 4 codes which were not defined in the actual survey to allow participants to define and select responses based on how they understood the question. In addition, depending on the topic, an example of what we meant by, for instance, information for everyday health (e.g. leg cramps, stomach-ache or stress) was provided. Examples reflected the specific category that the questions sought to answer.

3.4.1.1   *Technology use*

Data from the technology use section of the survey was extracted for this dissertation. The questions were in two parts. The first question asked students how often they used their smartphone to search for information for health, leisure, news and academic purposes.

Figure 4: Screenshot of smartphone use survey question

The second asked participants how often they used their computers to search for information for health, leisure, news, and academics.

Figure 5: Screenshot of computer use survey question

A copy of the full survey instrument is attached in Appendix E

3.4.2 Data collection

The survey was sent through McGill Admissions services. An email with a link to the online survey was sent out to 22,900 students in October 2017. Students had a period of three weeks to complete the survey before it was closed. Three reminders were sent out by listserv during the three weeks to encourage high participation. Participants were encouraged to fill out the questionnaire for the chance to win gift cards and cash prices. Data was collected through Limesurvey2 which was administered online.

3.4.3 Participants

Survey participants were undergraduate students attending McGill University. In all, 3565 responses were received which represent a response rate of 15.6%.

3.4.4 Demographic information of survey participants.

The section provides demographic information of online survey respondents. This information is provided in tabular form and shows the frequency distribution of survey

participants by year of study, faculty, age, gender and origin. Table 1 shows there were

participants from every level of study. Table 2 shows the various faculties from which

participants belonged as well as the number of participants from each faculty. In Table 3 the age

range of respondents is presented. Table 4 and Table 5 present the gender and origin of

respondents respectively.

Table 1: Number of students per year of study

Year of study	Number of students	Percentage
U0	456	12.8
U1	1087	30.5
U2	875	24.5
U3	809	22.7
U4	338	9.5

Table 2: Number of students per faculty

Faculty	Number of students	Percentage
Agri/Enviro	285	8.0
Arts	1064	29.8
Dentistry	30	0.8
Education	221	6.2
Engineering	463	13.0
Law	120	3.4
Management	339	9.5
Medicine	259	7.3
Music	57	1.6
Science	727	20.4

Table 3: Number of students per age

Age	Number of students	Percentage
18	678	19.0
19	745	20.9
20	758	21.3
21	594	16.7
22	341	9.6
23	170	4.8
24	75	2.1
25+	204	5.7

Table 4: Gender

Gender	Number of students	Percent
Female	2396	68
Male	1129	38
Self-identified	38	1.07

Table 5: Origin of students

Origin	Number of students	Percent
Quebec	1536	43.1
Canada	917	25.7
International	1109	31.1

3.4.5   Survey analysis

The data was analyzed using SPSS version 23. Three main forms of data analysis were performed for this study. The first analysis was descriptive statistics for the main variables of interest. These variables were: smartphone use for health, leisure, news and academic domain and computer use for health, leisure, news and academic domains. The second analysis was a frequency distribution of the same variables. The third analysis was an analysis of variance for both devices using repeated measures factorial analysis. Repeated measures were chosen because questions on both devices were answered by the same people. Under each topic (e.g., health), the analysis used smartphone for health and computer for health as the dependent variables. Then demographic properties such as year of study and faculty were used as the independent variables.

The aim of this analysis was to find out if these factors affect how each of the devices are used under all the topics. This analysis was repeated for leisure, news and academics. In performing the second analysis, faculties which had response rates of less than five percent (5%) of the total number of responses were excluded. Faculties which fell under this exclusion criteria were the faculties of dentistry, law and music.

3.4.6   Reliability, validity and generalizability

Rigour in quantitative research is achieved through validity, reliability and objectivity of the research process (Pickard, 2013). To ensure validity, the survey questionnaire was pre-tested several times to ensure the scores from each measure represented the variable they were intended to. The survey questionnaire was tested for internal reliability (Beheshti, Bartlett, Couch & Kumah**,** 2018) with Cronbach's alpha ranging from 0.884 to 0.992 for different sets of questions (Krippendorff, 1980). This sample was representative of the target population. The survey results of this study can be generalized to the population of undergraduate students at McGill University because of the sample (15.6%) of responses received. To ensure objectivity, survey data was analyzed by other researchers on the main project. These researchers derived the same results as the study results. This indicates results are independent of the researcher.

3.5   Interviews

The researcher conducted semi-structured interviews to explore smartphone usage among undergraduate students. The interviews were mainly centered on the topic of information to support and maintain wellbeing. However, the researcher sought to understand how smartphones are used to search for information for that purpose. Also, the researcher was interested in finding out the different areas or types of information resources undergraduates used in their everyday life information seeking.

3.5.1 Participants

In the initial set of interviews, 16 participants were interviewed. Table 6 illustrates the demographic features of these participants. At McGill University, students are grouped by the location of their permanent residence. Quebec students have their permanent residence in Quebec, Canadian students are from other provinces or territories (apart from Quebec) in Canada, and international students are from outside Canada. Year of study is labelled U0-U4. Most Quebec students are admitted with a CEGEP (*Collège d'enseignement général et professionnel)* diploma – the equivalent of Grade 12 and first year university elsewhere in North America. These students enter as U1. Students without a CEGEP diploma take an extra year to complete a degree and enter as U0. Most bachelor's degrees can be completed in three years (or four years if the students enter as U0).

Table 6: Demographic features of participants in the initial interviews

Origin	Gender	Age	Year	Faculty	Course
Quebec	F	21	U	Science	Physiology
	F	22	U	Music	Music
	F	24	U3	Arts & Science	Cognitive Science
	M	24	U1	Arts	Social work
Canadian	F	18	U0	Arts	Linguistics
	F	18	U1	Arts	Psychology and Sociology
	F	19	U1	Science	Microbiology
	F	19	U1	Science	Chemistry
	F	21	U2	Science	Pharmacology
	F	22	U3	Science	Neuroscience
	M	19	U	Arts	History
	M	21	U	Arts	Political science
	M	21	U	Engineering	Engineering
International	F	19	U0	Science	Life Science
	F	22	U3	Management	Management
	M	21	U3	Science	Biochemistry

3.5.1.1 *Recruitment of interview participants*

Participants were recruited through the posting of fliers on notice boards in several

departments across the downtown campus of McGill university, including the Humanities and

Social Sciences Library, Leacock building, Engineering Building, Education building and the Arts building. In addition, fliers were sent via the undergraduate listserv through the Students' Society of McGill University (SSMU) online platform; every undergraduate student at McGill University is a member of SSMU.

3.5.2   Data collection

Data was collected using semi-structured interviews. Interviews were conducted between the fall of 2016 and spring of 2017. Interviews were audio recorded and transcribed. Data collection and analysis were iterative.

Most of the interviews were conducted in the researcher's office. Some interviews were conducted in a study room in the library due to the noise levels in the building where the researcher's office was located. Interviews typically took between thirty minutes and an hour. To ensure anonymity of participants, pseudonyms were adopted.

Each interview began with the participant first signing the consent form (Appendix A), after which a biographical data form (Appendix B) was given to the participant to complete. Participants were also informed that they could stop the interview at any time. They could stop the interview at any point if they felt uncomfortable, they could pull out of the study and ask the researcher not to use their data without any consequences. General interview questions were posed first and as the interview progressed, the researcher asked more specific questions. A typical general question is, "Can you tell me generally some of the things you use your smartphone for"? Some questions centered on aspects of their everyday life and academic life for which they use their smartphone for; the type of information they search for; what motivated the instant search for information or otherwise and so on. There were also specific questions about what applications they frequently used, if they have specific applications for specific aspects of

their lives and so on. A copy of the interview guide for the first set of interviews is in Appendix C.

At the end of each interview, the researcher thanked the participants for their participation. Once participants left the office or room where the interview took place, the researcher compiled all the notes that were taken during the interview. Notes were on general factors such as how the interview went, unique meaningful expressions towards interview questions, specific modification to interview questions that elicited interesting answers, issues that arose which needed further exploration. The researcher also conducted a short debriefing meeting with her supervisor after each interview to discuss what went well and what did not.

3.6   Follow up interviews

Eleven undergraduate students participated in the follow-up interviews. The data was gathered using face-to-face semi-structured interviews. Interviews continued until data saturation was achieved. The questions for the interviews were derived from the research questions of the study and previous studies on information search on mobile devices and the evaluation of online information. Interviews were audio recorded with the participants' permission. The interviews were conducted in the fall of 2018. Most of the interviews were conducted in a study room in the library. Only one interview was conducted in the researcher's office. Interviews typically took between twenty minutes and one hour.

3.6.1   Follow up interview guide

After analysing the initial interview data and the preliminary results of the survey, there was a need for follow up interviews on how participants evaluate information found on smartphones. As such, interview questions were modelled according to the main topics which were derived in the survey to ascertain how the evaluation of information may differ based on

the topic of interest. The interviews, therefore, sought to confirm or seek clarification on the issue of evaluation which was a main component of this research study. The questions were more targeted than the initial interviews. The interview guide for the follow up interviews can be found in Appendix F.

3.6.2   Demographics of follow up interview participants

As seen in Table 7, the majority of participants were from the Faculty of Arts, with a few from the Faculties of Science and Management.

Table 7: Demographic features of participants in the follow up interviews

Origin	Gender	Age	Year	Faculty	Course
Quebec	M	23	U3	Arts & Science	Psychology
Canadian	F	19	U0	Arts	Not declared
	F	20	U2	Science	Anatomy and Cell biology
	F	22	U1	Management	Finance
	M	21	U2	Arts	Industrial relation
International	F	21	U3	Arts	Art History
	F	21	U3	Arts	Environmental development
	M	18	U0	Arts	Not declared
	M	18	U1	Management	Commerce
	M	23	U3	Arts	English
	M	23	U3	Arts	Not mentioned

3.6.3 Data analysis

Transcribed data was coded using Atlas.ti software for further analysis on themes and categories. The qualitative data was analysed using the inductive approach. Coding began as open coding, where codes were built from main ideas derived from the transcripts. These codes were further organized into main themes based on the similarities among codes. The initial coding generated 48 unique codes. These codes were further grouped under 10 main sub themes based on similarities among the codes. Which were further reduced to 6 main themes. Data analysis was iterative and was done in parallel with data collection as typically done in qualitative studies (Creswell,1997, 2007). The coding manual is in Appendix D.

3.6.4 Trustworthiness of qualitative research

Pickard (2013) identifies four methods used to establish the trustworthiness of research in information science. These include credibility, transferability, dependability and confirmability. To ensure credibility, the researcher has provided a rich description of the research site, participants and research design. The researcher triangulated different data sources for information and examined evidence from the literature to build a justification for themes. In addition, randomly selected transcribed interviews were crossed checked with audio recordings to check for accuracy. Also, two fellow doctoral students served as peer reviewers for the study for dependability of results. (Creswell, 2014). The first doctoral student was a colleague conducting her research in a related area in information science. The second doctoral student was from a different faculty with no links to information science, who was conducting qualitative research in rehabilitation science. Each coded samples of transcribed data to ensure codes matched that of the researcher. The majority of their codes matched with the researcher's codes.

To ensure transferability, the researcher has provided a detailed description of the naturalistic research setting, the participants, criteria for selecting participants as well as the data collection process. In addition, strategies for data collection and analysis have been reported in detail to give readers a clear picture of the research. Confirmability is assured based on the availability of all audio recordings of the interview, the transcripts and coding schemes used to derive the results of the study. Also, details have been provided on the research design, the use of an interview guide, and field notes.

3.7 Ethics approval

Researchers obtained ethical clearance from the McGill Ethics Board before conducting the research. Each part of the research required separate permission from the Ethics board as the research was divided into three separate parts. As such, researchers applied for ethics approval for each part of the research. Ethical clearance was sought for the survey, the initial interviews and another for the follow up interviews. The ethics application form and all the ethics certificates can be found in Appendices G and H respectively.

3.8 Summary

This chapter presented the detailed information on the mixed methods approach used to conduct this research. Data was collected using surveys and semi-structured interviews. Participants of the study were undergraduate students between the ages of 18-24. Survey data was analyzed using SPSS version 23 and interview data was analyzed using Atlas.ti.

Chapter 4: Results

4.1 Introduction

This chapter is organized in two main sections (survey and interviews). In the first section, survey results which provide answers to RQ1 are presented. The results show the frequency of distribution of smartphone and computer use for everyday life and for academic purposes. In section two, the interview results for RQs 2 & 3 are presented.

4.2 Survey results

To answer the research questions of the study, smartphone use for information searches was compared with how the computer was used for information searches online. The computer, which was the main device that people used to search for information online before the smartphone, provided a scale to measure the frequency of smartphone technology usage in information searches.

4.2.1 Response rates on the use of devices

The results in table (see Table 8) show the number of responses obtained for the use of the devices in searches for information for everyday life and for academic purposes. Generally, the response rates for computer searches were higher than that of smartphones. The number of responses ranged from 2708 to 2724.

The highest mean for frequency of smartphone use was 4.4 and the lowest was 3.0. The highest mean for frequency of computer use was 4.8 while the lowest mean was 4.0.

Table 8: Response rates for the use of devices for everyday life information and for academics

	Smartphone		Computer	
	N	**Mean (SD)**	**N**	**Mean (SD)**
Health	2710	3.74 (1.2)	2723	3.96 (1.1)
Leisure	2712	4.35 (0.9)	2722	4.13 (1.0)
News	2711	4.17 (1.0)	2723	4.12 (1.0)
Academic	2708	3.01 (1.4)	2724	4.77 (0.6)

Figure 6 shows a graphical representation of the frequency distribution of responses for both types of devices across the four topics under which they were studied. The chart shows that most participants selected the option "always use" for both types of devices across all topics except for academics where very few people selected the option "always use" for the smartphone. The analyses show that the same people were selecting "always use" for both smartphone and computer searches. This suggests that research participants interpreted the Likert scale differently than was intended.

Figure 6: Frequency distribution of smartphone and computer use for health, leisure, news and academic information searches expressed as percentage of total count
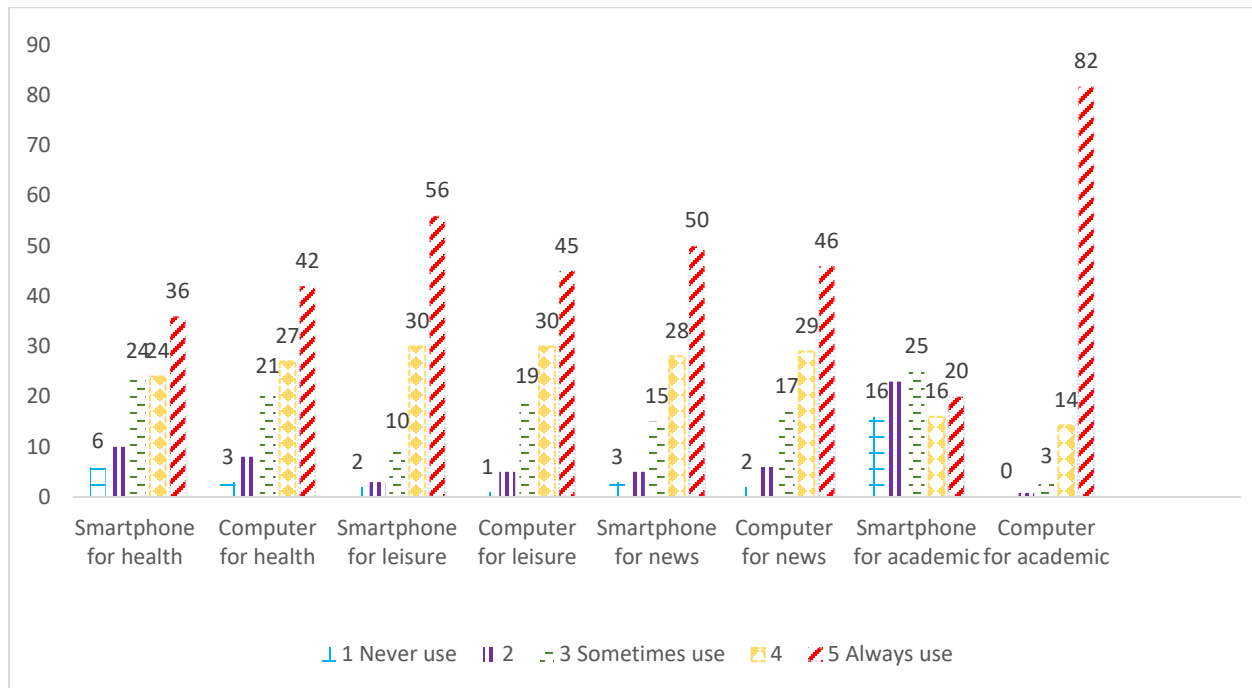
4.2.2 Device use for academic purposes

Survey results indicated that over 95% (n= 2615) of participants selected 4 or 5 (always use), suggesting that they always used their computer for academic related searches while only 36% (n= 973) selected 4 or 5 (always use), that is, they always used their smartphones for academic related searches. Computers have been the primary device used in academic information searches, as such having 36% of respondents choosing smartphones for academic information searches warranted further probe.

Table 9: Frequency distribution for academic

	Smartphone for academic (N=2708)		Computer for academic (N=2723)	
	Frequency	%	Frequency	%
1 Never use	437	16.1	4	0.1
2	613	22.6	23	0.8
3 Sometimes use	685	25.3	82	3.0
4	435	16.1	385	14.3
5 Always use	538	19.9	2226	81.7

To understand the pattern of use of the devices, further analysis was done for all the topics. However, the results on device use for academic purposes was more varied than for the other topics where usage was skewed in one direction or the other. This was done by using the estimated means of each device by year of study to plot the graph below. In Figure 7 there is a downward trend in the use of the smartphone for academics among students at different levels of study from U0 to U4. Computer use remained stable across all levels.

Figure 7: Smartphone and computer use and for academic information as a function of year of study.
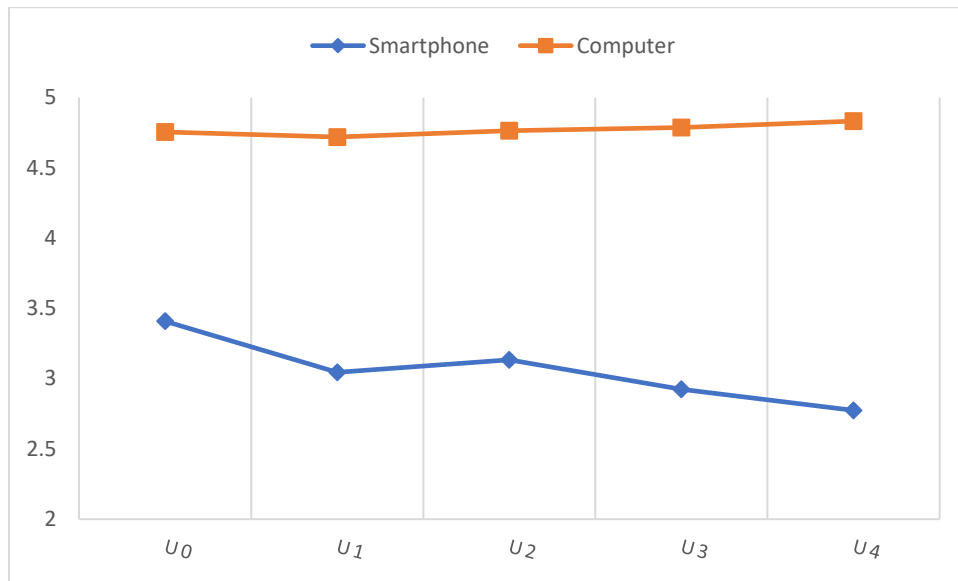
Figure 8 shows a near linear trend in the use of computers across all faculties. The trend for smartphone use was different across faculties. The faculty of Arts had the lowest number for smartphone use for academic purposes. Faculties of Engineering and Medicine had the highest use of the smartphone for academic purposes.

Figure 8: Smartphone and computer use for academic information as a function of faculty
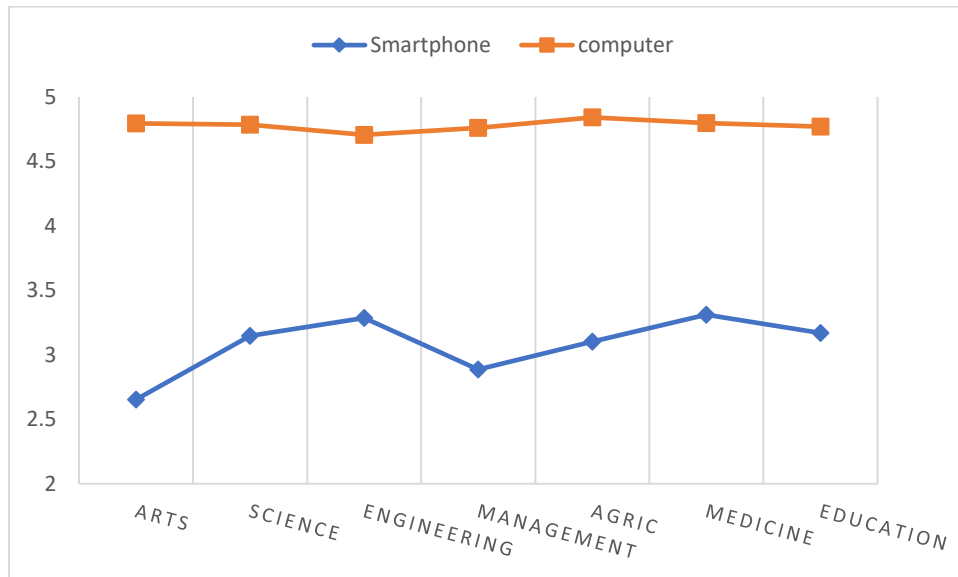
The frequency results informed the decision to conduct further analysis to determine the relationship between device use and the following factors (year of study and faculty). A repeated measure ANOVA analysis was conducted for the use of smartphones and computers for academic information searching.

Table 10: Results of mixed-plot ANOVA: test of within subject for academics showing significant main effect for device and significant interaction for device and year of study; device and faculty; device and year of study and faculty.

Source	Degrees of freedom	F	Significance	Partial eta Squared
Device	1,2449	1206.246	**0.000**	0.330
Device*year of study	4, 2449	7.18	**0.000**	0.012
Device*faculty	6, 2449	9.089	**0.000**	0.022
Device*year of study*faculty	24, 2449	1.613	**0.030**	0.016

The ANOVA results Table 10 for test of within subject effect for device use for academics showed a significant main effect for device F (1, 2449) = 1206.25, $p < .0001$, $\eta^2=0.33$, which indicated that a high proportion of the total variability could be attributed to the variation in device used.

The results also showed a statistically significant interaction for device and year of study F (4,2449) = 7.2, $p < .0001$, $n^2=0.012$.

Another significant interaction with device and faculty F (6, 2449) =9.09, $p < .001$, $\eta^2=0.022$. Meaning differences existed in how students in the different faculties used their devices for academic purposes.

The final statistically significant interaction was device and year of study and faculty F (1, 2449) = 1.613, $p <= 0.030$, $\eta^2=.016$, which indicated that a proportion of the total variability

could also be attributed to the variation between device, year of study and faculty of the participant.

Post hoc tests for device showed statistically significant differences between how both devices were used for academics. The multivariate test results indicated Wilks's Λ =.67, F (1,2449) =1206, p< 0.001, η^2=0.330. This means 33% of the variance in the use of devices for academics was a function of the type of device used.

The post hoc test for year of study showed a statistically detectable difference between U0 students and all other levels of study; U0 versus U2 (p <.01) U0 versus U3 (p <.01) and U0 versus U4 (p <.001). Except for U1 where p=0.06 which is not significant with Bonferroni procedure at .013 level (.05/4). However, there was no statistically detectable significant difference between U1, U2, U3, and U4. The ANNOVA results for year of study showed F (4, 2449) =5.225, p <0.001, η^2=0.008.

In addition, the post hoc test for faculty indicated no statistically detectable difference between the faculties of Agriculture, Education, Management and Medicine with any of the other faculties. There was a statistically detectable difference between faculties of Arts versus Engineering (p <.001), and Arts and Science (p <.001) with Bonferroni procedure at .008 level (.05/6). The ANOVA for faculty showed a statistically significant results F (6,2449) = 7.374, p <0.001, η^2=0.018. Which means 1.8% of the variance in how students use their devices was a function of the faculty they belong to.

