Is Hearing Believing? Perception of Online Information Credibility by Screen Reader Users who are Blind or Visually Impaired

by

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy

Faculty of Information
University of Toronto

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Abstract

While credibility perception on the Web is a well-researched topic across multiple disciplines, extant studies have not considered nonvisual modalities of Web access. This research explored how Web users who are blind or visually impaired perceive the credibility of online information and how the screen reader used by them to interact with the Web mediates the process. Credibility perception was studied in the context of the screen reader users’ everyday information practices, examining in depth the effect of Web accessibility on their online information interactions, information practices and credibility perception.

Adopting an exploratory approach, a sequential multimethods research design was used. Between April and July 2008 data were collected from adult screen reader users residing in Ontario, Canada through an electronic questionnaire survey (N=60) to identify salient issues, which were then examined deeper through semi-structured interviews with a subsample (N=13) during June 2009. Hands-on online information activities (with participant observation and think-aloud protocol) were also conducted during the interview session. Primary findings emerged through qualitative content analysis of descriptive data, with quantitative results guiding and supplementing the analysis.
Online information credibility perception is found to be a dynamic and social process. It is governed by users’ assumptions based on their past experiences, personal knowledge/beliefs and social inputs. Assumptions evolve over time and usage into personal heuristics. The credibility perception process spans three phases—prediction, evaluation and corroboration—permeating the information seeking, using and sharing practices of users. Evaluation of website and web content depends on users’ online interaction proficiency and is bounded by the interface affordances provided by the screen reader and the amount of meta-information provided by the websites for interpreting visual/spatial features. Community support scaffolds users towards more effective technology management and credibility perception. Therefore, promoting inclusion in the online participatory culture will enhance the information practices of screen reader users.
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Chapter 1 – Introduction

“Overall, the Web is a wonderful source, and we just have to use it wisely.”
— Participant P34

This dissertation reports the results of my research on how individuals who are blind or visually impaired perceive the credibility of online information when they interact with the Web using a screen reader.¹ Web users believe or feel persuaded by some information if they perceive it to be credible. A majority of Web users interact with the Web visually, and websites are also designed keeping this fact in mind. My research explores how credibility is perceived by a group of users who interact nonvisually with the Web and how the assistive tool (screen reader) they use mediates the credibility perception process.

This chapter explains the research context, states the research questions and the approach followed, describes the significance of the research, and provides an overview of the chapters to come.

1.1 Research Context

Between 1999 and 2003, household Internet use in Canada increased two to three times, with at least 67.9% of individuals over the age of 18 accessing information on the Internet in 2003². By 2007, this percentage had increased further to 73.2%³. The Internet is a popular source of everyday information for a majority of Canadians. There is a wide choice of information available online on almost any topic, which makes it necessary for Web users to exercise judgment and selection. The onus for assessing the trustworthiness and quality of

¹ Screen reader is the generic name for software tools that assist individuals who are blind or visually impaired in interacting with digital content. It converts the text, events, and elements displayed on the screen into synthesized speech. It can also send the output in Braille notation to a hardware device called “refreshable Braille display” device. In popular usage