In Table 10 above, there was only one significant interaction. This interaction was within device by year of study and faculty. It, therefore, required a simple main effect analysis of the interaction. The analysis with data split by year of study was significant for U0 (F (6,296) =2.277, p = .037), U2 (F (6,621) =6.221, p <.000), U3 (F (6,590) =6.569, p <.000) an (F (6,242)

=4.648, p <.000) but was not significant for U1(F (6,726) =1.468, p >.05). Additional analysis

with data splits by faculty was significant for the faculties of Agriculture (F (4,207) =2.603, p

=.037), Arts (F (4,784) =10.616, p <.000), Education (F (4,174) =3.580, p =.008), Management

(F (4,253) =3.669, p =.006) and Science (F (4,537) =6.543, p <.000). but was not significant for

the faculties of Engineering (F (4,361) =0.369, p =.831) and Medicine (F (4,196) =0.239, p

=.921).

Table 11: Results of mixed-plot ANOVA: test of between subject effect for academic showing

significant main effect for year of study and faculty; significant interaction for year of study and

faculty; year of study and gender

Source	Degrees of freedom	F	Significance	Eta squared
Year of study	4	5.225	**.000**	.008
Faculty	6	7.374	**.000**	.018
Year of study*faculty	24	1.732	**.015**	.017
Error	2449			

Post hoc tests for the year of study main effect for between subject tests showed

statistically detectable differences between the following pairs; U0 vs U2 (p= .006), U0 vs U3

(p<.001), U0 vs U4 (p<.001). Also, between U1 vs U3 (p<.001) and U1 vs U4 (p<.001).

Post hoc tests for Faculty main effect showed there is no statistically significant

difference between the following faculties Agriculture vs Arts (p=.002); Arts vs Education

(p=.021); Arts vs Engineering (p<.001); Arts vs Medicine (p<.001); Arts vs Science (p<.001)

Further analysis of the interaction between year of study and faculty Table 12 was statistically significant for U0 smartphone use, U2 smartphone and computer, U3 and U4 smartphone.

Table 12: Analysis of interaction between year of study and faculty showing significant p-values for smartphone use of U0, U2, U3 and U4; computer use for U2

Source	Degrees of freedom	F	Significance
U0 Smartphone	6, 296	2.698	**0.016**
U1 Smartphone	6,762	1.363	0.227
U2 Smartphone	6,621	4.692	**0.000**
U3 Smartphone	6,591	6.667	**0.000**
U4 Smartphone	6,242	4.471	**0.000**
U0 computer	6,296	1.139	0.339
U1 Computer	6,766	0.620	0.714
U2 Computer	6,624	2.609	**0.017**
U3 Computer	6,595	0.260	0.955
U4 Computer	6,245	1.205	0.304

4.2.3   Device use for everyday life (health, leisure and news) purposes

As shown in Table 13, the majority of participants indicated option 4 or 5 (always use) for both smartphones 60% (n=1626) and computers 68.5% (n=1864) to search for health information. The frequency of use of computers, however, was higher than that of smartphones. Unlike device used for academics above, the device used for health, leisure and news did not generate

interesting patterns among students of the different faculties and levels of study. As a result, the analysis of variances were not included in this thesis.

Table 13: Frequency distribution for health

	Smartphone for health (N=2710)		Computer for health (N=2723)	
	Frequency	%	Frequency	%
1 Never use	162	6.1	84	3.1
2	278	10.3	209	7.7
3 Sometimes use	642	23.7	566	20.8
4	646	23.8	727	26.7
5 Always use	980	36.2	1137	41.8

Table 14 illustrates the frequency distribution of responses in how the devices were used to search for leisure information. It shows that the majority of respondents selected option 4 or 5 (always use) for both devices in searching for information for leisure. With smartphone use, option 4 or 5 is at 85.8% (n=2327) and computer use at 74.9% (n=2040). Contrary to the results for smartphone and computer use for health, smartphones were used more than computers to search for leisure information.

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Table 14: Frequency distribution for leisure

	Smartphone for leisure (N=2712)		Computer for leisure (N=2722)	
	Frequency	%	Frequency	%
1 Never use	52	1.9	30	1.1
2	70	2.6	131	4.8
3 Sometimes use	263	9.7	521	19.1
4	806	29.7	812	29.8
5 Always use	1521	56.1	1228	45.1

As found in Table 15, most of the participants selected either option 4 or 5 (always use) for both devices to search for news information. However, smartphones 77.8% (n=2,110) were used more than the computer 75.1% (n=2046) in accessing news related information.

Table 15: Frequency distribution for New

	Smartphone for news (N=2711)		Computer for news (N=2723)	
	Frequency	%	Frequency	%
1 Never use	76	2.8	51	1.9
2	129	4.8	157	5.8
3 Sometimes use	396	14.6	469	17.2
4	759	28.0	790	29.0
5 Always use	1351	49.8	1256	46.1

Summary

The responses from the study suggest that the use of smartphones in searches was not proportional in the topics discussed, such as, health, leisure, news and academics, its usage for academic related research is increasing.

4.3   Interview results

Introduction

     This section presents the interview results. The first section focuses on the uses of the smartphone, which include the use of the device to search for information on specific topics such as health, leisure, news and academics. This is followed by a section on the evaluation of information found on the smartphone. The final section deals with instances where people choose one device over the other in information searches.

4.3.1   Uses of the smartphone

     Nine main themes were derived from interview data which describe the various uses of the device such as for searching, communicating, and reading among others; together these provide a general view about smartphone usage. In addition to these themes, there were also themes derived from the data on using smartphones for information searches on specific topics.

Table 16: Themes for the general uses of smartphones and the number of interviewees that mention them

Theme	N	%
Searching and definition	27	100
Communication	27	100
Social media	25	93
Entertainment	20	74
Organizing	9	33
Reading and documentation	8	30
Other	4	14

Searching: Research, fact checking, location

Searching for information was one of the uses mentioned by all study participants. The

internet capabilities of the smartphone enabled users to search for information on all subjects,

wherever they found themselves.

> *Communication is the primary [reason] and after that research and navigation so*
>
> *if I am in conversation with someone and I want to settle, point of contention or*
>
> *something like that, now that we have all the humanities at our fingertips. . .***P22**

The smartphone facilitated access to information on the go. With internet access, people

could find answers to questions right away without having to wait until later when they might

forget. Searching was done for different purposes or reasons. With the smartphone, searching

was done anywhere and anytime.

> *Searching up stuff that I need immediately or I have a thought in my head I want*
>
> *to search it up 'cause I might forget to search it later that kind of things. . .***P6**

Participants indicated that they used their smartphone to search for different information

for both their everyday life and for academic purposes. For example, they searched for

information to answer specific questions that they had. They searched for definitions and

meanings of words that they did not understand in class. They used the smartphone to search for

information on hours of operation of services and also for searches on the location of activities,

buildings, events and so on.

> *I use it for school, like some words I read in my book and I don't know, I search it*
>
> *up, I use the app . . . and search for stuff for sure: like when the gym is opened,*
>
> *when the library is opened until, those information are pretty instant. . .***P11**

Communication

Communication was one activity which was mentioned by everyone. With the smartphone, communication took different forms. For example, communication between students and their colleagues in connection with academics or social activities on campus was usually through emails or texting. Students used emails on their smartphones to stay up to date with emails from professors, part-time work and for volunteering opportunities.

> *I will be able to talk to my friends like message them and that's very helpful*
>
> *because I'm not just doing work, but I'm actually having social interaction. . .P9*

They used texting and calling to communicate with family and friends who did not live in Montreal. Video chatting was more preferred with parents and family. While some preferred texting friends, others preferred calling. Participants with a preference for calling mentioned that calling allowed them to hear the voice of the person on the other side and helped them to feel more connected. This activity provided emotional satisfaction. Other participants also preferred texting because they did not feel comfortable talking on the phone. Most people said being able to keep in touch with friends in other cities helps maintain social connection with people they would have lost touch with if they did not have the option of mobile communication.

For study participants, the main modes of communication were by email, Skype, Facetime, texting, iMessage, WhatsApp, WeChat, Facebook messenger among others.

> *I definitely text a lot, I actually prefer calling to texting. I think a lot of emotions*
>
> *in the possibly in the voice that is really lost to texting. Definitely if it's going to*
>
> *be a conversation, I prefer to talk in person, or skype, or phone, somewhere you*
>
> *can hear their voice like the voice recording. . .P10*

Social media: Facebook, twitter, snapchat, Instagram.

Checking or visiting social media was a major activity performed on the smartphone. Social media was used as a central platform for many purposes. It provided information on the happenings in the life of one's social network friends through their postings. It was an avenue to stay connected with several hundreds, if not thousands, of people. It provided information about the rest of the world through news feeds.

I think I am a little bit addicted to it, I like to just, sometimes I just click in Facebook and see new information, like my friend's post, I like to look over those things but I don't know if that's a habit or I actually need that kind of information, it more like a habitual thing to just like swipe down and see news feed and I don't even click in some news, I just read the title and oh that's interesting and I just like instant news and I swipe through it. . .P11

Social media is a huge aspect of probably where I get my information, I guess like a lot of other people, every morning, I wake up and I look at twitter, Instagram, Facebook, I think that's like where I get majority I think of my information of like what is happening in the world and all the other stuff, so social media is a huge part of what I see . . .P16

I have the Facebook app installed which is probably the most popular app on my phone for me but I use it mostly as a news source because I am subscribed to certain pages and I have the settings set so that they automatically updates me so

whenever something happens, there is news about it on my Facebook feed so I do

that instead of watching news on tv for example . . .P8

Visiting the platform from time to time provided users with updates on what was posted since their last visit. Social media was also the platform where people searched for social activities and events happening in their neighbourhood, towns or cities. Apart from the information provided through social media, the platform was also an important communication tool. Many people stayed connected with friends through messages sent on social media websites. It also provided videos and other entertainment tools such as music, games and so on. Another important feature was the avenue it provided for sharing ideas, thoughts, and stories in various forms and formats.

. . . so like if a group of people, if someone wants to do something we will always

post it on Facebook or like we will always talk in the lab, or always talk in the

house, if people are going, then we all decide to go, and that's like activities and

then sometimes it's just like impromptu like tonight, oh I have nothing to do night,

what am I going to do…sometimes it a lot impromptu as well and in terms of

information, if we are like particularly looking for something, I guess it will be

Facebook, because like Facebook has an events page or something and people

will tag someone or someone will tag you or something, that's where the

information comes from. . .P14

I use it are for assessing Facebook, posting in spiritual groups. . .P16

Using social media sites has become a major part of peoples' everyday lives and for many smartphone users, this was an addiction. Especially because they have their smartphones

on them all the time, it is easy to feed this addiction. The most commonly used social media network include Facebook, twitter, snapchat, Instagram, and Wechat.

> *I have the Facebook app installed which is probably the most popular app on my phone for me but I use it mostly as a news source because I am subscribed to certain pages and I have the settings set so that they automatically updates me so whenever something happens, there is news about it on my Facebook feed so I do that instead of watching news on tv for example. . .***P24***

Entertainment: music, watching videos, video games

Another essential use of the smartphone was for entertainment. Many study participants mentioned that they used the device to listen to music, watch videos on YouTube, stream television shows as well as play video games. The smartphone served as their main entertainment tool since diverse kinds of options were available to use as entertainment, especially when they were bored. The most visited websites for videos and music was YouTube and Netflix.

> *If I'm bored I will find a you tube video if I have 5 minutes to spare …......stuff I don't have an alternative to that I will just kind of be like okay, I will just chill out and then for music if you tube didn't work, to listen to music, I would probably go to sites like band camp I guess, I don't really listen to music that much…. There is a lot of different sites to listen to music on, I just like YouTube. . .***P3***

> *Also like check the drama I'm watching, check when it will be updated, also streaming like watch TV dramas and things like that. . .***P8***

I love watching YouTube in my bed before I go to sleep, I use my cell phone. .

.P12

Reading and Documentation: Dictionary, note taking, reading, Google docs

Some participants indicated that they used their smartphone to read eBooks, PDF versions of materials they have, and access documents saved in their cloud account. The device was also used to document things in the form of note taking or taking pictures of information, events, people and places of interest.

. . . reading books, I love e-books on my phone so I read books on there as well

when I am on the bus for example. . .P16

So I use it to jot things down as I'm walking and doing things. . .P7

Also taking photos, I think sometimes I take photos of information that I might

need and sometimes it's just like photos that I might use to follow something just

like so I can remember it. . .P6

Organizing: calendar, alarm, physical activity

Most people also mentioned that they used the smartphone to organize and plan their daily lives. The calendar feature on the phone helped them keep track of everything that they must do each day. They got reminders for activities saved in the calendar. They also used it to track their physical activities such as distances run, and steps taken in a day. It is also used as an alarm clock as well as to track the number of hours slept.

It helps me stay organized, it's really big organizing tool, not just for my alarm,

but also for my calendar, for my notes, for keeping everything on the cloud. . .P10

. . .the sleep thing on my . . . is specifically setup that when I set my alarm at

night, it starts: it is not perfectly accurate because I don't fall asleep immediately,

and then when my alarm rings in the morning and I turn on my phone or click on

my phone and it says wake up, so when I wake in the night and don't touch my

*phone, it doesn't track that; and for exercise. . .***P15**

Other News, banking, translation

The other features used on the smartphone include internet banking and for language translation. A few people mentioned they pay bills through their banking application. Some also mentioned they used it in translating from French to English and vice versa.

For banking, online banking those are the day to day things I use and for

*languages, I keep track of books that I read. . .***P13**

4.3.2   Searching for specific purposes

In addition to the other uses of the smartphone mentioned above, participants also said they conducted searches for specific purposes. In this section, these searches are categorized into health, leisure, news and academic.

4.3.2.1   Health

Participants searched for information that helped to address their health-related concerns online. The main themes derived from health information search on smartphones are information on symptoms of disease, remedies for illnesses, nutrition, physical activities, and booking hospital appointments.

Information on symptoms

The majority of health-related information searches were to verify what disease or illness one might possibly have due to some symptoms they might be experiencing. Here, participants were interested in finding some answers online before consulting a specialist for treatment or medication. In some cases, people wanted to gain understanding of a medical condition, based on their symptoms, to determine if they have that condition. An example is depression. People may feel they have depression, as such, they search online for symptoms of the condition to confirm or reject it. Although people were aware that they might be getting inaccurate health information through the online search, they still went ahead to search.

> *. . . like for my mental health and physical health if I'm sick I might Google my symptoms, to see what I have. I realized that you shouldn't do that because they always exaggerate . . .. I then I think one thing for mental health is like…. People talk about depression but then how will you know if you have depression. So I Google that before; like "how would you know if you have depression because a lot of people have it and I wanna know if I have it; to get help if I do need help. I think that's very important. I think for mental health its mainly looking for signs to see whether you . . .I mean what make the person have that sickness, and how to help with that sickness . . .P9*

> *. . . for example, yeah like if I'm feeling sick or something, I might look up for certain symptoms, there are a couple of websites that I know are I mean they are reasonably good . . . forgot the name. . .P2*

Remedies for illness

Another reason for searching for health information was to find homemade remedies for common diseases and conditions such as cold or broken bones. Participants searched for activities to do or foods to consume to ensure a faster healing process. They surmised that getting online information from people who have had similar experiences might be the best way to address their health problems.

So like I don't trust it that much but at the same time I'm worried and also I will like to look for remedies to get better soon. If I have a cold I will Google what drinks to make to make your cold better. . .P9

Right now its been my phone and I actually broke a bone, my collar bone, when I was going through that, I was using my phone a lot to find what I can eat that would help the bone heal, what things I should avoid, I was also reading other people's experiences of this fracture and how long it took for them to heal, so I really noted a lot of videos and things because I had a lot of time and I wanted it to heal well. . .P23

Getting sick like getting a cold is inevitable, I know that it happens like two times a year, I always get cold and then sometimes especially when I was in Toronto if I get sick, I wouldn't like search up my symptoms or anything I would just go to the doctor, the doctor will have a look usually they just have the same thing like drink warm liquids, gargle the throat with salt and water, Strepsils or like lozenges. Those candy things. . . that you use, that's pretty much it, like here going to a

doctor is complicated so I just,so, just do everything the doctor said before I

actually doing any research. . .P4

Nutrition

Participants searched for nutrition related information to help them consume balanced and nutritious meals. Most people, especially students who never cooked while they lived at home, said they look up recipes online to help them prepare the kind of meals they want. Online recipes were very popular since some of these students cook and would like to experiment with different food cultures. Others searched for the nutritional content of food such as the number of calories as well as type of ingredients contained in a particular food product.

. . . so I went on their website, actually McDonald's have a lot of information

about their products, about how much calories, how much sugar, what

ingredients so I found. . . I looked for the ones I saw which ones had more natural

ingredients and which ones have less sugar. Now I know now when I get the

smoothie I pick one with less sugar. . .P2

like recipes, not really but sometimes when I am not sure if . . .I'm not familiar

with a certain food I search up just through Google and the facts of that food, I

have been searching up for what tofu is. . .P6

Physical activities

Participants also mentioned that they searched for information on physical activities to either learn how best to perform specific activities or add to the knowledge they already possessed. Here, users searched for information that related to the particular physical activity that they were currently using or they intend to include in their exercise regime.

sometimes online I will see, I look at blogs, I like fitness blogs sometimes, I will

see like what they are doing and I will try to incorporate that into my routine

especially with meals or dietary plans and like maybe just like routine like the

gym, but mostly what I do is pretty similar to what I have been doing in the past I

just weight train. . .P14

4.3.2.2   Leisure

The category leisure represents searches for information that is not related to health, news or education. Leisure information search covered activities people want to do for fun. They include events or activities, shopping, location, operation hours, and places to go, among others. All themes derived under leisure searching are further explained below.

Events or activities to attend

Searches for events and activities mostly focused on the event or activity that one wanted to attend. Often, participants searched for activities such as watching movies, going for a musical concert or searching for dates of well-known events. As one interviewee said,

my mobile phone, about 80 percent of the time 20 percent will be for things when

you need planning, for example you go to visit … you have never been to, that's

leisure so I would want to use my computer for that because I want to plan but

with your phone, it's kind of hard, 80 percent of the time I use my phone, lets you

are looking for a restaurant that's cheap or a movie that's like good like you

don't know what to watch for tonight. I use my phone around 80 percent to search

for leisure related. . . P20

Shopping

Online shopping was also mostly done on smartphones. The searches included both the item being considered for purchase as well as reviews on the item.

> *. . . ideally, I search for products, I use map to locate where ever I am going. For example I need to check up something on amazon, so I just go check it up, I need to buy something on Kijiji, I go check it up basically. . .**P17***

"How-To" information or videos

This kind of information focused on information that taught study participants how to do things such as exercise, cooking, learning to play music instruments and so forth. Most of such information was found in videos. Some of these videos were created by private individuals while some were created by professionals with sponsorship from an institution or a corporate entity.

> *Sometimes recipes, when I have some vegetables and I don't know what to do with it I will just look up some recipes to use with the vegetables. . .yeah that's true I will try to look up like what should I do so that I won't feel tired, I will truly look up for that and there's some nutrition advices and they will suggest you do some exercise like a moderate exercise, also there was a time I tried to use my iPad to download "soso" another kind of fitness app that had kind of different tutorials for exercises, and I kind of used it for a month or so and I just gave up, I just can't constantly do that. I think basically that. . .**P8***

Location searching/ Opening hours

In this instance, people used their smartphones to locate public places like libraries, bookstores, museums and so forth. Participants were able to do all these searches with ease because they always have their smartphones with them and so it is very convenient to find this

information. Also, location searches included, searches for services such as pharmacies, hospitals, grocery shops, or restaurants close to the person.

> *it could be anything, like any kind of little question I have at that moment, a lot of time it will be searching up addresses or location of nearby places that I am trying to access; so if I am looking for a restaurant or the closest pharmacy, or most of the time where a building is on McGill campus for example, so that is one of the biggest places I search beside that, it will be sort of questions that I come across just in my daily life; like I said, travelling, like what kind of tree is that. . .*
> *P15*

Places to go

Searches for places to go covered places to go eat, places to travel to for vacation as well as spontaneous visits to places. Searches here were centred on the place and not what was found there or what services were provided there. Usually these were places that they had not visited.

> *leisure time, when I have free time to go out and do things that I like, I like to find what is going on with my phone and then go to it. . .P23*

Entertainment online

Most people mentioned they searched for and watched videos on YouTube and other streaming websites on their phone. Some also played video games on their smartphones for entertainment.

> *The phone, because again I will have it with me more often, computer feels like I tend towards using it maybe in the evening if I am watching a movies or something, I like the bigger screen or podcast or music or even like YouTube videos I use the phone. . .P22*

I play some mobile phone games, I look up like news or recipes and mostly

buzzfeed and do some very stupid surveys and also streaming like watch TV

dramas and things like that. And sometimes I shop online. . .P8

Check Reviews

Reviews were checked to know more about the items they were buying, places they

wanted to go as well as activities they wanted to try. They checked reviews on everything, from

food to hotels to shoes. There was no limit on what they searched for reviews on. The most

popular reviews they searched for on their smartphones were restaurant reviews.

We asked the Indigo person for help, I look it up online to get ratings too and I

asked her about it, I asked another friend about it, that friend hadn't heard about

it but I try to get as much information as I can before committing to buying the

book and we know it was wealth it, I mean the purchase was good and then after

that like I bought the sequels online. . .P1

4.3.2.3   News

In today's fast changing world, news has become central to everyone, including young

people. Everyone wants to know the latest news in their community, city, country and the world

in general. Access to such information is mostly found on smartphones. In terms of ways of

accessing news related information, most participants indicated the following methods are their

main means of accessing such information: news applications (apps), podcasts, social media, and

internet searching. Very few people use their computers for news related information.

News applications

Most of our participants said they had news applications of their preferred news agencies

installed on their smartphones. This gave them access to news items published by those news

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agencies as well as notifications on breaking news. These notifications usually included links to the full story.

> *I find that I read it more on my phone because I have the BBC app, New York Times app, so they give me the notification on the daily briefing and what is like important for that day so it's just because like if I am on my phone I get notification, I click on it and then it redirects me to the news page but I do like to read more on my computer than on my phone. . .**P27***

Podcasts

Participants also mentioned that they used their smartphones to access podcasts online. Some have podcasts from news agencies that they listened to each day to stay abreast with current news.

> *I listen to podcast all the time, so I use my phone for that to keep up to date, and also current events . . .**P26***

Social Media

The other method through which people obtained information on the latest news was through their social media accounts. They received news feeds on social media platforms such as Facebook, twitter, and Instagram. On social media, participants mentioned they either follow the news agencies themselves or news personalities that they were interested. As such, when the news agency or the person they were following published anything, they immediately received notification about that. In addition, some did not follow any news agency or media personality (e.g. Anderson Cooper on CNN) but got news feeds through social media by having a social media account or through friends reposting interesting news stories.

. . . either if I am reading news on Facebook, I am subscribed to pages and I am

also subscribed to particular people they are sort of bloggers where they would

...on tumbler or someplace like that they write on their Facebook pages, so

sometimes if I am searching specifically for news I will look on Facebook mostly

and the mobile browser, I use that for about anything else so whatever I want to,

mostly Google, I will use that, sometimes I search news on Google but it's rare

*that was a few years ago . . .**P24***

General internet search

Few people mentioned that they did general internet searches for news. These searches mostly happened when they saw a news item on someone or headlines about an issue that people were discussing.

I will look up the name and see what pops up like in recent news, it also applies to

the political sites and you tube doesn't work, I have seen all those freaking videos,

I will just ditch you tube go to Google and look up if he is in the news lately and

*end up reading an article or whatever publishing thing . . . **P3***

4.3.2.4   Academic

Generally, all participants indicated that they did not perform academic information searching on their smartphones. Academic information, in this instance, referred to peer reviewed articles meant for research assignment for writing a paper for a class. The consensus was that academic searching was "serious business". This was because they were required to provide reference sources for the materials, they used to write their paper. Such in-depth searching for information was often done on computers. However, a few study participants mentioned that they occasionally used their smartphones to search for brief academic

information. Sometimes, they used it for looking up terms or concepts, accessing course related

information online, taking notes, reading, locating library items, translation, dictionary,

teamwork, and watching educational videos.

Looking up terms or concepts

Looking up terms or concepts constituted the majority of academic searches done on

smartphones. It covered instances where participants said they used their smartphones to find

meanings of words or concepts that they came across, either through reading a book or when the

word was mentioned in class. It included information searches to get a quick overview and

meaning of a term or a topic that was being treated in class. Sometimes, the smartphone was

used to search for terms that may suddenly come to mind that they did not understand. They also

looked up information on how to properly cite reference materials in a paper as well as how to

properly format documents or posters.

> *Yes, as I mentioned before, if I want to make a research paper or a poster and*
>
> *how I want to format it to make it look nice, when you hand in stuff there's always*
>
> *a rubric, and they look for what's proper and what isn't. . . because we had to do*
>
> *that for our biology class last year so me and my partner will Google it. And like*
>
> *what's the proper way of citing something because we learn how to cite in high*
>
> *school but we don't learn it properly. It's important to Google stuff that you will*
>
> *really need in the future and to look at reference to see if you are doing something*
>
> *right or wrong. Or if I don't understand a concept I will try to Google it to see if*
>
> *I'm doing it right. If I'm doing an assignment and I really don't know how to do*
>
> *that question I will try to Google it. . . P9*

well if I don't have access to my laptop, I will use it as search engine or whatever

especially when I am in class and the professor says something and I don't know

like a word that I don't understand and they don't explain it, I will just like

*quickly to type it into Google and see what they are talking about. . .**P14***

Accessing course related information online

In terms of accessing course information online, participants indicated they used their smartphones to access information on their class schedules, class readings as well as any information the professors might put or leave on the online course platform.

I think my first semester here I wouldn't open my computer because I didn't have

a laptop, didn't need to connect it to …..things, I didn't bring my computer for the

first semester and I think then I searched more like if the teacher asked for

anything on my courses or things like that on my phone, way more often than I do

*now because I have my computer with me. . .**P21***

Also I have lately started using the McGill app more often in order to find my

*classes or to check up on what the readings are for my course. . .**P26***

Translation

Another major use of the smartphone for academic related purposes was for translating from one language to another. Some students taking language classes mentioned that they used their device in classes to assist in translation.

if I need to check something really quick, I take language classes so sometimes in

class if my teacher says a word that I am unfamiliar with, I will look it up, like I

will translate it or something on my phone because I don't have my computer with

me, I don't really bring my computer to school every day but I bring my phone

just because it smaller, its very handy. . .P27

Dictionary

Apart from translation, some also used the smartphone as a dictionary to search for meanings of words in the dictionary applications.

I search up stuff sometimes on my phone, actually very often I use it for dictionary cos I

feel like let's say I'm reading a book in French, and going to my computer or using a

physical dictionary, I will be too lazy to stand up and get it but with the phone it's kind of

very simple you can go to… if you have internet you can go to any kind of website its very

fast in terms of translating, phones are very useful for that. . .P6

Sometimes I look up some words, since English is not my first language. . .P8

Locating items in the library

Some mentioned that they used the online map of the library on their smartphone to help them locate library materials. For instance, if they forgot to write the call number of a book they were looking for in their library, they used the map on their phone to locate the item which was very useful to patrons.

Like I came to the library and I forgot what the call number of the book is or

didn't write it down and I want to search it up quickly and see if it's there or not

then I will use my phone, here at the McLennan library they have this amazing

thing on online where you can press and it shows you the map and shows you

where it is. . . Yeah I really like it, it doesn't show you [a] specific place where the

book is but at least it shows you which floor it is and which shelf it's on. I find it

very useful. . . P6

Teamwork

The smartphone played a key role in working on group assignments. In cases where team members could not be together to work on the project at the same time, they did so through communication by calling or texting. While the actual work of writing the work was done on a computer, the communication aspect was done through the phone, one participant mentioned that they use the smartphone,

mostly to take note, sometimes I just... I also look up things on my mobile phone

like there is a term I didn't know in class and I will quickly look it up also because

when we are doing group projects I tend to communicate with my partners

through text message or iMessage or something like. . .P8

definitely, I feel like in those situation, I will be using them both at the same time

though, like say I am doing a group project, I might find it easier to do the actual

work o the computer and talk to the person I am doing it with on my phone. . .P18

Watching educational videos.

There were instances where some used their smartphones to watch educational videos as well. Similar to "how to" videos that people watched to learn a skill, such as, playing a music instrument, the educational videos provided lecture-like videos on various subjects online. Some students watched these videos to make up for missed lectures or as a complement to what they had been taught in class.

If I don't understand something that is in the text book, I will look up it up in

wikipedia, adventure to try to understand what is going on, I also watch a lot of

*educational videos too to help me. . .***P18**

Non searching academic activities: note taking/ record keeping

The smartphone served as a note taking device. Participants said that they used their smartphones to note down information they would like to either search more on or to just to keep a record of their notes. One person said that using his smartphone for note taking ensured that he had a record forever and did not have to worry about losing the information like he would if he wrote it on paper. While this does not involve searching for something online, it is an academic related activity some participants performed on their smartphone.

When you think of something you can note it down on your mobile phone. I

*omitted that, I also use reminder and notebook to note down things. . .***P8**

Also I have this where you can take notes, so I will sometimes use it to take notes,

*cos unlike paper it will not get lost so I use that a lot. . .***P6**

*So I use it to jot things down as I'm walking and doing things. . .***P7**

Reading

The smartphone was also used to read e-books and other electronic resources that are of interest to people. Some study participants said they used it to read books when they were on a bus. Few people said they read their e-books on their smartphones most of the time. Some also used it to get access to online reading platforms for which they have membership to access books online.

Do you know Hermione Granger ?...she is an actress and she started this book

project called my shared self, so its like a giant book club on good reads and I'm

part of it and she always give feminist books to read there, you know like she

gives suggestions. So like I use online resources to find my books. . .P1

reading books, I love e-books on my phone so I read books on there as well when

I am on the bus for example. . .P16

There was one student who did not, at the time of the interview, have access to her computer due to a bedbug infestation in her apartment and as a result did all her reading on her smartphone.

for school I guess, to know my classes, what I have to do, I have a computer in my

old apartment but they had bed bugs that's why I have all my stuff over there but I

haven't brought a lot of it because I don't want to bring it back to my new place,

that's why right now I can manage just with my phone, If I need a computer I can

use one on campus but I can do a lot of things, I do my reading…. I already have

few classes, because it's the first week, it's not so much yet and also I haven't

been working too much, reading is easy because you just download the file and

then you can read it, I think if I have to do an assignment, I will not do it on my

phone because it will be too complicated but I don't have too many assignments

right now so maybe once I have ..either try to get my computer back or use the

ones at school. . . P23

4.3.3 Evaluation of information found on smartphones

This section focuses on how information is evaluated based on the purpose for which the information was searched. The analyses in this section aim at answering RQ 2.

4.3.3.1 Evaluation of health information

When asked if they evaluated health information found on smartphones, almost all participants indicated they did not evaluate the information they found. After prompting them with specific scenarios derived from the questionnaires, some said they sometimes looked out for some of the following; credibility of the website or source, author, consistency with other sources, quality of language or images, currency of the source, experience with the source, top five hits in Google search and other users reaction. None of the respondents mentioned that they used all these factors in evaluating information. Some mentioned applying a few of these factors.

Credible and trustworthiness of source or website

People were careful when dealing with online health information. As such, they would ensure that the information they finally adopted, based on their search, was from a credible source. Here, the credibility of the website, and the source or the organization responsible for the information were vital. For example, people believed that if the information they were reading was from a hospital or medical institution, that information was credible. Also, well-known medical websites, such as PubMed, which offer access to the MEDLINE database, and WebMD were also used to ensure that the information was credible. Generally, people flagged websites that they would avoid when looking for health information. For instance, a website like buzz feed was mentioned as a site without credible health information.

> *you go through more websites that are almost like quiz or buzz feed type of*
>
> *situation and it's like this is not very legitimate especially when its something as*

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important as health so it's definitely more of those website is connected to a big

university, its like a medical website. . .P21

Study participants mentioned that they made a conscious effort to avoid websites with less
credibility for health-related answers.

like if it is like more like PubMed versus Yahoo answers I guess which is like

known to be more of a trustworthy website

...personal stuff maybe like if someone is asking me about a certain infection, like

they are worried that they might be undergoing some sort of infection, then they

know I have science background but like I don't want to give them an incorrect

information so I will just go to a more scientifically correct website just to make

sure what I am telling them is correct, yeah I will do that, anything else, no I

don't think so. . .P16

In addition, if the information is provided by a health institution, respondents believed
that the institution would have conducted due diligence before publishing the information on the
institution's website.

if it's like a .. a web page of a hospital or a health organization I know that's a

source I can trust, so I know that probably pretty accurate information……. well

on the internet usually, like usually the information that you find on the website of

organizations like a reputable organization like I said for example a hospital or

something 'cause I know that like there is ...these people are serious and there is

someone who is actually knows is putting this information there and it's not

random you know if it's just like Wikipedia, I don't , it depends , maybe I wouldn't

trust all the......especially things like health I wouldn't necessarily trust anything

on Wikipedia. . .P2

Author

Apart from the organization or institution responsible for the website, others went further to look at the author or the person who published that information. They considered their professional background and research to determine if they had enough experience on the topic to provide the right information. In instances where medical advice was sought from a question and answers website, they judged the credibility of the information through the professional background of the person providing the answers.

often the actual website that is publishing the information, I will look at that

before I will even click on the site like I said before. Because I can tell or not,

maybe not fully, accurately but often this site gives a little bit of information about

who put the information whether that institution or group is credible otherwise if

it's not the website, often the authors of the information I'll check underneath who

they are or why they are credible about this information, whether they professors

or doctors or what they have done in that field to make them credible with what

they are providing. . .P15

Yes I try to, sometimes when I am in a hurry but sometimes for example like

medical advice on like question and answer website, obviously I would try to look

for who the person is, like he or she might have Dr. something in his name or her

name, it could be like the Dr. title is actually a doctor or actually it could a fraud,

when it comes to that I take my time. . .P20

Consistency with other sources

Another method used to evaluate health information was to check several sources to ascertain the consistency of the information provided. This was to ensure that decisions were not made based on only one source. Participants indicated that they were often wary of health information online. However, they were less skeptical if two or more websites provided the same information.

probably not as much as I should, … I might check like two or three websites to compare, that's the end of my evaluation. . .P18

let's say for example when I have a headache or I have a symptom for something like health related issues or like travelling to a different country, I take my time I try to look for other sources because I don't want to depend on one side… if multiple sources or multiple sites say the say thing, then I am more likely to believe that even though there is still some skepticism. . .P20

In some cases, study participants were suspicious of the accuracy of information, especially when they found inconsistent information from several websites. The essence of consulting several websites was to ascertain the credibility of the information being provided. As such, if after consulting different websites, there was still inconsistency, users concluded the information could not be trusted.

I will try to look at a few websites to determine if it matches, if there is, like two or three websites telling me different things, I will tend not [to] believe any of that, and then also there is a gab reaction there. . .P22

Quality of language and image

The kind of language that was used to write the information also influenced respondents' judgement of the information provided on a website. Websites that were written in professional language were considered credible as opposed to those that were not. Also, when there were typographical or grammatical errors in a written piece of information, it conveyed that the information lacked credibility. It also communicated the lack of professionalism on the part of website contributors, creators and editors who are responsible for creating and ensuring the quality of the content. As such, users were less inclined to use that information.

> *Yes, it just has to look good, it has to look professional, it has to look at I can trust it and not be something that is trying to lure people like an advertisement scheme or something. . .P21*

> *. . . the more professional the language is, the more people or me myself will be more likely to believe in it or to accept that advice though I wouldn't say 100 percent, sometimes people give advice or information in professional language but its not really true. . .P20*

> *If the text is written in such a way that you could clearly see that it is missing spaces and comers, I would probably ignore what is written there. . .P24*

Furthermore, if the images on the webpage do not load well and efficiently, it portrayed that the page was either outdated or was not a credible website.

. . . I'm definitely biased towards those results but also [the] quality of the web

page itself so if there is a web page and it's not loading well, I may be skeptical of

it because it seems like outdated information. . .P22

I feel like when a website is designed well, you can tell like I have seen this so

much, it's like pictures don't load and it looks like it was made in 1999, am just

like this is obviously outdated, not trustworthy. . .P21

Currency of the source

Users considered how current the information provided was by looking at the date of

publication of the piece. Due to the nature of the rapid changes in medical information, with new

information added daily, users checked to be sure the information they were accessing was the

most current. When the date of publication indicated a date, which was more than ten years old,

they were more likely to conduct further checks to ensure credibility.

Interviewer: what if the information is up to date, would you check for that?

Participant: yes, definitely especially with my medical things, things just change

like more information is added. . .P21

Information is up to date; I try to look at the publication date also. . .P24

Yes I always check, information from 2006. . .P20

Experience with the source

If a website provided credible information the previous time the person visited the site, they were more inclined to use the website based on that experience. Adversely, if the information was not credible, they discredited the source based on previous experience. There were instances in which well-known websites had been branded not credible based on previous false information retrieved from the website. In the case of health information, WebMD was mentioned as one website that exaggerated diagnoses based on symptoms inputted in the information search. Some study participants therefore avoided WebMD for health information.

but if in advance I know that is not a very good source, I almost will never go

there, unless I am interested in something, how did they present it, even though I

don't trust them. . .P24

I have moved far away from using WebMD, WebMD is so bad [it] is fear

mongering. I try not to seek medical advice from the internet like "by the way you

have cancer", but if I am to use a website, I will definitely read a bit about the

About pages to see if there are organizations that I know of, that are credible

sources. . .P26

Top Five

This refers to the first five links that are provided when you enter a search term in a search engine. Study participants believed that a link that appeared in the top five results was highly rated by users and was relevant either because many searchers had accessed the link or was highly ranked by relevance ranking algorithms.

I would say generally this first one here is . . . fit at the top of the search, not

necessarily more keen to trust it but it seems that it's been pushed to the top either

due to views or ratings, some algorithms, so top search I definitely biased

towards those results. . .P22

Others selected the top five not because they trusted it more but because they did not go further

to see which other sources they could consult. This behaviour was based on the belief that all

relevant documents to a search were presented right away in Google, and as such anything that

did not appear in the first few pages were irrelevant.

I will definitely open up the first links that pop up, I don't think I ever go to the

second page, its very rare unless if I don't find any on the first page I can

sometimes click on the second one, the third one but if there is three or four

results .. the first one, I won't go any further. . .P24

Other users' reactions

Here, the decision to use the information was based on what other people had said about

it. Respondents trusted other people who had been through a similar situation and were sharing

their experience on the topic online. These user reactions also included their own reviews of the

website. The common assumption was that one can only comment on something that they had

experienced. As such, even though there was no guarantee on the veracity of the shared

experience, study participants still viewed shared experiences, in the form of comments, as

credible.

I also trust people who share their experiences because if someone has been

through the same thing, sometimes they will explain things more detailed that a

doctor wouldn't tell you, and most of their sources gave similar, like different

nutrients, something that you eat so all the information worked well together. .

.P23

Reviews

Sometimes, the decision to use a health facility or service was evaluated based on the reviews received by that facility or service in the form of customer reviews. Here, the health service was evaluated based on how many stars they received or what their customers had written about them online.

> *I need to find a dentist, that kind of stuff, I did find a dentist here, I can randomly*
>
> *I just search up dentist that they had and chose a random one that had good*
>
> *reviews so it's kind of like it was not very organized and it is just like the first one,*
>
> *I just scroll down and I press on the random one in the list. . . P4*

4.3.3.2   Evaluating leisure information

Generally, leisure information was not evaluated. In cases where respondents evaluated leisure, three methods were used. They were recommendation/rating/reviews/stars, quality of image, and a combination of other methods such as top five, quality of language, experience with a source and by following an individual, group or event.

Recommendation/rating/reviews/stars.

This method involved deciding to, buy something, attend an activity or go to a place based on the recommendation of friends or people they believed had more knowledge. Other times, the decision was made based on peoples reviews, ratings or stars that the place or thing of interest online. For instance, if the item of interest had received a lot of good reviews by others who had used it, respondents would consider these. Also, if the item was highly rated by people and it had many stars, that will be considered as validation that this item was good. In addition,

having other people's review of a restaurant as well as their ratings provided study participants with several peoples' opinions on the restaurant. As such, deciding to eat at that restaurant was based on the views of many, rather than on one person's opinion.

> *It's actually like now it's my first choice, because I can usually get the information I want just from cell phone searching, and also there are more information like more people writing comments, writing reviews so I can get perspective of all what other people say, like if I just hear like oh this restaurant is good from my friend, it's just one opinion, but actually on cell phone, when you are searching you get a lot of opinions and you can evaluate. . .P11*

Quality of images

Another way of evaluating information on leisure was through the quality of images presented on the website.

> *. . . for that I look at stars often when something had a lot of ratings in a high number of stars that suggest reliability, I sometimes look at which one has a picture if something has a picture then I'm more prone to cooking it. . .P4*

Other methods

Here participants indicated several methods they used to evaluate the information. An example is to decide to use information from a website because it has been used before and it was helpful. Sometimes, they may follow a popular person on social media to get information on events hosted by that person. In such cases they would receive notification about those events and would make a decision to attend or not. Some respondents mentioned that that evaluation was best done in person. For example, even if they found a restaurant online through information

search, they would still visit the restaurant and would evaluate and assess the restaurant based on their experience at the restaurant.

If there is something I want to go to, I would probably check for credibility when I am there. . .P26

Usually on Facebook, I follow, It could be like a bar, a specific place that I have been to that I like so I follow them or artists, whenever they are going to perform somewhere or they have an event, they post it and I will say that I am interested, sometimes they post it several days or weeks, then I will say I am interested so afterwards I have all that information stored I can just look at it because if I just look at the events then I will probably forget but that way I can put it on my calendar, I wont always go but at least I can look at what is happening. . .P23

4.3.3.3   *Evaluating news information*

In evaluating news information, respondents mentioned that two main factors influenced their evaluation. They were concerned with the authenticity of the news, that is whether it was fake or real, and they were also concerned with inherent biases that a source might be known for.

Fake or real news

Due to the constant news feeds received from social media, many people indicated that they were aware of news articles which were sometimes fake. When they encountered articles that might be fake, they would go to the actual websites of the news agency purported to have published the news article to verify if indeed they published it. Sometimes, they would check other known credible news agencies' websites to ascertain if they have also published an article on the same topic. Verification of whether news was fake or real could be triggered by the nature

of the article. If the article was too sensational, readers were suspicious of the information

provided. In addition to checking from other sources to ensure the story was not made up, they

checked for the quality of language to see if there were any grammatical or spelling mistakes.

> *If I am reading news articles and I find that there is aspect of what is been reported that*
> *seem to me be dubious or it seems like it's enough new information to me that I want to*
> *do some back up research on that, back up research to see what "I didn't even know the*
> *basic facts about this so I would get a good understanding of what that is, in that context,*
> *I think I would do more research to find that and part of that research will be verifying*
> *that the information is correct or that it's a full reporting of the facts, in other cases I*
> *don't really find the kind of things I am looking at my phone or things to need to be*
> *verified. . .P19*

Biases

The other key factor for evaluation of news was to check for biases or leaning of the

source. Here, it was mentioned that the problem was not the credibility of the sources since they

got the information directly from a credible source. Instead, the problem was the underlying

political leaning that is portrayed by some news outlets. Interviewees said that news agencies

were not objective in their reportage due to their political affiliation. As such, they would report

a news item in their favour, depending on the side to which they belonged. Thus, it was

important to get the story from both sides for a better understanding of the situation being

reported.

> *I listen to podcast from the economist from the New York Times, and of course you are*
> *always checking for bias, I recently reduced my conception of the New York times*
> *podcast called the daily. which is just like 20 minutes of top news cast, it has very, very*

left leaning slant and even though I'm a left person I don't want that much bias in news…

I listened to another podcaster recently sort of to supplement because it has different

sources and different bias, or I will reduce my consumption of that media because I want

a balanced approach. . .P26

4.3.3.4   *Evaluating Academic information*

In terms of evaluating information for academic information, participants indicated that since in-depth academic information searching was mostly done on computers, the evaluation was based on several factors. These included peer reviewed papers, library catalogue and databases, Google Scholar, and a combination of methods. For example, students used at least two of the following methods in their evaluation; author affiliation, quality of language, top five results, matches other sources; based on the list of evaluation methods shown to participants. With information found on smartphones, which was usually factual information, such as definitions of terms and concepts, or for accessing course related information found on their university website, no evaluation was done. In cases where students evaluated this information, they used a combination of methods such as author affiliation, quality of language, top five results and matches with other sources.

Peer reviewed sources, or library catalogue and database

When searching for information for academic purposes, such as a paper writing assignment, participants indicated they used either peer reviewed sources or the library's databases to find documents and were aware that they must use credible sources accessed through the library.

Yes, I know to avoid putting resources like Wikipedia and I think I know which

websites trustworthy are not more, if I am using the library catalog and its like

JSTOR I can trust more but I would never put a blog something on my paper. . .P27

. . .for academic purposes I think I would use sources that were more inherently credible, sources that my professors would recommend for example and use databases provided by McGill to find journal articles, use books at McGill, I would say that even so maybe I would apply a similar process….sometimes I would …reading an article and I would say this doesn't seem rigorous in how it was researched, the logic of the author isn't sound to me so I don't trust the facts so much, but I would also say it depends on how desperate I am to get the assignment done I feel like there are a lot of instances like this is a 200 hundred double class and I feel it's not related to my major, I am just taking it as an elective,…so I know that this isn't a quality source but it is quality enough to do this PowerPoint presentation. . .P19

I think if it's about academic, I will look up to see if it's peer reviewed or something or if the publisher is trustworthy. . .P8

Google Scholar

Sometimes, when documents were not found in academic databases, students used Google Scholar to locate credible sources for the assignment. Here, peer reviewed documents which had more citations were considered more than those with less citations.

Because when it comes to papers, looking for resources for papers I will look in citations or Google Scholar,…..or how many times this work has been cited,

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that's the only thing I try to verify if its like 100 people who verified or 100 who

sited, then I would trash that but if its just like two people, that's not really a lot. .

.P20

Combination of methods

There were instances where respondents were unable to find the documents, they needed to write a paper for a class in a library database. In such cases, they searched for the material in Google and used one or more of the following evaluation methods to judge the credibility of that document. This included combining different methods such as the reputation of the author, publishing organization, quality of language, the top five results, consistency with other sources and currency of information in deciding whether a piece of information could be trusted and used to write an academic paper.

Looking at information pertaining to assignment, quality of language is really

important as well as how early it shows up in the list because I am lazy, I guess

those two for primary sources, but if it is a scholarly, ... so quality of language

and then early results if it's a primary source, like an older document but if its

like a scholarly document or recent article or republication of an article form the

60s to 90s, I will try to do a little bit of search to make sure it matches with other

sources…and then. . .P22

When it is about something for studies, I am going to check for quality of

language of course and the experience affiliation. . .P25

4.3.3.5   *Reasons for not evaluating*

Respondents cited various reasons for not evaluating found information. These included their perception of smartphones, the source of information, and the purpose of the information. These are discussed below.

Perception of smartphones

Respondents did not evaluate found information on smartphones because of their perception of the device. Some students viewed the smartphone as a tool for casual use. Students did not evaluate information on the smartphone because of this perception. Therefore, because the smartphone was for casual use, the found information did not warrant deep thought and evaluation. The lack of seriousness attached to using the device could be the reason most people did not evaluate information found on it.

> *I think cell phone is different from laptop search because laptop, you do it with more seriousness but cell phone is like everyday life so I don't like really do that, if it looks legit. . .***P12***

> *I think on my computer because its easier for me like I said to use the tab, its easier for you to go through a lot for a shorter amount of time and its more difficult with a phone that's why I think I am less likely to verify on my phone because its convenient you don't want to wait for a lot of time trying to look for answers, that's why I don't verify stuff that I search on my phone to the same extent as when I am search for stuff on my computer. . .***P20***

Source of information

Respondents also mentioned that they did not evaluate information found on the smartphone because of the source of the information. Generally, people believed that information from certain websites was credible. As such, they did not need to check for credibility if the found information on the smartphone was from those websites. Also, when information was retrieved from a well-known source, the name and reputation of that source provided a certain level of comfort with the material. As a result, users did not feel the need to evaluate information coming from that source. In the same way, for some respondents, information from some sources which they believed as non credible influenced the evaluation process more than information coming from a known source.

> *Yes, maybe the reason why I don't evaluate it is because of the source of the news, for example when I see a news item from maybe CNN, I don't really need any validation because I trust the source but maybe when I see a news item on social media since social media is a platform where everybody post anything else, then maybe it will prompt me to validate it but for example if it is a news item or if it is a health news from a credible health centre or something I don't need validation I just feed on the news and I am on the go but if it has to do with social media, then yes I might need some validation. . .P17*

> *No, because usually the things I don't understand in class are like definitions so it will be like they are repeating a word a lot and its part of the explanation and I am like I don't know what that means so I will look it up, so it's usually like I will*

go on Wikipedia because they have a good link, the first sentence tells you what it

is, like the term, then I am like I understand, I will keep listening. . .P18

Purpose

Respondents mentioned that the purpose for which the information would be used also influenced their evaluation of found information using smartphones. For example, the searchers did not think there was the need to evaluate information that they considered unimportant. They also considered the information they searched for on smartphones simply for fact checking and not for detailed reading. Interviewees frequently mentioned that quick fact checks did not need verification. However, if it was detailed information for in-depth reading, they might consider checking to be sure the information was credible. In addition, if the purpose of the information was to address health concerns they were experiencing, they were more likely to evaluate it than if it was for other purposes.

If it is a quick search like for something that I am not going to spend a lot of time

reading, but no I definitely don't care about the credibility but if it is something

that's sort of more in-depth, that I am actually going to take the time to read,

obviously it's not on the go: maybe when I am sitting down sort of reading

something on my phone then I will check the credibility. It also depends what

information I am looking for: like it is something that is not that important like a

location, I don't think I find something that is credible or if it is an article about

wellbeing like I was talking about before, exercise or nutrition that I want to be

legitimate, then I will take the time to look at it. So, I depends on the information

that I am looking for, check the credibility of the source. . .P15

4.3.4 Choosing device to search by topic

The results in this section provide information about how people choose devices in searching for information online.

Health

Health information is searched both on computers and on smartphones. Respondents mentioned that they had preferences for where they searched for information. The choice to search for health information on the smartphone or on the computer differed from person to person. Whereas fast factual health information was almost always searched for on smartphones, respondents preferred to use the computer for searches that required extensive reading.

Smartphone only

Most of our respondents conducted their health searches on their smartphones. Most people said they searched on smartphones because it was the device which was readily available and accessible to them when health related questions came up. They also used the phone because they had installed health related applications which they used when they needed health related information.

> *My mobile phone because the mobile phone I have some apps which are health related*
> *so if you want anything concerning health or fitness, it's on the app, you just click on the*
> *app and you just ask the question then you get the answer so mostly it's on my phone. . .*
> *P17*

Computer/laptop only

Few study participants mentioned that they only searched for health-related information on a computer. To them, health was a critical issue that required more diligence in searching.

Also, the computer allowed them to search several sources and they could easily verify the

information they found.

> *For my health, I think on my computer, just mainly because on a computer you can more*
>
> *of the sources, you can see the links more clearly, you can see everything like it's a*
>
> *legitimate source, on your phone sometimes you don't see the website clearly or things*
>
> *like that. . .P21*

Computer/laptop and Smartphone

Some interviewees said they searched on both smartphones and on computers. They

indicated that the choice was dependent on their location when the need to search for that

information occurred. Also, it depended on how much research they would like to conduct on the

topic. If they wanted to find information on just the symptoms, they would use a smartphone.

However, depending on the information found, if they wanted to read more on the topic, they

would do so on a computer.

> *That would usually be my phone because I usually have my phone on me when random*
>
> *things like that happen so I feel like that is mostly my phone but again if I had access to*
>
> *my computer I would rather use my computer but I don't bring it everywhere, like right*
>
> *now I don't have it with me if I want to check something now. . . P18*

Leisure

Generally, searching for leisure was mostly done on smartphones. However, when the

reason for the searching required more reading, then the search was done on a computer. One

participant said he did his travel related searches on the computer because it required consulting

other related websites for more information on the destination.

My mobile phone, about 80 percent of the time 20 percent will be for things when

you need planning, for example you go to visit a place that I have never been to,

that's leisure so I would want to use my computer for that because I want to plan

but with your phone, it is kind of hard, 80 percent of the time I use my phone, lets

you are looking for a restaurant that's cheap or a movie that's like good like you

don't know what to watch for tonight. I use my phone around 80 percent to search

for leisure related. . .P20

News

With the high usage of news applications and podcasts, most people preferred reading their news on their smartphones. The convenience of having access to breaking news through news applications made the smartphone the preferred device. However, few people said they read detailed news on computers, especially when they wanted to cross check with other media sources. One participant said she read her news from printed newspapers the few times she had the desire to read the news. Otherwise, she avoided reading the news altogether, whether on a smartphone or the computer.

News will generally be on the computer but occasionally I use my phone to look

up news, for instance I have associated press app on my phone and also ..updates

and if something catches my eye I use my phone. . . P22

I usually read news from newspaper… but honestly I find…. sometimes I do it,

sometimes I just avoid it, sometimes I prefer reading about something that I can

do something about, ...there's always something happening like disasters and

things. . .P23

Academic

Academic information search was generally done on computers. Participants considered academic information search as a very important search. It also mostly entailed in-depth reading, which is difficult to do on a smartphone. Searching for academic purposes often corresponded to writing a paper for a course, which meant that one needed to be diligent. In addition, the searching was conducted while writing, as such they needed to be able to type their work easily and efficiently. For these reasons, it was better to use the computer rather than the smartphone.

> *For this I would use a computer because on my phone it will be extremely difficult with the small screen, small keyboard, and of cause when I am writing assignment I absolutely need very trustworthy sources so I will go unto the library database and I can search for articles on a particular subject, in fact its almost it's a requirement to use peer review articles so on occasion I will look through the internet just to give me a certain idea about the subject, sometimes what I do actually is go on Wikipedia and look at what is there but I can't use Wikipedia but if it says something interesting, then I will try and trace the source and try to find a real scholarly article about that. . P24*

4.3.4.1   *Preferred form of information on smartphone*

Majority of the participants mentioned that they preferred short, straight to the point information on smartphones. They did not want to read extensive documents on smartphones. Detailed documents were mostly consulted on computers. Participants continually mentioned that they do not want to spend much time on long documents on smartphones, especially documents that required them to scroll up and down. They preferred text that has been written in

point form and not full sentences and long paragraphs. The preference for simple, short straight to the point information was not limited to any particular topic.

> *Yes except that if I search for information on my mobile phone it's gonna be like quick and useful information like what is the capital of this...things that I can read fast because I'm not going to read like a longer article on this tiny screen and just scroll for hours. . .P7*

4.3.4.2 Handling of Information

Information may not be handled in the same way by everyone. The way information is handled is defined in the present study as peoples' intention towards how they search and use information on both smartphones and computers. The discussion in this section centers on whether people are aware of how they handle the information they find on smartphones and computers. The themes under which responses fall are unconscious and conscious ways of handling information.

Unconscious

Respondents placed in the unconscious group were not aware of how they handled information found on either one of the devices. To them, the information they found or the websites they visited did not change because of the device they used to search for the information. They handled online information in the same manner. For instance, they mentioned social media information on a smartphone. This information was the same as the social media information they saw on their computer. They did not differentiate how they handled information on the smartphone versus information on the computer. They were also more likely to not conduct any fact check on the information they found regardless of the device used.

I would say so, its all kind of the same thing so I wouldn't trust the information that I got

on my phone any less than what I find on the computer and vice versa, fairly the same. . .

P22

 I think I would treat them pretty similarly as in I don't pay much attention to either as

much as I should, like everything I said about checking things, even if I had my computer

*in class, I would check things the same way, just fast. . .**P18***

Conscious

The group who were conscious, on the other hand, handled information based on what

they have allocated the device for. For instance, they mentioned that their smartphone was

mainly for casual and social related purposes. As such, they treated the information found on

them casually. Similarly, members in this group said that the computer was for "serious

business" and so they treated all the information they found on it seriously.

I think from my perspective I do because the things that I use on my phone is mostly like

social media and stuff like that so the information I get from there is not as legitimate,

when I am using my computer I have more resources of information, it's usually the

*more legitimate ones. . .**P21***

If I am looking for the same thing, again I do associate my phone for social media

and my computer for research, so I tend not to not care that much about the

information that I find on my phone because it's not like so important to my life as

much, they are just like which restaurant to eat, this person posted this picture,

this place looks cool, but I associate research to my computer . . .it is for serious

research . . .P27

Participants were more likely to follow trendy information on their smartphones, and skim through what they found there to get a general overview, than on their computers. Searches may be based on their own categorization of the information. For example, a search on a smartphone may be abandoned because it was for social purposes if the answer was not found immediately. Whereas on the computer, they would persist in their search even if what they were retrieving was not what they wanted. They also assumed that since the computer was for important searching, everything they found on it was also credible.

I think that on the computer I would find it easier to check information, I think if I

came across a source on that on my phone that I would deem not trustworthy,

then I am not going to just decide to trust it, I am more likely to say this isn't

worth my time, I will just close that article. On my computer if I find something

that I didn't find trustworthy I think I'd be more like I want to prove to myself that

this is untrustworthy or I want to get to the bottom of it not just forget about and

say this isn't worth my time. . . P19

4.3.4.3   *Reasons to search for information on smartphones*

Searches for information were usually triggered by several reasons. The most mentioned themes were, need to know, convenience or easy or quick to access, and context.

4.3.4.4   *Need to know*

The most frequent theme among participants was the need to know. They mentioned that the need to get answers to things that bothered them impacted the use of either the cell phone or the computer. So, for instance, if they were really bothered by that particular thing they were

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searching for, they would search for it right away on the smartphone. In this case, it would be very disturbing for them if they did not know. And so, they would rather not worry about it, and search for the information right away. Some said that if they did not get the answers right away, they might forget to search for it later; for that reason, they liked to search for information that they needed to answer those types of questions on their smartphones. Searches on the smartphone were sometimes triggered by the need to settle an argument between friends. The smartphone gave them the tool to search for the answer to win an argument and to prevent arguments among friends.

> *I think for me it because I just don't like not knowing and it bothers me if I don't know something. So then I will just Google it, because I don't know why but I have always been like this; if I get something wrong I would want to know what the right answer is. So I can get it right the next time. I feel that I always have to try to find the answer. . .P9*

> *I think it depends on how interested I am in the topic, if it is immediately relevant to conversation, although I try not to use my phone too much in conversation because it's a bit of a barrier but if there is sort of a need to settle something in both parties having interest in figuring something out at that moment, like a historical event, my friend couldn't remember the other day about Louise and Clark. He remembers Louise's first name was Mary, but he couldn't remember Clark's. That would have been a mediate thing that I would search right away. . . P26*

*I am very impatient person so when there is something that I miss out or something, I have to look for it right away because sometimes when I am writing down something and if I spell a word wrong or write a word wrong, that would bother me just because I know when I go back later and look at it and its incomplete, I won't remember what it is, so I have to do it right away, or sometimes when I am with friends and we are debating over something I have to look it up just because I have to know what the truth to that is, especially if I'm talking to my mum, I need to show her that I'm right. . .***P27**

For some respondents, there was also the sense of immediacy in their need to know. This desire to get the information right away as opposed to waiting and searching later, in most cases, triggered information searches on the smartphone. Some respondents also mentioned the urgency in finding answers. For most people, when they needed information, it had to be right now and not later.

*. . . for searching up things not for searching up important things like school stuff. Searching up stuff that I need immediately or I have a thought in my head I want to search it up cos I might forget to search it later that kind of things. Also, I have this where you can take notes, so I will sometimes use it to take notes, cos unlike paper it will not get lost so I use that a lot. . .***P6**

*If its something really important that can wait, I will go home and use my laptop for sure. If its something important and also urgent, I'll take my phone but if its something that I wanna take my time and read and research, I most likely can't do it on my phone. . .***P7**

*It's about the same …if its urgent and I really need it, like I have to go to somewhere on bus or I am lost somewhere, I have to use Google map right but if its like or sometimes I am walking with my friend and we are both very into restaurant and we are walking and we see a nice restaurant am like oh this looks nice, but I won't necessarily Google that right away, because it's not like urgent: so many good restaurant. . . **P12***

Searching right away, in some cases it will be like having, the question triggers the discussion or sort of a debate among the people I am speaking to so to settle it, I feel like it needs to be done right away, other times it is due time constraint so I am trying to find a pharmacy while I am walking there, for example, I will Google it right away. Also I am pretty forgetful, so I have a question about something that I just thought of and I know I will forget, I will search it up right away then…. Because often if I don't search it right then I know I won't ever, so if I think of something that comes across my mind and it seems important enough that I need to the answer, I do it right away. I guess your question is how do I decide how do decide what is important or not: I guess if it something that the information that I find I can benefit from directly or sheer curiosity that reach a certain threshold that I need to know the answer to so sometimes I guess some questions come up but I don't care that much for the answer, whilst other questions are more specific towards things that I am particularly interested in so the curiosity is what will tempt me or push me to actually search the question up. . .P15

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4.3.4.5   *Ease of access*

There were also instances where smartphone use was triggered by the fact that it was convenient to search on the device. Also, smartphone searches were considered easy and quick to do.

. . . it's one is more convenient because you can't carry it everywhere, you can just search up information basically the same thing you will search up on your laptop, but I prefer to use my laptop if I am home because it's just bigger screen. . .P11

. . . if you want to check something quickly, not only is it more convenient to check on your phone but you can't just pull out a laptop, like I can't pull out a laptop at work to check something, I can check on work computer but if I want to be discreet about it. . . P18

I just feel a phone is mobile, its just easier to take with you if you need to look up something like if you waiting in line for something then you can use that, my computer is heavier its bigger, so you need a table for it to do research. . . P 27

4.3.4.6   *Context: everywhere*

Due to the size of the smartphone, people carry it everywhere. As a result, people tend to search for information more often on them. Also, because smartphones could be carried anywhere, respondents mentioned that it was easy for them to take their smartphones out to search for information without worrying about others noticing what they were searching for.

Participant; if you want to check something quickly, not only is it more convenient

to check on your phone but you can't just pull out a laptop, like I can't pull out a

laptop at work to check something, I can check on work computer but if I want to

be discreet about it. . .P18

Yes because if I am out in public somewhere, even if I have my computer it will be

difficult to take it out so I will use my phone for that but at home or if I am in my

laboratory for example at school. . . P24

I think when I am at the university I am more on my computer, I do everything on

my computer even for entertainment, social media and stuff but if I am at home, I

am going to be more on my smart phone but always on my computer if it is about

work, and the other times like if I am on the streets or on a subway or something

its going to be on the smart phone. . . P25

4.4   Summary

The results showed the many uses of the smartphone. Its uses ranged from
communication, to internet searches and to non searching activities such as taking notes in
classrooms. The results also show limited evaluation of information found on the smartphone,
the reasons why people were not evaluating found information, as well as provide insights into
the reasons why people choose one device over the other.

Chapter 5: Discussion

5.1 Introduction

This research was conducted to study how smartphones and computers are used for online information searches among undergraduate students. This chapter discusses the results of the study presented in Chapter 4 by examining the inter-relationship between the survey and interview results. It also examines this study in relation to previous research and the implications.

Research and anecdotal evidence have shown the widespread use of smartphones for information searches (e.g., Church & Smyth, 2009; Cummings et al 2010; Smyth, et al 2007; Westlund, 2011). To answer the research questions, the present study focused on four information domains (health, leisure, news, and academic) to better understand smartphone information behaviour among undergraduate students. The intent of the study was to examine how often smartphones are used for information searches for everyday life and for academic purposes, how the information found on smartphones was evaluated, and why people choose one device over the other in searching for information. The findings for this study have added to knowledge of smartphone information behaviour on young adults.

Information behaviour research covers a wide range of studies on ways in which people search for and use information. Research in this field has studied people's behaviour in order to understand and better propose ways of enhancing services to meet the information needs of everyone, regardless of their circumstances. One of the most interesting groups of people on which research has been conducted are students. This group is of interest to many researchers because of their inherent information need and their use of information technologies. Therefore, in order to understand the smartphone information behaviour of people, students were chosen to determine how this technology enables information search and use. The review in Chapter 2

points to a gap in the literature where there are no studies that specifically examine the use of devices in search of information for different purposes. There are also no studies that examine how information found on smartphones were evaluated. The following sections discuss the findings of Chapter 4 by relating them to the research questions of the present study.

5.2 Smartphone usage

RQ1. How often are smartphones used in information search for everyday life and academic purposes relative to computers?

The results of the current study show that smartphones are used for information searches for leisure, news and to some extent health. While leisure and news were the main topics for which people frequently used their smartphone to search, the results show that the smartphone is also used to search for health and academic information. In relation to health and academic searches, the results show that computers are used more frequently than the smartphone. However, when it comes to health, the difference between those who use smartphones frequently and those who use computers is not as wide as is found with academic related searches.

Previous research on smartphone technology identified that the intent of smartphone use centered on personal information management needs and geographical needs (e.g., Church & Smyth, 2009), the lack of a networked computer (Kassab & Yuan, 2013), and the need for information to answer a question during a conversation as motivation for the use of smartphones to search the internet. Yet, no studies have thus far focused on how having both computers and smartphones to access information online affects how users search for information. The findings from the present study show that not only do participants have access to networked computers, but they all have access to smartphones. Faced with such abundance of technological devices, users showed interesting patterns of use in relation to how these devices are used in online

information searches. Smartphone information searches were not limited to personal information management and geographical needs as found by previous researchers (e.g., Church & Smyth, 2009). Smartphone users used their device for information searches on various topics.

One of the topics that the present study focuses on is health. Previous research on smartphone use in relation to health focused on the use of applications and other smartphone services for diagnosis by health professionals and trainees (e.g., Ducut & Fontelo, 2008; Curioso & Mechael, 2010; Payne, Wharrad et al. 2012; Ventola, 2014). There have also been studies on designing and developing specific applications for the management of specific diseases such as cancer, applications for weight control interventions, as well as applications for nutrition and calorie count. (e.g., Bert, et al 2014; Jeon, et al 2014; Pandey et al 2013). However, in the current study, the focus is on health information searches online on the smartphone device and not on applications. When discussing how smartphones are being used in this area, the present study found that a majority of students use their smartphones to search for information on their everyday health. Students search for health information on computers more frequently than on the smartphone. Despite computers being the dominant device when searching for health information, the study also found that 60% of respondents use their smartphones frequently[5] to search for health information. This shows that there is an increase in smartphone use in health. Fox and Duggan (2012) found that 52% of smartphone owners in the US used their smartphones for health information searches online. In an earlier study, Hesse et al. (2005) found that 48.6% of respondents used the smartphone to search for health information. If we compare the frequency rate of the current study with previous research (Hesse et al. 2005; Fox & Duggan, 2012), we find that the frequency rates from the 2005 and 2012 studies to the current study show

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[5] Frequency of use here refers to participants who selected 4, or 5(always use) in the survey.

an increase from 48.6% in 2005 to 52% in 2012, and a further increase to 60% in the present

study. This shows a slight percentage increase in the present study.

The present study also set out to discover the reasons for searching for health information

on smartphones. With respect to the purpose of searching for health information, we found that

study participants searched for information on the symptoms of a disease, remedies for illnesses,

nutrition, physical activities, and booking hospital appointments. These findings are similar to

the findings from previous studies (e.g , Bert, Giacometti, Gualano, & Siliquini, 2014; BinDhim,

Shamen, Trevena et al, 2014). However, these earlier studies concentrated on how people used

smartphone applications for these health-related purposes and not on the actual searching for the

above-mentioned health related information on the smartphones.

The results of the current study point to interesting differences in how computers and

smartphones are used in information searches based on demographic features such as level of

study and faculty. The differences in level of study and faculty may not be impactful since the

effect sizes were small. While these unimpactful differences do not communicate how

participants search for health information on these devices, they give room to speculate that the

devices could influence how users of different faculties and level of study search for and use

information.

 Smartphones are used to search for information on leisure. As expected, the smartphone

(85.8%) and computer (74.9%) use for leisure supersedes their use for information searches on

other topics. This finding from the current study supports the dominant use of the smartphone for

leisure information search. The use of smartphones for leisure purposes such as for

communication, geographical information and social interaction is documented in the literature

(e.g., Absar, O'Brien & Webster, 2014; Church, Smyth et al. 2007; Reis, Church et al. 2012; Ling and McEwen 2010).

With regards to the reasons for leisure information search on smartphones, the current study found that leisure information search covered activities that people want to do for fun Most of the leisure activities described in this study falls under casual leisure (Hartel, 2010). They included searching for events or activities, restaurants, shopping, locations, operation hours, places to go and information on how to do things, for example, how to use certain ingredients to cook. These findings are similar to previous studies (e.g., Kassab & Yuan, 2012; Bomhold, 2013; Yeh 2014 Al-Daihani, 2018). However, the current study expands on the purposes and elaborates on how both smartphones and computers are used in searching for leisure information. It shows that while smartphones may be popular for leisure information searches, computers are sometimes used for this purpose.

Among the four topics discussed in this study, the news media industry appears to be the most adopted on smartphones. Most major news media companies everywhere have proprietary applications for users to access daily news; examples are the CBC, CTV, CNN, BBC news application which provide both national and local news for free on smartphones. The shift from newspapers to online news and currently to smartphones was predicted early and has been confirmed over the years (e.g., De Waal et al. 2005; De Waal, & Schoenbach, 2010; Westlund & Färdigh, 2015). All the respondents who were interviewed in this study said they had news applications of their favorite news media company on their smartphone. Because people are using these proprietary applications of media companies, they search less on the internet for breaking news headlines.

Among young people, research (e.g., Chan, 2015; De Waal & Schoenbach 2010; Westlund & Färdigh, 2015) indicated a gradual shift from the computer for news to mobile devices as the preferred device, which is consistent with the findings of this study. The results of the present study show that both devices are used in accessing news (smartphones 77.8% and computer 75.1%) information. However, smartphones are used slightly more than computers.

In terms of ways of accessing news related information, most participants indicated that their main means of accessing such information included news applications (apps), websites of news agencies, podcasts, social media, and internet searching. The preference of smartphones for news has increased access to news through news applications and podcasts which were not popular before. The findings also confirm the increased use of online news in general, since both computers and smartphones are used in accessing news information.

In academic environments, researchers have looked at the smartphone's possible impact and usefulness in learning (Sharples, 2000; Motiwalla, 2007; Evans, 2008; Huang, Kuo et al. 2008; Uzunboylu, Cavus et al. 2009; Chen & Denoyelles 2013). In information science, a lot of researchers have considered smartphone use and its impact on library operations and services (Cummings, Merrill, & Borrelli, 2010; Lippincott, 2010; Smith, Jacobs et al. 2010; Little, 2011; Paterson & Low, 2011; Yarmey, 2011; Nowlan, 2013; Pažur, 2014; Yeh, 2014). Some findings show that smartphones have the capability to transform library services, since students are showing an interest in using their smartphone for academic purposes. The present study results show that 36% of respondents use their smartphones for academic information search. Although this number is a lot less than the 96% of respondents who mentioned that they use computers for academic information, it is still interesting that a small percentage of students mentioned that they used their smartphones for academic information searching. On the contrary, discussions

with students during interviews showed that many more students actually use their smartphone for academic related activities. They communicated that they used their phones, to watch educational videos online and to work in groups. These activities are academic activities. And yet, students did not consider them as academic. It is possible, therefore, that the 36% response from students is an under reporting of what actually transpires.

Based on the findings, a further analysis was conducted to better understand how devices are used. A mixed plot analysis of devices shows a statistically detectable difference in how devices are used in searching for academic information. The test of within subject effect showed both devices are used differently for academic purposes. It was found that about 33% of the variances in academic search could be attributed to the device used. The study also showed that students from faculties of Medicine and Engineering used their smartphones for academic purposes more than students from other departments. The use of smartphones for academic purposes could be high in these faculties because some educational resources used by these students are already available in the form of applications on the device. Previous studies (Boruff & Storie, 2014) showed that medical students used mobile devices in searching for medical information online.

In terms of the specific academic related searching that they conduct, all participants who were interviewed indicated that they did not perform academic information searching on their smartphones. Academic information, in this instance, refers to searches for peer reviewed articles meant for research assignment or writing an academic paper for a class. The consensus was that academic searching was "serious business". This was because they were required to provide reference sources for the materials, they used to write their papers. The results show the dominance of computer use for academic information while establishing the use of smartphones

for academic information as well. It also relates to previous findings that show that using smartphones for academic purposes is not high among students (e.g., Havelka, 2013; Abas et al., 2017; Aharony, 2017; Al-Daihani, 2018).

The use of computers for in depth academic information search supports Havelka's (2013) conclusion that students prefer computers for in-depth academic information search. However, this could be changing as the current study results show a gradual shift from computers to smartphones for purposes which were in the past reserved for computers. Such purposes include accessing course related information online, taking notes, reading, translation, dictionary, teamwork, and watching educational videos.

The use of smartphones and computers for information searches for health, leisure and news might not affect the information behaviour of users due to the similarities in how both devices are used to search for information on these topics. The same cannot be said about the use of both devices for academic information searches. The vast difference in how the smartphone and the computer are used for academic information searches could affect students' information behaviour. In essence, searchers are more likely to use credible databases for academic searches done on computers than they would on smartphones, which could mean the choice of device may affect elements of information behaviour. In addition, the demographic and discipline specific differences that were found in all the domains discussed, no matter how small, indicate there could be patterns of search behaviour based on the devices being used for the searches as was found in previous research which found that information seeking behaviour is affected by demographics, psychological, role-related, environmental factors and disciplines (e.g., Nicholas et al 2011; Niu & Hemminger, 2012; Niu et al 2010) .

5.2.1   Implications

From the discussions of this study, it will be prudent for information service providers who are investing in smartphone use to access information to take into consideration the various domains within which people search for information. This will enable them to provide the necessary tools that will allow searchers to do so on smartphones. For instance, information which relates to leisure and news might be of higher utility on smartphones than on computers. For that reason, information service providers should consider publicizing smartphone services of news media subscription to users rather than taking print copies.

Academic related video and audio recordings should be made available on smartphones. In addition, liaison librarians should consider compiling a subject specific glossary of terms, which will be accessible on smartphone devices. Smartphones were more likely to be used to search for academic information among undergraduate students at the beginning of their undergraduate studies. This could be helpful for university administrators, information professionals and researchers when they are designing resources for students to take into consideration which devices to send information to for better distribution and to increase access to resources.

5.3   Evaluation of information found on smartphones

RQ 2. Is information found on smartphones evaluated? If so, how is information evaluated? If not, then why not?

To explore how respondents, evaluate information, which was found after smartphone searches, the researcher focused on identifying information literacy skills that respondents used in assessing the credibility of information retrieved. A previous study by Bowler et al. (2018) found that credibility had a new meaning in the context of mobile information. Participants in their study were more concerned about the content of the information rather than the quality of

information. In the present study, most participants, when asked if they evaluate health information found on smartphones, initially said they did not evaluate found information. The response implied that participants did not consider the act of selecting one link over another after results are presented as a method of evaluation. On second thought, and after prompting them with specific scenarios derived from the survey questionnaires, some said they sometimes look at the credibility and trustworthiness of the source, credibility of the website or source, author, consistency with other sources, quality of language or images, currency of the source, experience with the source, top five hits in Google search, other users reaction and their good or bad feeling about a source. Some of these evaluation methods were consistent with those identified by previous studies (Ambre, et al 1997; Price & Hersh, 1999) such as relevance, credibility, bias, content and currency. In discussing information found on smartphones, methods such as consistency with other sources, quality of language or images, experience with the source, top five hits in Google search, other users' reaction and my good or bad feeling about a source were used in assessing the quality of health information. However, while some participants mentioned these methods after they were prompted with specific options, others, even after prompting, said that they did not use these methods.

In terms of evaluating news information, users were not concerned about the credibility of the source. Rather, they were concerned about whether the news was fake or real and also the inherent biases that a source might be known for, since most media houses have political leanings. The issue of fake news and bias in smartphone news was also reported by Newman, et al (2017). This was an indication that people are bothered by the current trend in the spread of fake news, and it points to the need to find ways to eradicate such information. In order to ensure objectivity in news information on smartphones, some participants said they had more than one

news application installed on their phone. Determining fake news and bias in found news information is part of checking credibility. The results show an interesting relationship between bias and credibility. It seems some respondents equated credibility to their point of view. Which means something is credible (true) if it agrees with me. If indeed credibility of news information is controlled by ideological viewpoint, then there is a need for more critical theory in information literacy instruction to address this shortfall. There is also the need for more research on the topic to ensure people are not equating credibility to their truth.

Generally, leisure information is not evaluated. In instances where it is evaluated, three methods are used. They are other users' reaction (e.g., recommendation or rating or reviews or stars), quality of image, and combination of other methods such as top five, quality of language, experience with a source and by following an individual, group or event. The use of online reviews, ratings and others has been well documented in the food industry as a key component in accessing the quality of restaurant services (e.g., Gan, Ferns, Yu, & Jin, 2017; Jurafsky, Chahuneau, Routledge & Smith, 2014).

In terms of evaluating academic information, participants indicated that since in-depth academic information searches were mostly done on computers, they evaluate based on the following; accessing peer reviewed papers, library catalogue and databases, Google Scholar and combination of methods. The most common searches for academic information on smartphones were for factual information, such as definitions of terms and concepts. They also used their smartphones to access course related information found on their university website. No evaluation was necessary in this case because they trusted the information from that source. In cases where evaluation is done, they use a combination of methods (e.g., reputation of the author,

publishing organization, quality of language, the top five results, consistency with other sources and currency of information).

Evaluation of information also differs across topics with some similarities among health and academic. For news, evaluation takes a different form. Here, users evaluate to determine whether an article is fake and or biased towards a particular viewpoint. It is necessary to identify ways of helping smartphone users evaluate news items to eliminate fake news and locate news articles presented from an objective point of view. Similarly, leisure evaluation includes mechanisms such as ratings, reviews and user comments, factors which were not included in any of the information literacy models for the evaluation of information. These new methods reflect what people currently do more than what was done in the past before the widespread use of smartphones.

Interestingly, the results show the diverse strategies people employ in evaluating information. These ranged from traditionally established methods of checking for credibility, accuracy, or bias, to checking the stars or reviews on a piece of information. The results show that people employ different strategies in evaluating information on different topics. While information literacy standards (e.g., ACRL, 2000; Bundy, 2004) did not explicitly state specific strategies to use in evaluating information for purposes such as leisure, news and health, the strategies mentioned above relate to information literacy. An information literate person is said to have the "ability to locate, evaluate, and use effectively the needed information" (ACRL 2000, p. 2). which is what people are doing as they use the stars and reviews to make sure they are selecting accurate information. It is important to recognize that these strategies play an essential role in helping people to determine the quality of any piece of information. Even in cases where people think they are not evaluating and there is no overt use of strategies in selecting one

information item over the other, there is still some form of evaluation going on as at the end of their search, they still select one item over another.

5.3.1 Implications

Most undergraduate students search for information on their smartphones, both for their everyday life purposes such as leisure, news, and health, and for academic purposes. However, information found on smartphones, whether for everyday life or for academic, was not always evaluated. There is therefore the need to educate students on the need for diligence when searching on smartphones. There is the need to develop information literacy instruction aimed at educating users on how to search for and use highly credible sources on smartphones. The instructions could include evaluating information found on smartphones, and identifying known credible sources for everyday life and for academic purposes which are smartphone friendly. This could help create awareness on where users could search for credible information on their smartphones. It is also important to explore measures that would automatically evaluate information searches on smartphones for users.

5.4 Choosing devices

RQ 3. Why does someone choose one device (smartphone or computer) over the other?

The smartphone and computer continue to be used interchangeably among users. The present study and previous studies have found that both devices are used interchangeably for many purposes. This interchangeable use of devices (e.g., Karlson et al 2009; Nikou & Economides 2019), researchers have found, has led to the merging of work and personal life. The results of the present study show that people may be choosing devices to search with based on the topic for which they need information. Both the survey and interview results show that people had preferences when it comes to choosing devices to search for information on specific

topics. For example, the present study found that the smartphone was preferred for leisure related search. This is similar to the findings by Adepu, & Adler (2016). They found that young people preferred to play games on smartphones even when the game worked better on computers. When it comes to health, some preferred smartphones only, others smartphones and computers, while a few also preferred accessing health information on computers only. Academic information was mostly preferred on computers, especially for instances where detailed searching and reading are required, like when writing academic papers.

Smartphone use for academic purposes was limited to brief or factual searching, accessing online learning management systems and for non-search related information. Overall, the results point to the preference of computers for health and academic information more than the other topics. It could be speculated that participants pay more attention to information on health and academic topics, which could influence why they search for information on those topics on computers. It could also be because searching for information for health and academic purposes is mostly done to answer specific questions on the topic. This could lead to accessing large amounts of information and require more focus and time to read than when you search for information for leisure and news purposes.

While the present study did not focus on the efficiency of the devices, the results show that participants had no difficulty retrieving information on both devices as mentioned in previous research (e.g., Bergman, & Yanai, 2018).

The current study shows that some people are conscious when it comes to choosing devices to conduct a search. They can specify what they search for on smartphones and what they search for on computers. People who have made that clear distinction about which device they use based on the kind of information they are searching for could easily describe the

methods they use to ensure credibility of information found on each device. They said, they did not pay as much attention to the information they found on smartphones as they did with the information they found on the computer.

There is another group of people who are not conscious of the devices they use in searching for information. For this group, there is no distinction in what they search for on each device. Regardless of purpose, they search for information either the smartphone or the computer. Their decision is dependent on the device available to them at the time of searching. Almost all participants in this group were more likely to not check for credibility of information they found regardless of the device on which the search was conducted. The results of the current study indicate a clear link between devices used in searching for information and evaluating information for credibility. This observation warrants future research into the topic.

There are also instances where people do not choose one device over the other. The results in 4.2.6. show instances where people simply search for information on their smartphones due to the urgent need to get information on something that is bothering them. In such an instance, the searcher usually searches for the information on the smartphone no matter where they are. Sometimes, the context or the location where the searcher finds himself or herself does not give them the opportunity to choose where to search for the information other than to search for it on the smartphone. For example, if the searcher finds herself on the go, she cannot go home to use the computer even if the information is for academic purposes. As such, the choice of device may be affected by the purpose of the search as well as the context within which the searcher finds himself or herself.

5.4.1   Implications

The results of the current study show that there is a link between choosing a device and being careful about the credibility of the information found. While searching on the computer does not mean the information found is credible, the present study shows that people pay more attention to information found online on computers than they do on their smartphones. This suggests that there must be a system in place to ensure automatic credibility checks when people start to use the smartphone for more searches.

5.5   Information behaviour

The findings of the present study did not completely match any of the information behaviour models discussed in Chapter 2. The findings show that smartphones are used to search for information for various purposes. In the present study, the emphasis was placed on the information people searched for and not on the process people go through to search for information (e.g., Bates, 1989; Ellis, 1987; Kuhlthau, 1988).

Figure 9: Wilson's revised general model (Wilson 1997)
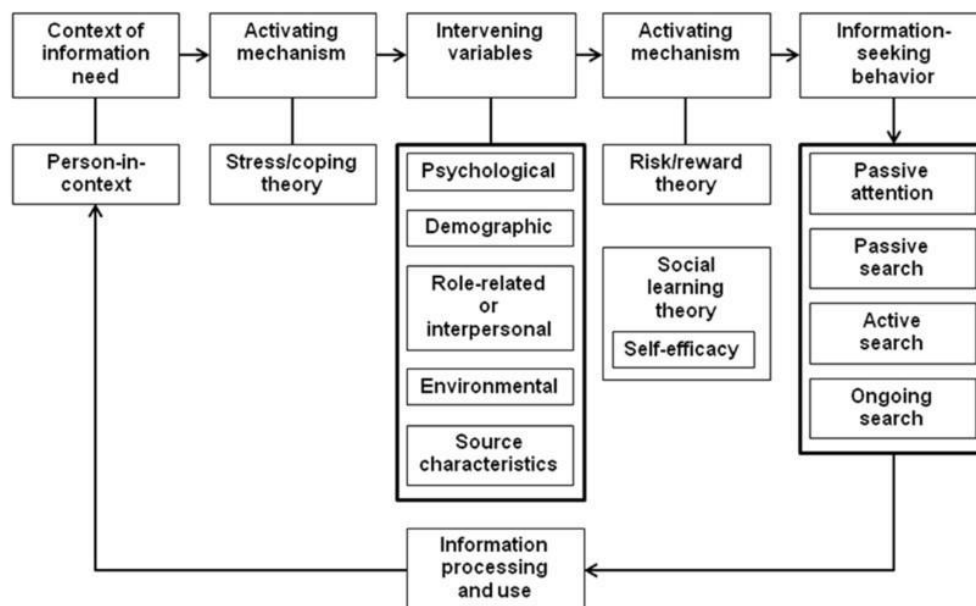
The present study used Wilson's (1997) revised general model as a conceptual framework to study smartphone information behaviour to understand whether the activities proposed in the model can also be found in the smartphone environment. The use of smartphones for information searches by young adults incorporates the "totality of human information behavior in relation to the sources and channels" as expressed by Wilson's (2000, p.49) definition of information behaviour. Information search in the smartphone environment allows users to both actively search for information and passively receive relevant or other kinds of information through notifications and the use of mobile applications.

In this study, the context of information need is taken to be any context for which someone needs information. This could be health, leisure, news or academic, as found in the results the purpose of the information could decide the device on which the information would be searched. Based on our results, it could be speculated that the context of information need in the smartphone setting could be for leisure and news purposes more than the other purposes.

Wilson's (1997) model illustrates four forms of searching: passive attention, passive search, active search and ongoing search. Three forms of searches were seen in the present study; these are passive attention, passive search and active search.

According to Wilson's (1997) model, passive attention involves receiving information while watching television or listening to radio. In the present study, participants mentioned listening to music and watching videos on their smartphones for leisure and sometimes for academic purposes. While the process of watching videos does not necessarily involve searching for information, as the person watches, they might receive relevant information. For example, a student watching videos on a course she is taking receives information on that course without conducting an actual search.

Passive searching is concerned with receiving relevant information without actually interrogating the information system for information. The results show that people also receive information due to installed applications on their smartphones without them actively searching for that information, which is an indication of passive searching. For example, after someone installs news applications on their smartphone, they can receive notification on breaking news information from the news agency that owns the application.

Active searching involves physically formulating a search strategy for information on a topic. The smartphone information behaviour research demonstrates the manifestation of active searching. The results show that people conduct information searching on their smartphones no matter where they find themselves, which is an illustration of active searching. The smartphone was used to search for information for both everyday life information and academic purposes.

In relation to ongoing search, there were instances where previous searches could influence subsequent searches but these instances were not specifically mentioned in the results. All the forms of searches described in the present study are not limited to the smartphone environment, they can be found on computers as well. However, the focus was on how these types of searches are manifested in the relatively recent smartphone technology environment.

Furthermore, some of the intervening variables described in the revised generalized model Wilson (1997), were present in the results of this study. These are demographic, environment, and source characteristics. With demographic, we consider age and gender. In terms of age, all participants belonged to the same age group and all used both devices for searching. In terms of gender, although some gender differences were recorded, the impact of those differences were not adequate to be used to describe how it affects information searches.

The environment variable in this research refers to the setting or location within which information need might arise. In a smartphone environment, information could be found anytime and anywhere. Which could mean that information searches may occur more frequently on smartphones, than in any other circumstance, especially among young people who are known to interact with their smartphones more than with people (e.g., Hill, 2016). In addition, the environment within which the need arise could also be affected by the type of information that could be searched based on the results of this study. For instance, health, leisure and news related searches can be done on smartphones, meaning searches on these topics could be done anywhere. In the case of academic information search, the results show that this search was mostly done on computers, which meant academic searches were conducted in specific locations.

In the present study, source characteristics were found to be any websites that an information searcher may consult on their smartphone for information. The results show that young people use their smartphones to search social media websites, known news media sites as well as university websites for information.

In addition to the above variables, there is a need for the introduction of a new variable, which is the device variable. The device variable represents the type of device the searcher used in searching for information. In as much as the present study shares similarities with what we already know about online information searches, this study and previous research (e.g., Bowler et al 2018) show that there are distinct differences in information behaviour of people in the mobile environment. The present study has shown that people may not be paying as much attention to the information they find on smartphones as they do with information found on computers. Including the device variable will allow researchers to conduct more research on how

these devices change the way in which we search and use information. Figure 10 below

illustrates the inclusion of the device variable, that is, device affordances, in the model.

Figure 10: An adaptation of Wilson's 1997 model to include the type of device variable
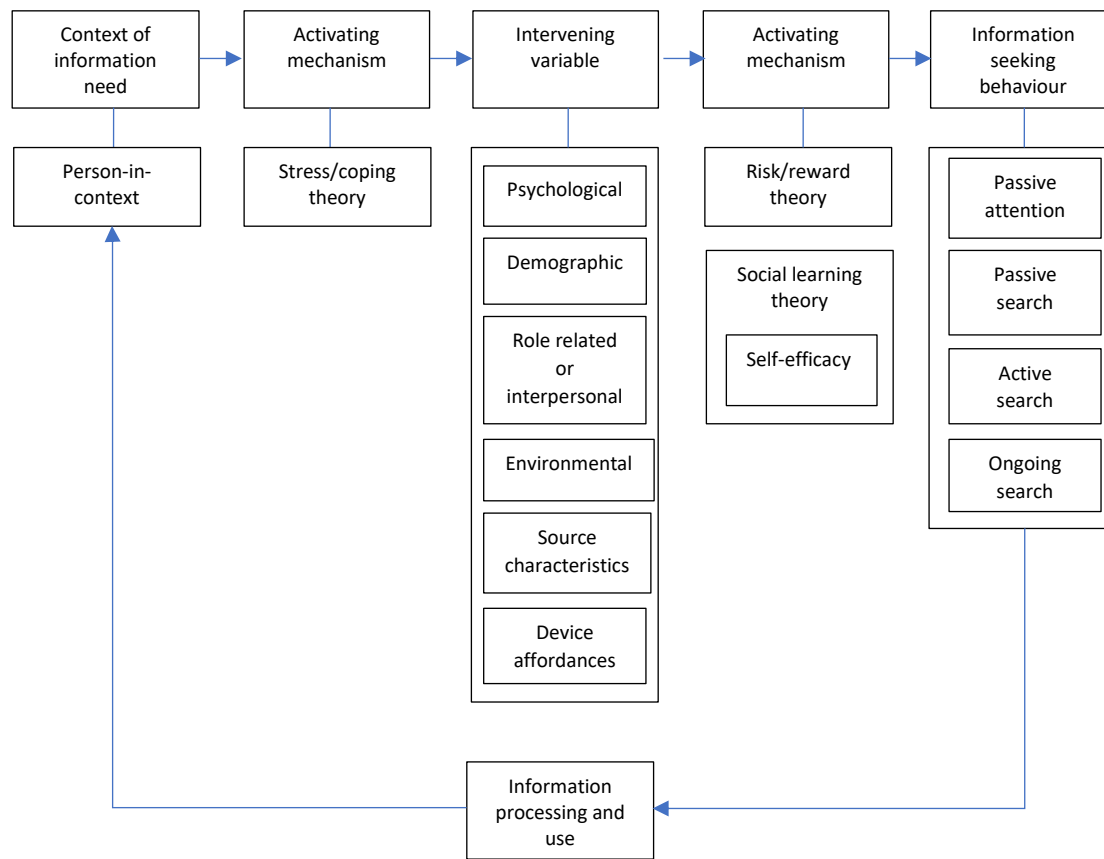
Gaver, (1991) defines affordances as "properties of the world defined with respect to

people's interaction with it" (Gaver, 1991, p. 80). In other words, affordances describe the things

that people can do or accomplish with an object, and they indicate what is possible with an object

or a thing. The device affordances variable reveals the different modalities about affordances that

are inherent in the device used in information searches. The variable would allow researchers to

describe features that enables certain activities to be conducted easily and other activities with

some difficulty in relation to information behaviour. The variable would allow researchers to

study what is possible with the device users use in searching for information. For example,

according to the results of this study, users choose to search for leisure and news information more frequently on the smartphone because it affords them access to information on those topics easily. Results show users do not search for academic related information on the smartphone because it does not afford easy access to academic related information. Having knowledge about which searches could be conducted on which devices could enhance our understanding of user information behaviour. As technology advances, the device affordances variable will allow researchers to better describe what is actually happening.

Psychological and role-related or interpersonal intervening variables were not obvious in the results of the present study. In relation to the activating mechanisms, the results in section 4.4 points to the reasons for smartphone information searches. The reason participants gave on the choice of the smartphone as the searching device is the need to know. For some people, not having information on an important issue can be stress inducing. This is why they search for information immediately on their smartphone. Searching for information on the smartphone increases social learning as people are able to search for information whenever they need information. To have unlimited access to information enables people to learn on the go. They are also able to cope with whatever situation they find themselves due to access to information on the smartphone.

Some aspects of the study share similarities with research in everyday life information (e.g., Agosto & Hughes-Hassell, 2005; Savolainen & Kari, 2004) who focus on non-work-related information seeking. The responses from study participants on the different topics such as health, leisure, and news are consistent with findings from research on information seeking for everyday life (e.g., Savolainen, 1995; Agosto & Hughes-Hassell, 2005). Interestingly, Agosto and Hughes-Hassell's (2005) findings show the telephone as the most preferred non-people source. The

telephone, at the time, was mostly for communication between people. People were using the telephone to either call for information or text for information. Currently, the telephone (smartphone) includes technological features that provide information searches everywhere and is the focus of this study.

Chapter 6: Conclusions

6.1 Summary

The present study was conducted to understand how the smartphone is used to search for information for everyday life and for academic purposes. The findings show that young adults use their smartphones for leisure, news, health and academic information searches. Usage varies across topics; the smartphone is used more than the computer for leisure, news, and health. In academic information searches, smartphones are not used as much as computers. Although there were slight differences among participants based on their levels of study, and their faculty, these differences were not impactful.

Smartphone information searches were diverse and ranged from searches on the symptoms of a disease to academic videos. While information searches on smartphones are typically not evaluated, in cases where information is evaluated, the evaluation mechanisms mentioned were known and in line with information literacy principles, there were also few others which were new. Further research is needed to identify evaluation methods that might be peculiar for smartphone environments.

The study results showed many factors influence participants' choice of a search device. Some of these factors include the purpose of the information, the need for information, and the location where the searcher finds themselves.

6.2 Limitations

Although the study used the computer as the point of comparison, the analysis was more focused on how students used their smartphone and explored the differences in relationships between factors related to undergraduate students' use of smartphones. Also, study participants' responses were based on what they could recall in terms of searches for information on the topics

mentioned. We did not have respondents perform the task to observe what they actually do. Students' understanding of what constitutes academic information may have led them to indicate that they do not use the smartphone for academic information. The results show they use smartphones for some activities which constitute academic use. The present study was focused on information searches on smartphones in general, it did not focus on applications. Smartphone applications are useful sources of information, but applications were not the focal point for this study.

6.3   Contributions to research

This research is contributing to current research on information behavior by extending the existing research to new devices used in searching for information. It is also adding to literature by expanding on the research to include information searches on smartphones and how users apply information literacy skills to evaluate information on these devices for various purposes.

Studying smartphone information behaviour in health, leisure and news has provided insights into existing research gaps in information searching behaviour. For instance, the findings on evaluation of found information on smartphones show the carelessness that exists when searches are conducted for everyday life purposes. Perhaps there is the need to advocate for an automatic filtering system for searching for information on smartphones. It is increasing our understanding of how smartphones are used among millennials, thereby facilitating ideas on how to develop information resources targeted at young undergraduate students.

Theoretically, the present study contributes to literature on information behavior by applying principles of Wilson (1997) revised general model to research on smartphone information behavior. There are similarities between the activities depicted in Wilson's model and activities that smartphone users engage in, which influence smartphone information

behaviour. The model, which was created in 1997, is still relevant in the smartphone era. Focal points which include types of searches, intervening variables and activating mechanisms in the model have been described as activities that are present in smartphone information behavior as well. However, this study also suggests that there is a need for an additional intervening variable, that is, the device variable. This is because the device used plays an important role in people's information behavior.

6.4   Conclusions

This study sought to understand young people's smartphone information behaviour. Smartphone information behaviour in this study was defined in relation to Wilson's (2000) definition of information behaviour. The term is therefore defined as the totality of human behaviour in relation to sources and channels of information including active and passive information seeking and information use on a smartphone device. To do that, the study focused on the use of smartphones among this group. Specifically, the study answered the following three research questions; How often are smartphones used in information search for everyday life and academic purposes relative to the computer? Is information found on smartphones evaluated? If so, how is information evaluated? If not, then why not? Why does someone choose one device (smartphone or computer) over the other?

The smartphone was used for information searching among all students. Searching may differ from person to person based on the purpose for which the information was searched. The device was used more for leisure, news and health information than it was used for academic purposes. Generally, young people were found to not always evaluate information found on smartphones. In cases where information found on smartphones was evaluated, they employed old and new strategies. Further research is needed to identify and describe ways in which

information searchers can efficiently use new credibility strategies to ensure that they are using credible and reliable information in their decision making.

More research focused on everyday life information behaviour is needed. Current events have demonstrated the importance people place on information needed for daily life. Knowing more about what people search for will make it easy to ensure that the information they are accessing is credible. It will help reduce misinformation and help people make the right choices from the credible information they eventually find no matter what device they use. While devices used in searches have not been the focus for information behaviour researchers, this study has shown that this needs to change. The devices used to search for information provide insight into what users are searching for and how they ensure credibility of found information.

6.5   Future research

Future research would observe how users search for and evaluate information on smartphones. It would also look at specifying the requirements for the information processes now so that as smartphone technologies evolve, it will fit and support human capabilities by designing the most effective ways of ensuring easy, fast and credible online information on smartphones. This study identified differences in the use of smartphones by students at certain levels of study and faculties for health and for academic purposes. Future research would explore what could be accounting for those differences as well as whether the differences persist with the same group of students as they move to high levels in their programs. Research will also explore challenges and issues on information found through specific topic related applications. Research is also needed to understand the affective, the cognitive and the physical processes that young people experience while searching for information on the smartphone.

References

Abeele, M. V., Antheunis, M. L., & Schouten, A. P. (2014). Me, myself and my mobile: A
segmentation of youths based on their attitudes towards the mobile phone as a status
instrument. *Telematics and Informatics, 31*(2), 194-208

Absar, R., O'Brien, H., & Webster, E. T. (2014). Exploring social context in mobile information
behavior. *Proceedings of the American Society for Information Science and Technology,
51(1), 1-10.* (1st ed., Vol. 51, pp. 1-10).

ACRL (2000) "Information Literacy Competency Standards for Higher Education."
http://www.ala.org/acrl/standards/informationliteracycompetency

Adams, N. E. (2014). A comparison of evidence-based practice and the ACRL information
literacy standards: implications for information literacy practice. *College & research
libraries*, *75*(2), 232-248.

Adepu, S., & Adler, R. F. (2016, October). A comparison of performance and preference on
mobile devices vs. desktop computers. In *2016 IEEE 7th Annual Ubiquitous Computing,
Electronics & Mobile Communication Conference (UEMCON)* (pp. 1-7). IEEE.

Agosto, D. E., & Hughes-Hassell, S. (2005). People, places, and questions: An investigation of
the everyday life information-seeking behaviors of urban young adults. *Library &
Information Science Research, 27*(2), 141-163

Aharony, N. n. a. b. a. i. (2017). Factors affecting LIS Israeli students' mobile phone use: an
exploratory study. *Electronic Library, 35*(6), 1098-1121. doi:10.1108/EL-06-2016-0131

Al-Daihani, S. M. s. a. k. e. k. (2018). Smartphone use by students for information seeking.
Library Review, 67(4/5), 194-208. doi:10.1108/GKMC-01-2018-0008

Ambre, J., Guard, R., Perveiler, F. M., Renner, J., & Rippen, H. (1997). Criteria for assessing the
quality of health information on the Internet. *Health Information Technology Institute,*

Agency for Health Care Policy and Research.

Ana, P., & Humphery, S. C. (2013). Mobile health information system: a mobile app. to aid health workers relate health information. *Global Journal of Mathematical Sciences*, *12*(1), 13-23.

Anderson, M. (2015, April 1). 6 facts about Americans and their smartphones. Retrieved from http://www. pewresearch.org/fact-tank/2015/04/01/6-facts-about-americans-and-their-smartphones/

Bates, M. (2002). Toward an integrated model of information seeking and searching. *The New Review of Information Behaviour Research, 3*, 1-15.

Bates, M. J. (1989). The design of browsing and berrypicking techniques for the online search interface. *Online Review, 13*(5), 407-424. doi:10.1108/eb024320

Bates, M. J. (1990). Where should the person stop and the information search interface start? *Information Processing & Management, 26*(5), 575-591. doi:10.1016/0306-4573(90)90103-9

Bates, M. J. (1996). Learning about the information seeking of interdisciplinary scholars and students.

Bates, M. J. (2010). Information Behaviour. In M. N. Maack (Author), *Encyclopedia of library and information sciences* (3rd ed., pp. 2381-2391). Boca Raton, FL: CRC Press.

Bartlett, J. C., Bowen-Ziecheck, A., Kumah, C., & Beheshti, J. (2019). Everyday health information seeking among millennials. *Proceedings of the Association for Information Science and Technology*, *56*(1), 609-611.

Bartlett, J.C., Kumah, C., Couch, A., & Beheshti, J. (2018). How do millennials find health

information? A study of everyday-life health information seeking. Presented at the

Canadian Health Libraries Association Annual Conference, St. John's, NL, June 15-18.

Bawden, D., & Robinson, L. (2012). *Introduction to information science*. Chicago: Neal-

Schuman.

Beatty, J. F. (2013). Locating information literacy within institutional oppression.

Beheshti, J., Bartlett, J., Couch, A., & Kumah, C. (2018). A Comparative analysis

of information seeking behaviour of Canadian and international secondary

school graduates entering a university. In *IASL Annual Conference Proceedings*.

Belkin, N. J. (1980). Anomalous states of knowledge as a basis for information retrieval

The Canadian Journal of Information Science, 5, 133-143.

Belkin, N. J., R. N. Oddy and H. M. Brooks (1982). "ASK for information retrieval: Part

I. Background and theory." *Journal of documentation 38*(2): 61-71.

Belkin, N. J., P. G. Marchetti and C. Cool (1993). "BRAQUE: Design of an interface to

support user interaction in information retrieval." *Information Processing &

Management 29*(3): 325-344.

Bennett, H. (2006). Bringing the Studio into the Library: Addressing the Research Needs of

Studio Art and Architecture Students. Art Documentation, 25(1), 38-42

Bere, A. (2013). Using mobile instant messaging to leverage learner participation and transform

pedagogy at a South African University of Technology. *Journal of Educational

Technology, 44*(4), 544-561.

Bergman, O., & Yanai, N. (2018). Personal information retrieval: smartphones vs. computers,

emails vs. files. *Personal and Ubiquitous Computing*, *22*(4), 621-632.

Bert, F., Giacometti, M., Gualano, M. R., & Siliquini, R. (2014). Smartphones and health

    promotion: a review of the evidence. *Journal of medical systems*, *38*(1), 9995

BinDhim, N. F., Shaman, A. M., Trevena, L., Basyouni, M. H., Pont, L. G., & Alhawassi, T. M.

    (2015). Depression screening via a smartphone app: cross-country user characteristics

    and feasibility. *Journal of the American Medical Informatics Association*, *22*(1), 29-34.

Boruff, J. T., & Storie, D. (2014). Mobile devices in medicine: A survey of how medical

    students, residents, and faculty use smartphones and other mobile devices to find

    information. *J Med Libr Assoc Journal of the Medical Library Association : JMLA,*

    102(1), 22-30. doi:10.3163/1536-5050.102.1.006

Bowler, L., Julien, H., & Haddon, L. (2018). Exploring youth information-seeking behaviour and

    mobile technologies through a secondary analysis of qualitative data. *Journal of*

    Librarianship and Information Science, *50*(3), 322-331.

Brancato, L., Chan, T., & Contento, A. (2016). Tips from the Experts. *Issues in Science and*

    Technology Librarianship.

Bruce, C. (2003). Information literacy as a catalyst for educational change: A background paper.

    In *International Information Literacy Conferences and Meetings* (pp. 1-17). NCLIS. gov.

Bundy, A. (Ed.). (2004). *Australian and New Zealand Information Literacy Framework:*

    principles, standards and practice (Second ed.). Adelaide, Australia: Australian and

    New Zealand Institute for Information Literacy (ANZIIL) and Council of Australian

    University Librarians (CAUL).

Buschman, B. J. (2009). Information literacy,"new" literacies, and literacy. *The Library*

    Quarterly, *79*(1), 95-118.

Case, D. O. (2012). *Looking for information: A survey of research on information seeking, needs, and behavior* (3rd ed.). Emerald Group Publishing Limited.

Chan, M. (2015). Examining the influences of news use patterns, motivations, and age cohort on mobile news use: The case of Hong Kong. *Mobile Media & Communication, 3*(2), 179-195.

Chen, B., & Denoyelles, A. (2013). Mobile Learning Practices in Higher Education. *Educause Review*. Retrieved from http://www. educause. edu/ero/article/exploring-students-mobile-learning-practices-higher-education

Cheng, C., & Dunn, M. (2017). How well are health information websites displayed on mobile phones? Implications for the readability of health information. *Health Promotion Journal of Australia*, *28*(1), 15-20.

Chen, Y. Y., Li, C. M., Liang, J. C., & Tsai, C. C. (2018). Health information obtained from the internet and changes in medical decision making: questionnaire development and cross-sectional survey. *Journal of medical Internet research*, *20*(2), e47.

Chung, E., & Yoon, J. (2015). An Exploratory Analysis of International Students' Information Needs and Uses/Exploration et analyse des besoins et des utilisations d'information des étudiants internationaux. *Canadian Journal of Information and Library Science*, *39*(1), 36-59. doi: 10.1353/ils.2015.0000

Church, K., Smyth, B., Cotter, P., & Bradley, K. (2007). Mobile information access. *ACM Trans. Web ACM Transactions on the Web TWEB, 1*(1). doi:10.1145/1232722.1232726

Church, K., & Smyth, B. (2009). Understanding the intent behind mobile information needs. *Proceedings of the 14th international conference on Intelligent user interfaces* (pp. 247-256).

Cole, C. (2011). A theory of information need for information retrieval that connects information to knowledge. *J. Am. Soc. Inf. Sci. Journal of the American Society for Information Science and Technology, 62*(7), 1216-1231. doi:10.1002/asi.21541 *Conference on Intelligent User Interfaces* (pp. 247-256).

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches*. Los Angeles: SAGE Publications.

Creswell, J. W. (2007). *Research design: Qualitative, quantitative, and mixed method approaches*. Thousand Oaks, CA: Sage Publications.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed method approaches* (4th ed.). Thousand Oaks, CA: Sage Publications.

Cummings, J., Merrill, A., & Borrelli, S. (2010). The use of handheld mobile devices: Their impact and implications for library services. *Library Hi Tech, 28*(1), 22-40. doi:10.1108/07378831011026670

Curioso, W. H., & Mechael, P. N. (2010). Enhancing 'M-Health' With South-To-South Collaborations. *Health Affairs, 29*(2), 264-267. doi:10.1377/hlthaff.2009.1057

De Bruijne, M., & Wijnant, A. (2013). Comparing survey results obtained via mobile devices and computers: An experiment with a mobile web survey on a heterogeneous group of mobile devices versus a computer-assisted web survey. *Social Science Computer Review*, *31*(4), 482-504.

Denzin, N. K., & Lincoln, Y. S. (2011). *The SAGE handbook of qualitative research* (4th ed.). Thousand Oaks: Sage Publications. doi:10.1016/j.tele.2013.11.001

De Waal, E., & Schoenbach, K. (2010). News sites' position in the mediascape: Uses,

evaluations and media displacement effects over time. *New Media & Society, 12*(3), 477-

496.

De Waal, E., Schönbach, K., & Lauf, E. (2005). Online newspapers: A substitute or complement

for print newspapers and other information channels? *Communications, 30*(1), 55-72.

Dervin, B. (1983a). An overview of sense-making research: Concepts, methods and results.

Paper presented at the annual meeting of the International Communication Association,

Dallas, TX, May

Dervin, B. (1983). Information as a user construct: The relevance of perceived information needs

to synthesis and interpretation.

Dervin, B. (1999). "Chaos, order and sense-making: A proposed theory for information

design." *Information design*: 35-57.

Dervin, B. (1999). "On studying information seeking methodologically: the implications of

connecting metatheory to method." *Information Processing & Management 35*(6): 727-

750

Diviani, N., van den Putte, B., Giani, S., & van Weert, J. C. (2015). Low health literacy and

evaluation of online health information: a systematic review of the literature. *Journal of

medical Internet research*, *17*(5), e112.

Ducut, E., & Fontelo, P. (2008). Mobile devices in health education: current use and practice.

Journal of Computing in Higher Education, 20(2), 59-68. doi:10.1007/s12528-008- 90032

Eckhardt, C. M. (2014). Meeting the Information Needs of Studio Art Students in the Academic

Library: A Survey Conducted at the University of North Carolina-Chapel Hill. (Master's

Thesis). Retrieved from https://cdr.lib.unc.edu/record/uuid:6b463e56-56fc-4e91-82af-920044972e04

Eisenberg, M. B., C. A. Lowe & K. L. Spitzer (2004). Information literacy: Essential skills for the information age, ERIC

Ellis, D. (1987). The derivation of a behavioural model for information retrieval system design (Unpublished master's thesis). Thesis (PhD).

Ellis, D. (1984). "The effectiveness of information retrieval systems: the need for improved explanatory frameworks.*" Social Science Information Studies 4*(4): 261-272.

Ellis, D. (1984). "Theory and explanation in information retrieval research." *Journal of Information Science 8*(1): 25-38.

Ellis, D. (1989). "A behavioural approach to information retrieval system design." *Journal of documentation 45*(3): 171-212.

Ellis, D. (1993). Modeling the Information-Seeking Patterns of Academic Researchers: A Grounded Theory Approach. *The Library Quarterly, 63*(4), 469-486. doi:10.1086/602622

Ellis, D., Cox, D., & Hall, K. (1993). A comparison of the information seeking patterns of researchers in the physical and social sciences. *Journal of documentation*, *49*(4), 356-369.

Ellis, D., & Haugan, M. (1997). Modelling the information seeking patterns of engineers and research scientists in an industrial environment. *Journal of Documentation, 53*(4), 384-403. doi:10.1108/eum0000000007204

Evans, C. (2008). The effectiveness of m-learning in the form of podcast revision lectures in Higher Education. Computers & Education, 50(2), 491-498.

Ezemenaka, E. (2013). The usage and impact of internet enabled phones on academic

    concentration among students of tertiary institutions: A study of University of Ibadan,

    Nigeria. *International Journal of Education and Development Using ICT, 9*(3).

Fidel, R. (2008). Are we there yet?: Mixed methods research in library and information science.

    Library & Information Science Research, 30(4), 265-272.

Findlater, L., & McGrenere, J. (2008, April). Impact of screen size on performance, awareness,

    and user satisfaction with adaptive graphical user interfaces. In *Proceedings of the*

    SIGCHI Conference on Human Factors in Computing Systems (pp. 1247-1256).

Fox, S., & Duggan, M. (2012). Half of smartphone owners use their devices to get health

    information and one-fifth of smartphone owners have health apps. *Mobile health*, *2012*.

Fulton, C., Kerins, G., & Madden, R. (2004). Information seeking and students studying for

    professional careers: The cases of engineering and law students in Ireland. Information

    Research, 10(1), paper 208. Available from http://InformationR.net/ir/10-

    1/paper208.html

Gaver, W. W. (1991, March). Technology affordances. In *Proceedings of the SIGCHI*

    conference on Human factors in computing systems (pp. 79-84).

Green, N. (2002). On the move: Technology, mobility, and the mediation of social time and

    space. *The information society*, *18*(4), 281-292.

Griffiths, J. R., & Brophy, P. (2005). Student searching behavior and the web: use of academic

    resources and Google.

Hahn, J. (2017). The Internet of Things: mobile technology and location services in libraries.

    Library Technology Reports, 53(1), 1-27.

Hartel, J. (2010). Leisure and hobby information and its users. In M. J. Bates, & M. N. Maack

    (Eds.), *Encyclopedia of Library and Information Sciences* (3rd Edition). New York:

    Taylor and Francis.

Hayman, R., Smith, E. E., & Storrs, H. (2019). Information behaviour of undergraduate students

    using Facebook confessions for educational purposes. *Information Research, 24*(3)

Head, A., & Eisenberg, M. (2011). How college students use the Web to conduct everyday life

    research. *First Monday*, *16*(4).

Hesse, B. W., Nelson, D. E., Kreps, G. L., Croyle, R. T., Arora, N. K., Rimer, B. K., &

    Viswanath, K. (2005). Trust and sources of health information: the impact of the Internet

    and its implications for health care providers: findings from the first Health Information

    National Trends Survey. *Archives of internal medicine*, *165*(22), 2618-2624.

Hershatter, A., & Epstein, M. (2010). Millennials and the World of Work: An Organization and

    Management Perspective. Journal of Business and Psychology, 25(2), 211-223.

Hill, C. (2016, June 21). Millennials engage with their smartphones more than they do actual

    humans. Retrieved from http://www.marketwatch.com/story/millennials-engage-with-

    their-smartphones-more-than-they-do-actual-humans-2016-06-21

Higgins, J. P. (2016). Smartphone applications for patients' health and fitness. *The American*

    journal of medicine, *129*(1), 11-19.

Hoy, W. K. (2010). *Quantitative Rsearch in Education: A Primer*. Los Angeles: Sage

    Publications Information Technology Institute of Mitretek System.

Huang, Y., Kuo, Y., Lin, Y., & Cheng, S. (2008). Toward interactive mobile synchronous learning

    environment with context-awareness service. *Computers & Education, 51*(3), 1205-1226.

    doi:10.1016/j.compedu.2007.11.009

Hussain, M. M., & Howard, P. N. (2013). Democracy's Fourth Wave? Digital Media and the

    Arab Spring. In: Oxford University Press.

Ishimura, Y., & Bartlett, J. C. (2009). Information literacy courses in LIS schools: Emerging

    perspectives for future education. *Education for Information*, *27*(4), 197-216.

Islam, N., & Want, R. (2014). Smartphones: Past, present, and future. *IEEE Pervasive*

    Computing, *13*(4), 89-92.

ITU. (2018). *Measuring the Information Society Report 2018* (Vol. 2, pp. i-244). Geneva.

Jeon, E., Park, H., Min, Y. H., & Kim, H. Y. (2014). Analysis of the information quality of

    Korean obesity-management smartphone applications. *Healthcare informatics research*,

    20(1), 23-29.

Jones, M., Buchanan, G., & Thimbleby, H. (2003). Improving web search on small screen

    devices. *Interacting with computers*, *15*(4), 479-495.

Jurafsky, D., Chahuneau, V., Routledge, B. R., & Smith, N. A. (2014). Narrative framing of

    consumer sentiment in online restaurant reviews. *First Monday*, *19*(4).

Karas, M., & Green, R. (2007). The information needs and information-seeking behaviors of

    community college and lower-division undergraduate students. *Community & Junior College*

    Libraries, *14*(2), 103-109.

Kadli, J. H., & Hanchinal, V. B. (2015). Information seeking behaviour of law students in the

    changing digital environment. *DESIDOC Journal of Library & Information Technology*,

    35(1), 61-68. doi: 10.14429/djlit.35.1.8099

Kamvar, M., Kellar, M., Patel, R., & Xu, Y. (2009, April). Computers and iPhones and mobile

    phones, oh my! A logs-based comparison of search users on different devices. In

    Proceedings of the 18th international conference on World wide web (pp. 801-810).

Karlson, A. K., Meyers, B. R., Jacobs, A., Johns, P., & Kane, S. K. (2009, May). Working

    overtime: Patterns of smartphone and PC usage in the day of an information worker. In

    International Conference on Pervasive Computing (pp. 398-405). Springer, Berlin,

    Heidelberg.

Karnowski, V., & Jandura, O. (2014). When lifestyle becomes behavior: A closer look at the

    situational context of mobile communication. *Telematics and Informatics, 31*(2), 184-193.

    doi:10.1016/j.tele.2013.11.001

Kassab, D., & Yuan, X. (2012). Understanding the information needs and search behaviours of

    mobile users. *Information Research, 17*(4).

Khan, G., & Bhatti, R. (2012). Information needs and seeking behaviour of law students: The

    survey of Law College University of Peshawar. *Pakistan Library & Information Science*

    Journal, *43*(3), 34-38. Available from

Kuhlthau, C. C. (1983). *Library research process case studies and interventions with high school*

    seniors in advanced placement English classes using Kelly's theory of constructs. New

    Jersey: Rutgers, the State University of New Jersey.

Kuhlthau, C. C. (1988). Longitudinal Case Studies of the Information Search Process of Users in

    Libraries. *Library and Information Science Research, 10*(3), 257-304.

Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the user's

    perspective. *Journal of the American Society for Information Science J. Am. Soc. Inf.*

    Sci., 42(5), 361-371. doi:10.1002/(sici)1097-4571(199106)42:53.0.co;2-#

Kuhlthau, C. C. (1997). Learning in digital libraries: An information search process approach.

    Library Trends, 45(4), 708-725.

Kuhlthau, C. C. (1999). The role of experience in the information search process of an early

career information worker: Perceptions of uncertainty, complexity, construction, and sources. *Journal of the American Society for Information Science J. Am. Soc. Inf. Sci., 50*(5), 399-412. doi:10.1002/(sici)1097-4571(1999)50:53.0.co;2-l

Kuhlthau, C. C. (2004). *Seeking meaning: A process approach to library and information services*. Westport, CT: Libraries Unlimited.

Kuhlthau, C. C. (2009). Information Search Process. In M. J. Bates & M. N. Maack (Eds.), *Encyclopedia of library and information sciences*. Taylor and Francis.

Kukulska-Hulme, A., & Traxler, J. (2005). *Mobile learning: A handbook for educators and trainers*. London: Routledge.

Kuhlthau, C. C., Maniotes, L. K., & Caspari, A. K. (2012). *Guided Inquiry Design®: A Framework for Inquiry in Your School*. ABC-CLIO.

Krippendorff, K. (1980). *Reliability*. John Wiley & Sons, Inc.

Lau, J. (2006). Guidelines on information literacy for lifelong learning. *IFLA, Veracruz.*

Lever, K. M., & Katz, J. E. (2007). Cell phones in campus libraries: An analysis of policy responses to an invasive mobile technology. *Information Processing & Management, 43*(4), 1133-1139. doi:10.1016/j.ipm.2006.07.002

Li, J., Huffman, S., & Tokuda, A. (2009, July). Good abandonment in mobile and PC internet search. In *Proceedings of the 32nd international ACM SIGIR conference on Research and development in information retrieval* (pp. 43-50).

Ling, R., & McEwen, R. (2010). Mobile communication and ethics: implications of everyday actions on social order. *Etikk i praksis-Nordic Journal of Applied Ethics*, (2), 11-26.

Lippincott, J. K. (2010). A mobile future for academic libraries. *Reference Services Review, 38*(2), 205-213. doi:10.1108/00907321011044981

Little, G. (2011). Keeping Moving: Smart Phone and Mobile Technologies in the Academic

    Library. *The Journal of Academic Librarianship, 37*(3), 267-269.

    doi:10.1016/j.acalib.2011.03.004

Li, X. (2013). Innovativeness, personal initiative, news affinity and news utility as predictors of

    the use of mobile phones as news devices. *Chinese Journal of Communication, 6*(3), 350-

    373.

Liu, Z., Huang, X., & Fu, Y. (2014). Information behavior in the mobile environment: A study of

    undergraduate smartphone users in China. *Chinese Journal of Library and Information*

    Science, 7(4), 1-15.

Lu, L., & Yuan, Y. C. (2010). Shall I Google it or ask the competent villain down the hall? The

    moderating role of information need in information source selection. *J. Am. Soc. Inf. Sci.*

    Journal of the American Society for Information Science and Technology, 62(1), 133-

    145. doi:10.1002/asi.21449

Marcial, L., & Hemminger, B. (2011). Scrolling and pagination for within document searching:

    The impact of screen size and interaction style. *Proceedings of the American Society for*

    Information Science and Technology, *48*(1), 1-4.

McEwen, R. (2014). Mediating sociality: the use of iPod Touch™ devices in the classrooms of

    students with autism in Canada. *Information, Communication & Society*, *17*(10), 1264-

    1279.

McEwen, R., & Scheaffer, K. (2012). Orality in the library: How mobile phones challenge our

    understandings of collaboration in hybridized information centers. *Library &*

    Information Science Research, 34(2), 92-98. doi:10.1016/j.lisr.2011.08.001

    mobile information needs. *Proceedings of the 14th International*

Motiwalla, L. F. (2007). Mobile learning: A framework and evaluation. *Computers & Education, 49*(3), 581-596. doi:10.1016/j.compedu.2005.10.011

Newman, N., Fletcher, R., Kalogeropoulos, A., Levy, D., & Nielsen, R. K. (2017). Reuters Institute digital news report 2017.

Nielsen. (2016, November 15). Millennials Are Top Smartphone Users. Retrieved from http://www.nielsen.com/us/en/insights/news/2016/millennials-are-top-smartphone-users.html

Nikou, S. A., & Economides, A. A. (2019). A comparative study between a computer-based and a mobile-based assessment. *Interactive Technology and Smart Education*.

Ning, Z. (2015).Research on Mobile Information Service of Library. 2nd International Conference on Civil, Materials and Environmental Sciences, Atlantis Press.

Niu, X., & Hemminger, B. M. (2012). A study of factors that affect the information-seeking behavior of academic scientists. *J. Am. Soc. Inf. Sci. Journal of the American Society for Information Science and Technology, 63*(2), 336-353. doi:10.1002/asi.21669

Niu, X., Hemminger, B. M., Lown, C., Adams, S., Brown, C., Level, A., . . . Cataldo, T. (2010). National study of information seeking behavior of academic researchers in the United States. *J. Am. Soc. Inf. Sci. Journal of the American Society for Information Science and Technology, 61*(5), 869-890. doi:10.1002/asi.21307

Nowlan, G. (2013). Going mobile: creating a mobile presence for your library. *New Library World, 114*(3/4), 142-150. doi:10.1108/03074801311304050

Oblinger, D. (2003). Boomers gen-xers millennials. *EDUCAUSE review*, *500*(4), 37-47.

Oyinloye, O. O., Dangwaran, T. Y., & Kantiok, H. S. (2016). Information seeking behaviour and use of information resources, by Bingham university humanities, social and management

sciences undergraduate student. *The Information Technologist, 13*(1), 141.

Palumbo, L. B. (2014). Mobile phones in Africa: opportunities and challenges for academic(De Waal, Schönbach et al. 2005, De Waal and Schoenbach 2010) librarians. *New Library World*.

Paterson, L., & Low, B. (2011). Student attitudes towards mobile library services for smartphones. *Library Hi Tech, 29*(3), 412-423. doi:10.1108/07378831111174387

Payne, K. F., Wharrad, H., & Watts, K. (2012). Smartphone and medical related App use among medical students and junior doctors in the United Kingdom (UK): a regional survey. *BMC Medical Informatics and Decision Making, 12*(1). doi:10.1186/1472-6947-12-121

Pažur, I. (2014). Library services/resources and handheld mobile devices. *Libraries in the Digital Age (LIDA) Proceedings, 13*.

Pandey, A., Hasan, S., Dubey, D., & Sarangi, S. (2013). Smartphone apps as a source of cancer information: changing trends in health information-seeking behavior. *Journal of Cancer Education*, *28*(1), 138-142.

Pickard, A. J. (2013). *Research methods in information* (2nd ed.). London: Facet.

Prensky, M. (2009). H. sapiens digital: From digital immigrants and digital natives to digital wisdom. *Innovate: journal of online education*, *5*(3), 1.

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the horizon*, *9*(5), 1-6.

Price, S. L., & Hersh, W. R. (1999). Filtering web pages for quality indicators: an empirical approach to finding high quality consumer health information on the world wide web. In *Proceedings of the AMIA Symposium* (p. 911). American Medical Informatics Association.

Ranganathan, S. R. (1931). *The five laws of library science*. Madras Library Association

(Madras, India) and Edward Goldston (London, UK).

Raptis, D., Tselios, N., Kjeldskov, J., & Skov, M. B. (2013, August). Does size matter?
investigating the impact of mobile phone screen size on users' perceived usability,
effectiveness and efficiency. In *Proceedings of the 15th international conference on
Human-computer interaction with mobile devices and services* (pp. 127-136).

Reese Bomhold, C. (2013). Educational use of smart phone technology: A survey of mobile
phone application use by undergraduate university students. *Program, 47*(4), 424-436.
doi:10.1108/PROG-01-2013-0003

Reis, S., Church, K., & Oliver, N. (2012). Rethinking mobile search: Towards casual, shared,
social mobile search experience. *Proceedings of the Searching 4 Fun Workshop*,
Barcelona, Spain, April 1, 2012.

Reisner, B. A., Vaughan, K. T. L., & Shorish, Y. L. (2014). Making data management accessible
in the undergraduate chemistry curriculum. *Journal of chemical education*, *91*(11), 1943-
1946.

Sasseen, J., Olmstead, K., & Mitchell, A. (2013). *Digital: As mobile grows rapidly, the pressures
on news intensify. The State of the News Media 2013 – An Annual Report on American
Journalism*. Washington, DC: Pew Research Center's Project for Excellence in
Journalism.

Savolainen, R. (1995). "Everyday life information seeking: Approaching information
seeking in the context of "way of life"." Library & Information Science
Research **17**(3): 259-294.

Schwandt, T. A. (2001). *Dictionary of qualitative inquiry*. Thousand Oaks, Ca: Sage.

Sharples, M. (2000). The design of personal mobile technologies for lifelong learning.

Computers & Education, 34(3-4), 177-193. doi:10.1016/s0360-1315(99)00044-5

Shim, H., You, K. H., Lee, J. K., & Go, E. (2015). Why do people access news with mobile

    devices? Exploring the role of suitability perception and motives on mobile news use.

    Telematics and Informatics, *32*(1), 108–117. https://doi.org/10.1016/j.tele.2014.05.002

SCONUL, W. (2011). The SCONUL seven pillars of information literacy: core model for higher

    education. *2011-12-20]. http://www. sconul. ac. uk/groups/in-*

    formation_literacy/seven_pillars. html.

Sin, S. -C.J., & Kim, K. -S. (2013). International students' everyday life information seeking:

    The informational value of social networking sites. Library and Information Science

    Research, 35(2), 107–116.

Sin, S. C. J. (2015). Demographic differences in international students' information source uses

    and everyday information seeking challenges. *The Journal of Academic Librarianship*,

    41(4), 466-474.

Singh, K. (2007). *Quantitative social research methods*. Los Angeles: Sage Publications.

    situational context of mobile communication. *Telematics and Informatics, 31*(2), 184-193.

    smartphones. Retrieved from http://www.pewresearch.org/fact-tank/2015/04/01/6-facts-

    about-americans-and-their-smartphones/

Smith, B., Jacobs, M., Wilson, S., & McCarthy, G. (2010). The mobile university: From the

    library to the campus. *Reference Services Review, 38*(2), 214-232.

Spink, A. & Cole C. (2001). "Introduction to the special issue: Everyday life

    information-seeking research." Library & Information Science Research *23*(4):

    301-304.

Spink, A., & Currier, J. (2006). Towards an evolutionary perspective for human information behavior. *Journal of Documentation*.

Spires, T. (2008). Handheld Librarians: A Survey of Librarian and Library Patron Use of Wireless Handheld Devices. *Internet Reference Services Quarterly, 13*(4), 287-309. doi:10.1080/10875300802326327

Swanson, T. A. (2005). Applying a critical pedagogical perspective to information literacy standards. *Community & Junior College Libraries*, *12*(4), 65-77.

Tashakkori, A., & Teddlie, C. (2003). Major Issues and Controversies in the use of Mixed Methods in the Social and Behavioral Sciences. In *Handbook of mixed methods in social & behavioral research* (pp. 3-50). Thousand Oaks, CA: SAGE Publications.

Taylor, R. S. (1968). Question-Negotiation and Information Seeking in Libraries. *College & Research Libraries, 29*(3), 178-194. doi:10.5860/crl_29_03_178

Tella, A. (2009). Correlates of undergraduates' information-seeking behavior. *College & Undergraduate Libraries*, *16*(1), 1-19.

Tenopir, C. (2004). Searching on the Run. *Library Journal, 129*(16), 32.

Tuominen, K., Savolainen, R., & Talja, S. (2005). Information literacy as a sociotechnical practice. *The Library Quarterly*, *75*(3), 329-345.

Uzunboylu, H., Cavus, N., & Ercag, E. (2009). Using mobile learning to increase environmental awareness. *Computers & Education, 52*(2), 381-389.doi:10.1016/j.compedu.2008.09.008

Valk, J.-H., A. T. Rashid and L. Elder (2010). "Using mobile phones to improve educational outcomes: An analysis of evidence from Asia." The International Review of Research in Open and Distributed Learning 11(1): 117-140.

Van Scoyoc, A. M., & Cason, C. (2006). The electronic academic library: Undergraduate

research behavior in a library without books. *portal: Libraries and the Academy*, *6*(1), 47-58.

Ventola, C. L. (2014). Mobile devices and apps for health care professionals: uses and benefits. *Pharmacy and Therapeutics*, *39*(5), 356.

Wang, Q., & Chen, W. (2015). Network Information Foraging Behavior Strategy of Library Mobile Reading Platform Users. *Journal of Advances in Information Technology JAIT,* 178-181. doi:10.12720/jait.6.3.178-181

Wang, Y., Huang, X., & White, R. W. (2013, February). Characterizing and supporting cross-device search tasks. In *Proceedings of the sixth ACM international conference on Web search and data mining* (pp. 707-716).

Webber, S., & Johnston, B. (2000). Conceptions of information literacy: new perspectives and implications. *Journal of information science*, *26*(6), 381-397.

Webber, S., & Johnston, B. (2006). Working towards the information literate university. *Information literacy: recognising the need*, *17*, 47-58.

Wells, T., Bailey, J. T., & Link, M. W. (2014). Comparison of smartphone and online computer survey administration. *Social Science Computer Review*, *32*(2), 238-255.

Westlund, O., Gomez-Barroso, J. L., Compano, R., & Feijoo, C. (2011). Exploring the logic of mobile search. *Behaviour & Information Technology, 30*(5), 691-703.

Westlund, O. (2015). News consumption in an age of mobile media: Patterns, people, place, and participation. In: SAGE Publications Sage UK: London, England.

Westlund, O., & Färdigh, M. A. (2015). Accessing the news in an age of mobile media: Tracing displacing and complementary effects of mobile news on newspapers and online news. *Mobile Media & Communication, 3*(1), 53-74.

Williamson, K., Qayyum, A., Hider, P., & Liu, Y. H. (2012). Young adults and everyday-life

information: The role of news media. *Library & Information Science Research*, *34*(4),

258-264.

Wilson, T. (1981). On User Studies And Information Needs. *Journal of Documentation, 37*(1),

3-15. doi:10.1108/eb026702

Wilson, T. (1997). Information behaviour: An interdisciplinary perspective. *Information

Processing & Management, 33*(4), 551-572. doi:10.1016/s0306-4573(97)00028-9

Wilson, T. D. (1994). Information needs and uses: Fifty years of progress. *A Journal

Of Documentation Review,* 15-51.

Wilson, T. D. (1999). Models in Information Behaviour Research. *The Journal of

Documentation, 55*(3), 249-270 .

Wilson, T. D. (2000). Human information behavior. Informing Science. *Informing Science, 3*(2),

49-56.

Wilson, T. D., & Walsh, C. (1996). *Information behaviour: An inter-disciplinary perspective: A

review of the literature*. London: A British Library Research and Innovation Centre.

Yarmey, K. (2011). Student Information Literacy in the Mobile Environment. *Educause

Quarterly, 34*(1). doi:10.1201/b19843-7

Yeh, N. (2014, August). Understanding Taiwanese mobile information access behavior. In *IFLA

WLIC 2014 - Lyon - Libraries, Citizens, Societies: Confluence for Knowledge*. Retrieved

from http://library.ifla.org/972/1/190-yeh-en.pdf

Zhang, L., & Ma, W. (2011). Correlation analysis between users' educational level and mobile

reading behavior. *Library Hi Tech, 29*(3), 424-435. doi:10.1108/07378831111174396

Appendix A: Interview consent form

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Title of Project: Evaluating information on smartphones

Sponsor(s):   Social Science and Humanities Research Council

Purpose of the Study: The purpose of this study is to identify and describe possible differences inherent in the evaluation of information on smartphones. In this part of the study, the goal is to understand what information people consider important and relevant to their well-being, and how they use their smartphones to find, evaluate and use that information. We also hope to identify both barriers and facilitators to information seeking and use.

Study Procedures: We would like to meet with you for an interview to discuss how you use your smartphone in support of your well-being, what kind of information you search on your smartphone, how you evaluate information found in support of your well-being. The interview will last about 45-60 minutes. In order to accurately capture what you will tell us, we will audio-record the conversation. The audio-recording will be used only to create a transcript of the interview.

Voluntary Participation: Participation in this study is voluntary. You may decline to answer any questions, and may withdraw from the study at any time, for any reason. If you withdraw during the interview session, your information (consent form, audio-recording) will be destroyed, unless you give permission otherwise. If you withdraw after the interview session, we may no longer be able to destroy your information, since we will not record any links between your data and your identity.

Potential Risks: There are no anticipated risks to you by participating in this research.

Potential Benefits: Participating in this study might not benefit you directly, but, we hope to better understand the information needs and the evaluation of information on smartphones to support well-being. This will support both information services and systems to support those needs.

- **Compensation:** You will receive $20.00 in compensation for your time.

Confidentiality: The only identifiable information collected is this consent form, and the audio-recording of the interview. Names on compensation receipt will be blacked out and replaced with a code (e.g. RCPT 1, RCPT 2 etc) which will be different from the code given to audio-recorded data. This form is the only

place where your name will be recorded. This form will be stored in a locked file cabinet in the researcher's office – it will be kept separately from all other information related to this study.

Immediately following this interview, the audio file from the recording will be transferred to a password protected file on the McGill University server –the file will be identified by code, not your name. The student and her supervisor will have access to the identifiable data (the audio-recordings).The student will conduct the interview, obtain the signed consent form, and transcribe the audio-recording of the interview. The supervisor will store the signed consent forms in a locked cabinet in her office. The recording itself will not be disseminated in any way.

Finding from this research will be disseminated as thesis, presentations at scholarly/professional conferences and/or publications in scholarly/professional journals. In all dissemination, any findings from the research will be reported anonymously, and labelled with a non-identifying code (e.g., P1, P2, etc.).

Questions: If you have any questions or request clarification about this research, please contact the Principal Investigator: Cynthia Kumah, 514-649-0181, cynthia.kumah@mail.mcgill.ca or her Supervisor: Professor Joan Bartlett, 514-398-6976, joan.bartlett@mcgill.ca

If you have any ethical concerns or complaints about your participation in this study, and want to speak with someone not on the research team, please contact the McGill Ethics Manager at 514-398-6831 or lynda.mcneil@mcgill.ca".

Please sign below if you have read the above information and consent to participate in this study. Agreeing to participate in this study does not waive any of your rights or release the researchers from their responsibilities. A copy of this consent form will be given to you and the researcher will keep a copy.

Participant's Name (please print): _____

Participant's Signature: _____ Date: _____

Appendix B: Interview background information form

1. Age: _____

2. Gender:

   - Female
   - Male
   - Other

3. Faculty: _____

Department/Area of Study: _____

4. Which of the following best describes you?

   - Quebec student
   - Canadian student
   - International student

5. What is your year of study?

   - U0
   - U1
   - U2
   - U3

6. What is your first language(s)? _____

7. What is the language(s) mostly spoken at home?
   _____

8. Do you have a smart phone? ❒ Yes   ❒ No

9. Do you have a computer at home? ❒ Yes   ❒ No

Appendix C: Interview guide

Thanks for agreeing to participate in our study.

 Background to SIS

We're interested in finding out about how people define their own well-being, and what information they need to know or want to support their own well-being. We know that most information systems aren't perfect, and our overall goal is to be able to design more effective and usable information systems. So, we're interested in how well existing systems work for you.

1. Tell us a bit about yourself

2. When you think of your own personal well-being, what does that mean to you? How do you define well-being?

   - How do you try to achieve or maintain your own well-being?

3. What information do you consider to be important or relevant with respect to your well-being? What do you want or need to know?

4. How do you look for or find that information?

   - Formal sources
   - Personal

      - Family, friends, professionals

   - Social media
   - Internet

      - Google, Wikipedia, YouTube

   - Serendipity
   - Active/passive/ongoing search

5. Describe a typical process

- Sequence of steps
- What to click on
- Recent specific incident

6. Credibilty/reliability/what is "good" or "trustworthy"

7. Problems with the process / what does/would help with the process

8. Confidence in results? Was info adequate? Only possible solution? Could there have been a better approach?

9. What do you do with the information?

- PIM
- Sharing
- Social media
- Decision making

mobile information behavior

Can you tell me generally some of the things you use your mobile phone for?

1. Which aspect of your everyday life do you use mobile devices for?

2. What type of information do you search for using your mobile device?

3. What makes you decide to search for something right away and not later

4. How many results do you view when searching on mobile device

5. How do you use the information found?

6. Do you evaluate information found on your device?

7. How do you do that

8. How does your mobile devices help you in maintaining your well-being

(Probe for what was mentioned under well-being)

9. What apps do you use most frequently?

10. Do you have specific apps for specific aspect of your life?

11. Why do you use your mobile device this way and not your computer

12. Do you have different types of mobile devices?

13. Do you use specific devices for specific purposes?

10. Dream – what would make it better?

Appendix D: Interview codebook

Active searching	Evaluation	General uses	Information	Non searching	**Prompt**
Search related	**Topic related evaluation strategies**	**Device and purpose**	**Topic related info**	**Apps related**	Ease of access
Information searching	Health	Communication	Academic use	Communication apps	Context of use
Location searching	Leisure	Social media	Other academic related use	Location apps	Emotional trigger
Number of pages viewed	News	Entertainment	Health information	Entertainment apps (Netflix, youtube)	Environmental trigger
	Academic	Frequently use apps	Healthy lifestyle		
Device related	**Other evaluation**		Problems with online health information	Social media	
Reasons to search on smartphones	No evaluation		News	**Non app**	
Reasons to search on laptop	Reasons not to evaluate		News information	Organizing and scheduling	
Resources and devices used in access			Leisure activities	Reading	
			Info Related		
Other reasons for smartphone use			Information use		
			Information and devices		

Information searching	Health	Communication	Academic use	Communication apps	Context of use
Location searching	Leisure	Social media	Other academic related use	Location apps	Emotional trigger
Number of pages viewed	News	Entertainment	Health information	Entertainment apps (Netflix, YouTube)	Environmental trigger
	Academic	Searching	Healthy lifestyle		
Device related	**Other evaluation**		Problems with online health information	Social media	
Reasons to search on smartphones	No evaluation		News	**Non app**	
Reasons to search on laptop	Reasons not to evaluate		News information	Organizing and scheduling	
Resources and devices used in access			Leisure activities	Reading	
			Info Related		
Other reasons for smartphone use			Information use		
			Information and devices		

Appendix E: Survey instrument

Consent form

Academic and everyday-life information seeking and use

Details and Consent Form

Researchers: Professors Beheshti & Bartlett, School of Information Studies, McGill University.

Title of Project: *Towards a Model of Metaliteracy for Academic and Everyday-Life Information Seeking and Use*

Sponsor(s): Social Science and Humanities Research Council

Purpose of the Study: The purpose of this study is to understand what information resources students use and consider credible for their school work as well as for their everyday life.

Study Procedures: This survey will take **15-20 minutes.** It consists of 8 main questions, and a number of sub-questions. At the end of the survey, you have an option to volunteer for a follow-up interview, for which you will be compensated.

Voluntary Participation: Participation in this survey is voluntary. Participants must be 18 years or older.

Potential Risks: There are no anticipated risks to you by participating in this research.

Potential Benefits: Participating in this study might not benefit you directly, but, we hope to better understand information seeking and use of students. The outcome of our study will help services and systems at McGill and elsewhere to support students' information needs.

Compensation: You will have a chance to win one of more than 100 prizes, with two $500 Apple gift certificates, ten $100 cash prizes, and many other cash prizes for compensation of your time. The odds of winning depends on the total number of respondents to the survey, but it is estimated to be about 1 in 40 (based on 20 percent response rate). After completing the survey, to enter the draw, you **must type in your email on the last page of the survey after you 'submit'**. Only one entry per student.

Confidentiality: The survey is anonymous. Findings from this research will be disseminated as presentations at scholarly/professional conferences and/or publications in scholarly/professional journals. In all dissemination, any findings from the research will be reported anonymously, and labelled with a non-identifying code (e.g., P1, P2, etc.).

Questions: If you have any questions or request clarification about this research, please contact the researchers at: meta.sis@mcgill.ca.

If you have any ethical concerns or complaints about your participation in this study, and want to speak with someone not on the research team, please contact the McGill Ethics Manager at 514-398-6831 or lynda.mcneil@mcgill.ca.

ELECTRONIC CONSENT: You may wish to print a copy of this consent form for your records. Clicking on the "Next" button indicates that

- You have read the above information and agree to its terms
- You voluntarily agree to participate

Demographics

Thank you for agreeing to participate in this survey. The survey is designed to collect data on how you find and use information for everyday *non-academic* activities and issues on **health**, **leisure** and **news** as well as for *academic* purposes.

Year of study:

Please choose **only one** of the following:

- ○ U0
- ○ U1
- ○ U2
- ○ U3
- ○ U4

Faculty:

Please choose **only one** of the following:

- ○ Agriculture and Environmental Sciences
- ○ Arts
- ○ Dentistry
- ○ Education
- ○ Engineering
- ○ Law

- ○ Management
- ○ Medicine
- ○ Music
- ○ Science

Main Program:

Age:

Please choose only one of the following:

- ○ 18
- ○ 19
- ○ 20
- ○ 21
- ○ 22
- ○ 23
- ○ 24
- ○ 25 and older

Gender:

Please choose **only one** of the following:

- ○ Female
- ○ Male
- ○ Prefer not to answer
- ○ Prefer to self-describe

Which of the following best describes you?

Please choose **only one** of the following:

- ○ Quebec student
- ○ Canadian student from another province
- ○ International student

What is your first language?

Please choose **only one** of the following:

- ○ English
- ○ French
- ○ Other

What is the language most spoken at home?

Please choose only one of the following:

- ○ English
- ○ French
- ○ Other

Part 1

1. In general, how often do you use the following resources to obtain information? [response table repeated for each resource]

- Peers, other students
- Friends and family
- Experts (e.g., doctors, travel agents, political scientists, professors)
- Scholarly books, journals (e.g., Journal of Sports Sciences, Journal of Sociology, Molecular Biology of The Cell)
- Popular books, magazines (e.g., Health, Sports Illustrated, Toronto Star, Popular Science)
- Government or university websites (e.g., Government of Canada Travel Advisories, Stats Canada)
- Well-known websites (e.g., WebMD, tripadvisor, CBC, Yahoo!, MSN)
- Social media (e.g., YouTube, Facebook, Pinterest, Instagram, Flickr, Twitter)
- Blogs, forums, Q&As (including reddit, Quora, Yahoo! Answers)
- Wiki (e.g., Wikipedia, Online Health Wiki, Wikitravel, Wikinews, MediaWiki)TV, radio (including online TV, Podcasts)

Please choose the appropriate response for each item:

	Never use		Sometimes use		Always use
	1	2	3	4	5
For everyday **health** issues (*e.g., leg cramps, stomach ache, stress*)	○	○	○	○	○
For everyday **leisure** activities (*e.g., choosing a restaurant or a movie, travelling, cooking*)	○	○	○	○	○
For everyday **news** topics (*e.g., election, famine, war*)	○	○	○	○	○

	Never use		Sometimes use		Always use
	1	2	3	4	5
For **academic** assignments (*e.g., preparing for class, homework*)	○	○	○	○	○

If other resources are used, please specify which one(s):

Please write your answer here:

Part 2

2. In general, how credible do you find the information you obtain from the following resources? [response table repeated for each resource]

- Peers, other students
- Family and friends
- Experts (e.g., doctors, travel agents, political scientists, professors)
- Scholary books, journals (e.g., Journal of Sports Sciences, Journal of Sociology, Molecular Biology of The Cell)
- Popular books, magazines (e.g., Health, Sports Illustrated, Toronto Star, Popular Science)
- Government or university websites (e.g., Government of Canada Travel Advisories, Stats Canada)
- Well-known websites (e.g., WebMD, tripadvisor, CBC, Yahoo!, MSN)
- Social media (e.g., YouTube, Facebook, Pinterest, Instagram, Flickr, Twitter)
- Blogs, forums, Q&A (including reddit, Quora, Yahoo! Answers)
- Wiki (e.g., Wikipedia, Online Health Wiki, Wikitravel, Wikinews, MediaWiki)
- TV, radio (including online TV, Podcasts)

Please choose the appropriate response for each item:

	Not at all credible		Somewhat credible		Very credible	I don't know
	1	2	3	4	5	
For everyday **health** issues (*e.g., leg cramps, stomach ache, stress*)	○	○	○	○	○	○
For everyday **leisure** activities (*e.g., choosing a restaurant or a movie, travelling, cooking*)	○	○	○	○	○	○
For everyday **news** topics (*e.g., election, famine, war*)	○	○	○	○	○	○
For **academic** assignments (*e.g., preparing for class, homework*)	○	○	○	○	○	○

If other resources are used, please specify which one(s):

Please write your answer here:

Part 3

3. In general, when you judge the credibility of information on the Internet, how much do you consider the following factors? [response table repeated for each factor]

- Website is in top 5 hits on Google search results
- Other users' reactions to a posting (e.g., ratings, comments)
- Quality of images, sounds, videos
- Quality of language
- Information is up-to-date
- Information matches other sources
- Experience, affiliation, reputation of author
- My previous experience with website or source
- My good or bad feeling about website or source

Please choose the appropriate response for each item:

	Never consider		Sometimes consider		Always consider
	1	2	3	4	5
For everyday **health** issues (*e.g., leg cramps, stomach ache, stress*)	○	○	○	○	○
For everyday **leisure** activities (*e.g., choosing a restaurant or a movie, travelling, cooking*)	○	○	○	○	○
For everyday **news** topics (*e.g., election, famine, war*)	○	○	○	○	○
For **academic** assignments (*e.g., preparing for class, homework*)	○	○	○	○	○

If you consider other factors, please specify which one(s):

Please write your answer here:

Part 4

4. In general, which of the following search tools or databases do you use most often?

For everyday health issues (e.g., leg cramps, stomach ache, stress)

Please choose the appropriate response for each item:

	Never use 1	2	Sometimes use 3	4	Always use 5	Not familiar
Google	○	○	○	○	○	○
YouTube	○	○	○	○	○	○
Facebook	○	○	○	○	○	○
Twitter	○	○	○	○	○	○
Reddit	○	○	○	○	○	○
Google Scholar	○	○	○	○	○	○
Library catalogue	○	○	○	○	○	○
Databases on Library website	○	○	○	○	○	○

If other search tool(s) are used, please specify:

Please write your answer here:

Please choose the appropriate response for each item:

	Never use		Sometimes use		Always use	Not familiar
	1	2	3	4	5	
Google	○	○	○	○	○	○
YouTube	○	○	○	○	○	○
Facebook	○	○	○	○	○	○
Twitter	○	○	○	○	○	○
Reddit	○	○	○	○	○	○
Google Scholar	○	○	○	○	○	○
Library catalogue	○	○	○	○	○	○
Databases on Library website	○	○	○	○	○	○

If other search tool(s) used, please specify:

Please write your answer here:

For everyday news topics (e.g., election, famine, war)

Please choose the appropriate response for each item:

	Never use		Sometimes use		Always use	Not familiar
	1	2	3	4	5	
Google	○	○	○	○	○	○
YouTube	○	○	○	○	○	○
Facebook	○	○	○	○	○	○
Twitter	○	○	○	○	○	○
Reddit	○	○	○	○	○	○

	Never use		Sometimes use		Always use	Not familiar
	1	2	3	4	5	
Google Scholar	○	○	○	○	○	○
Library catalogue	○	○	○	○	○	○
Databases on Library website	○	○	○	○	○	○

If other search tool(s) are used, please specify:

Please write your answer here:

For academic assignments (e.g., preparing for class, homework)

Please choose the appropriate response for each item:

	Never use		Sometimes use		Always use	Not familiar
	1	2	3	4	5	
Google	○	○	○	○	○	○
YouTube	○	○	○	○	○	○
Facebook	○	○	○	○	○	○
Twitter	○	○	○	○	○	○
Reddit	○	○	○	○	○	○
Google Scholar	○	○	○	○	○	○
Library catalogue	○	○	○	○	○	○

	Never use		Sometimes use		Always use	Not familiar
	1	2	3	4	5	
ProQuest	○	○	○	○	○	○
Web of Science	○	○	○	○	○	○
Scopus	○	○	○	○	○	○
JSTOR	○	○	○	○	○	○
EBSCO HOST	○	○	○	○	○	○

If other search tool(s) used, please specify:

Please write your answer here:

Sharing and technology

5. In general, do you share information you obtained from the Internet or other sources about the following topics? (If you share information, please select all that apply) [response options repeated for each topic]

- For everyday health issues (e.g., leg cramps, stomach ache, stress)

- For everyday **leisure** activities (*e.g., choosing a restaurant or a movie, travelling, cooking*)

- For everyday **news** topics (*e.g., election, famine, war*)

- For **academic** assignments (*e.g., preparing for class, homework*)

Please choose **all** that apply:

- ☐ I do not share the information I obtain on this topic
- ☐ Share information on YouTube
- ☐ Share information on Facebook
- ☐ Share information on Twitter
- ☐ Share information on forums, Q&A (including reddit, Quora, Yahoo!)
- ☐ Share information on your own website or blog
- ☐ Share information through one-to-one communication (including phone, text, email)
- ☐ Share information on Instagram, Snapchat, Pinterest

Tech usage

6. If you own a smart phone, how often do you use it to access information?

Please choose the appropriate response for each item:

	Never use	Sometimes use			Always use
	1	2	3	4	5
For everyday **health** issues?	○	○	○	○	○
For everyday **leisure** activities?	○	○	○	○	○
For everyday **news** topics?	○	○	○	○	○
For **academic** assignments?	○	○	○	○	○

7. If you own a laptop or a desktop, how often do you use it to access information?

Please choose the appropriate response for each item:

	Never use	Sometimes use			Always use
	1	2	3	4	5
For everyday **health** issues?	○	○	○	○	○
For everyday **leisure** activities?	○	○	○	○	○
For everyday **news** topics?	○	○	○	○	○
For **academic** assignments?	○	○	○	○	○

Library Instruction

8. Have you ever been instructed in any of the following? (If you have been instructed, please select all that apply)

- Library research skillsCitation managers (e.g., Endnote, Mendeley)
- Database searching (e.g., ProQuest, EBSCO HOST)

Please choose **all** that apply:

- ☐ No instruction
- ☐ Self-taught
- ☐ Informal instruction
- ☐ Formal instruction (less than 1 hour)
- ☐ Formal instruction (1-3 hours)
- ☐ Formal instruction (more than 3 hours)

Thank you for completing the survey. If you wish to participate in the follow-up interview and earn $25 cash, please click on the link below. The link will also take you to the Prize Draw Entry page, where you have a chance to win one of more than 100 prizes through a draw on Friday, December 1.

Please click here.

Or

Click here to Exit the survey.

Submit your survey.
Thank you for completing this survey.

Appendix F: Follow up interview guide

Smartphone information behavior research

Interview guide

1. Can you tell me generally some of the things you use your mobile phone for?

2. Which aspect of your everyday life do you use mobile devices for?

3. What type of information do you search for using your mobile device?

4. On what basis will you choose a computer or smartphone in searching for information

5. What makes you decide to search for something right away and not later

6. When you think about searching for information for your everyday health, which device are you more likely to use? (**repeat for leisure, news and assignment**). Are there particular apps that you also use for your health, leisure, news and assignment?

7. Do you evaluate information found on your smartphone? How do you do that? (**ask subject specific after general question**)

8. Do you also check for (**site in top 5 results, other users reaction, quality of images, quality of language, information is up to date, information matches other sources, author, my experience with the source, my good or bad feelings**)?

9. Which of these factors will be more important to you when evaluating information for your assignment? Will you use the same factors for health information too? And leisure, news?

10. What are the main differences in computer and smartphone usage

11. Do you treat information found on computers and smartphone different? Why and how do you do that?

12. Given the following resources (**peers, family, expert, scholarly books and journals, popular magazines, government websites, social media sites, blogs, wikis and television**) which ones are you more likely to search for on your smartphone?

13. Why do you use your mobile device this way and not your computer?

14. How does the context where you find yourself affect the device used in searching?

15. Do you foresee using your smartphone for academic purposes? Why? What would incline you to?

16. Do you feel you use the information found on the mobile phone in decision making more than on computers? What are you most frequently used apps?

Appendix G: Ethics application for follow-up interviews

![McGill logo]

Applicable Research Ethics Board

X REB-I ___REB-II ___REB-III

Application for Ethics Approval for Research Involving Human Participants

(please refer to the Application Guidelines
[www.mcgill.ca/research/researchers/compliance/human/] **before** completing this form)

Project Title: Evaluating information on smartphones

Principal Investigator: Cynthia Kumah   **Dept:** School of Information Studies

Phone #: 5146490181Email: Cynthia.kumah@mail.mcgill.ca

(a McGill email MUST be provided)

Status: Faculty Arts   **Postdoctoral Fellow ___**   **Other (specify) _____**

Ph.D. Student X   **Master's Student ___**   **Undergraduate ___**

Type of Research: Faculty Research ___   **Thesis X**

Honours Thesis ___   **Independent Study Project ___**

Course Assignment (specify course name and #)_____

Other (specify) _____

Faculty Supervisor (if PI is a student): Prof. Joan BartlettEmail: joan.bartlett@mcgill.ca

Co- Investigators/Other Researchers (list name/status/affiliation):

List all funding sources for this project and project titles (if different from the above). Indicate the Principal Investigator of the award if not yourself.

Awarded: This research is funded by SSHRC (Social Science and Humanities Research Council – Canada) Insight Development Grants awarded to Prof. Joan Bartlett.

Principal Investigator Statement: I will ensure that this project is conducted in accordance with the policies and procedures governing the ethical conduct of research involving human participants at McGill University. I allow release of my nominative information as required by these policies and procedures.

 Principal Investigator Signature: _____   Date: _____

Faculty Supervisor Statement: I have read and approved this project and affirm that it has received the appropriate academic approval. I will ensure that the student investigator is aware of the applicable policies and procedures governing the ethical conduct of research involving human participants at McGill University and I agree to provide all necessary supervision to the student. I allow release of my nominative information as required by these policies and procedures.

Faculty Supervisor Signature: _____ **Date**: _____

Respond directly on this form to each section (1-8). Do not re-order or omit any section or any of the questions under each section heading.   **Answer every part of each section. Forms with incomplete sections will be returned.**

1. Purpose of the Research

a)Describe the proposed project and its objectives, including the research questions to be investigated (one-two page maximum).

This study explores the mobile information behaviour of young adults in relation to their well-being as well as how they evaluate information using mobile devices. It will also apply Wilson's (1997) revised model to mobile information behavior and assess the various factors that can assist in understanding mobile information needs, services and application that better support well-being of young adults. The objective of the study is to explore the mobile information behaviour of young adults in relation to their well-being as well as how they evaluate information on smartphones.

RQ: How does the device used influence the evaluation of found information?

b)What is the expected value or benefits of the research?

It is anticipated the study will add to knowledge on information behavior of young adults by extending previous research to use of mobile devices. Also provide information on their everyday life information behavior; specifically, on how they use mobile devices in search for information for their well-being.

This research will increase our understanding of how users evaluate information differently in relation to the device used. It is hoped that concrete factors will be provided to evaluate information on mobile devices.

Also, the study will contribute to theory by empirically applying Wilson's information behavior models to study people in mobile environment. The study will identify specific ways of applying this model in studying people in today's technological world.

c)How do you anticipate disseminating the results (e.g. thesis, presentations, internet, film, publications)?

Findings from this research will be disseminated through scholarly research channels including thesis, presentations at scholarly/professional conferences and/or publications in scholarly/professional journals

2. Recruitment of Participants/Location of Research

a)Describe the participant population and the approximate number of participants needed.

The target population for this study is undergraduate students between the ages of 18-24 attending McGill University.

b)Describe how and from where they will be recruited. Attach a copy of any advertisement, letter, flier, brochure or oral script to be used to solicit potential participants (including information to be sent to third parties).

Participants will be recruited through fliers (Appendix A) posted in public spaces at McGill University. Also by submitting a request for participants through online SSMU listserv submission form (Appendix B). The message to be used to request for participants on the listserv submission form will be the same as the one for the fliers.

c)Describe the setting in which the research will take place.

Interviews will be conducted in person. They will take place at a location that is convenient for the participant. This could be a research office at the School of Information Studies, a study room at the university library, or a local coffee shop.

d)Describe any compensation subjects may receive for participating.

Participants will be offered $20 in compensation for their time. Based on previous experience, this level of compensation is necessary, but not excessive, in order to recruit participants.

3. Other Approvals

When doing research with various distinct groups of participants (e.g. school children, cultural groups, institutionalized people, other countries), organizational/community/governmental permission is sometimes needed. If applicable, how will this be obtained? Include copies of any documentation to be sent.

None needed

4. Methodology/Procedures

Provide a sequential description of the methods and procedures to be followed to obtain data. Describe all methods that will be used (e.g. fieldwork, surveys, interviews, focus groups,

standardized testing, video/audio taping). Attach copies of questionnaires or draft interview guides, as appropriate.

Participants will be expected to read and sign the consent form (Appendix C) they will be given a copy of the consent form to keep for their records.

Next, they will be given a biographical questionnaire to fill (Appendix D). This will be followed by semi structured interviews (Appendix E). Participants will describe how they use their smartphones in support of their wellbeing, how they search and evaluate information them. Questions may be modified as the interviews progress. Participants can respond to the question in the way they understand and are comfortable to do so. The interviews will be audio-recorded. The interviewer will also make written field-notes during the interview.

5. Potential Harms and Risk

a) Describe any known or foreseeable harms, if any, that the participants or others might be subject to during or as a result of the research. Harms may be psychological, physical, emotional, social, legal, economic, or political.

There are no known or foreseen harms.

b) In light of the above assessment of potential harms, indicate whether you view the risks as acceptable given the value or benefits of the research.

Not Applicable

c) Outline the steps that may be taken to reduce or eliminate these risks.

Not Applicable

d) If deception is used, justify the use of the deception and indicate how participants will be debriefed or justify why they will not be debriefed.

Not Applicable

6. Privacy and Confidentiality

a) Describe the degree to which the anonymity of participants and the confidentiality of data will be assured and the specific methods to be used for this, both during the research and in the release of findings.

The only identifiable information collected will be the consent form, payment receipt and the audio-recording of the interview. The form and the receipt are the only place where the name of the participant will be recorded. The form, together with the receipt will be stored in a locked file cabinet in the researcher's office (3661 Peel St., Rm. 204) – they will be stored separately from all other material relating to this study.

In all other places, participants will be referred to using a code (e.g., P1, P2, etc.). This includes research notes, data files, data analysis, and any publication or other dissemination of the findings.

No link will be kept between a participant code and their data (e.g., field notes, audio-recording).

b) Describe the use of data coding systems and how and where data will be stored. Describe any potential use of the data by others.

All data files will be labelled with a non-identifying code (e.g., P1, P2, etc.) these codes will not be linked to names of participants. All physical data (e.g., paper notes) will be stored in a locked filing cabinet, in the researcher's office (3661 Peel St., Rm. 204). Electronic files will be stored in a secure, password protected folder on a McGill server. If data is stored temporarily on

personal computers or storage device (e.g., USB drives), they will be password protected and kept in an encrypted folder.

We do not anticipate any potential use of the data by others.

c) Who will have access to identifiable data?

The student and her supervisor will have access to the identifiable data (the audio-recordings).

The student will conduct the interview, obtain the signed consent form, and transcribe the audio-recording of the interview. The supervisor will store the signed consent forms in a locked cabinet in her office.

d)What will happen to the identifiable data after the study is finished?

All identifiable data will be maintained for a minimum of seven years after the completion of the research, then destroyed (paper files shredded, electronic files erased).

e)Indicate if there are any conditions under which privacy or confidentiality cannot be guaranteed (e.g. focus groups), or, if confidentiality is not an issue in this research, explain why.

None foreseen

7. Informed Consent Process

a)Describe the oral and/or written procedures that will be followed to obtain informed consent from the participants. Attach all consent documents, including information sheets and scripts for oral consents.

At the beginning of the interview, participants will be given a written consent form to read and sign to give their consent to participant in the study. Participants will be given a copy of the consent forms to keep for their records.

b) If written consent will not be obtained, justification must be provided.

Not Applicable

8. Other Concerns

a) Indicate if participants are a captive population (e.g. prisoners, residents in a center) or are in any kind of conflict of interest relationship with the researcher such as being students, clients, patients or family members. If so, explain how you will ensure that participants do not feel pressure to participate or perceive that they may be penalized for choosing not to participate.

No other concerns identified.

b) Comment on any other potential ethical concerns that may arise during the course of the research.

No other potential ethical concern identified

APPENDIX A

Recruitment

Seeking Undergraduate Students...

…to participate in a research project that explores the everyday-life information seeking and use as it relates to well-being. You must be:

An undergraduate student

18 -24years

We are looking for participants for a 45-60-minute interview. We'll talk about how you look for and use information to support your own well-being and the use of smartphones on this topic. You will be compensated $20 for your time.

If you'd like to participate, please contact:

Cynthia.kumah@mail.mcgill.ca

This research is part of a larger study, funded by the Social Science and Humanities Research Council of Canada, to determine the design criteria for an information system to facilitate the process of finding, evaluating and using information in support of well-being.

For more information, please contact Cynthia Kumah, Ph.D. Candidate or Professor Joan Bartlett, Supervisor at the School of Information Studies (http://www.mcgill.ca/sis/)

Appendix H: Ethics certificates

McGill

Research Ethics Board Office
James Administration Bldg.
845 Sherbrooke Street West. Rm 325
Montreal, QC H3A 0G4

Tel: (514) 398-6831

Website: www.mcgill.ca/research/researchers/compliance/human/

Research Ethics Board II
Certificate of Ethical Acceptability of Research Involving Humans

REB File #: 84-0718

Project Title: Evaluating information on smartphones

Principal Investigator: Cynthia Kumah

Department: School of Information Studies

Status: Ph.D. Student

Supervisor: Professor Joan Bartlett

Funding: SSHRC (PI Prof. Joan Bartlett)

Approval Period: <u>August 7, 2018 to August 6, 2019</u>

The REB-II reviewed and approved this project by delegated review in accordance with the requirements of the McGill University Policy on the Ethical Conduct of Research Involving Human Participants and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans.

Deanna Collin
Ethics Review Administrator, REB I & II

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* Approval is granted only for the research and purposes described.
* Modifications to the approved research must be reviewed and approved by the REB before they can be implemented.
* A Request for Renewal form must be submitted before the above expiry date. Research cannot be conducted without a current ethics approval. Submit 2-3 weeks ahead of the expiry date.
* When a project has been completed or terminated, a Study Closure form must be submitted.
* Unanticipated issues that may increase the risk level to participants or that may have other ethical implications must be promptly reported to the REB. Serious adverse events experienced by a participant in conjunction with the research must be reported to the REB without delay.
* The REB must be promptly notified of any new information that may affect the welfare or consent of participants.
* The REB must be notified of any suspension or cancellation imposed by a funding agency or regulatory body that is related to this study.
* The REB must be notified of any findings that may have ethical implications or may affect the decision of the REB.

McGill

Research Ethics Board Office
James Administration Bldg.
845 Sherbrooke Street West. Rm 429
Montreal, QC H3A 0G4

Tel: (514) 398-6831
Fax: (514) 398-4644
Website: www.mcgill.ca/research/researchers/compliance/human/

Research Ethics Board II
Certificate of Ethical Acceptability of Research Involving Humans

REB File #: 481-0516

Project Title: Metaliteracy for well-being: design criteria for an information system - Phase I

Principal Investigator: Joan Bartlett   **Department:** School of Information Studies

Funding: SSHRC – Insight Grant

Approval Period: May 31, 2016 to May 30, 2017

The REB-II reviewed and approved this project by delegated review in accordance with the requirements of the McGill University Policy on the Ethical Conduct of Research Involving Human Participants and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans.

Deanna Collin
Ethics Review Administrator, REB I & II

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* All research involving human participants requires review on at least an annual basis. A Request for Renewal form should be submitted 2-3 weeks before the above expiry date. Research cannot be conducted without a current ethics approval.
* When a project has been completed or terminated, a Study Closure form must be submitted.
* Unanticipated issues that may increase the risk level to participants or that may have other ethical implications must be promptly reported to the REB. Serious adverse events experienced by a participant in conjunction with the research must be reported to the REB without delay.
* Modifications must be reviewed and approved by the REB before they can be implemented.
* The REB must be promptly notified of any new information that may affect the welfare or consent of participants.
* The REB must be notified of any suspension or cancellation imposed by a funding agency or regulatory body that is related to this project.
* The REB must be notified of any findings that may have ethical implications or may affect the decision of the REB.

♔ McGill

Research Ethics Board Office
James Administration Bldg.
845 Sherbrooke Street West. Rm 325
Montreal, QC H3A 0G4

Tel: (514) 398-6831

Website: www.mcgill.ca/research/researchers/compliance/human/

Research Ethics Board II
Certificate of Ethical Acceptability of Research Involving Humans

REB File #: 72-0617

Project Title: Towards a Model of Metaliteracy for Academic and Everyday-Life Information Seeking and Use (II)

Principal Investigator: Prof. Jamshid Beheshti

Department: School of Information Studies

Co- Investigator(s)/Other Researchers: Prof. Joan Bartlett

Funding: SSHRC "Towards a Model of Metaliteracy for Academic and Everyday-Life Information Seeking and Use"

Approval Period: <u>June 27, 2017 to June 26, 2018</u>

The REB-II reviewed and approved this project by delegated review in accordance with the requirements of the McGill University Policy on the Ethical Conduct of Research Involving Human Participants and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans.

Deanna Collin
Ethics Review Administrator, REB I & II

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* Approval is granted only for the research and purposes described.
* Modifications to the approved research must be reviewed and approved by the REB before they can be implemented.
* A Request for Renewal form must be submitted before the above expiry date. Research cannot be conducted without a current ethics approval. Submit 2-3 weeks ahead of the expiry date.
* When a project has been completed or terminated, a Study Closure form must be submitted.
* Unanticipated issues that may increase the risk level to participants or that may have other ethical implications must be promptly reported to the REB. Serious adverse events experienced by a participant in conjunction with the research must be reported to the REB without delay.
* The REB must be promptly notified of any new information that may affect the welfare or consent of participants.
* The REB must be notified of any suspension or cancellation imposed by a funding agency or regulatory body that is related to this study.
* The REB must be notified of any findings that may have ethical implications or may affect the decision of the REB.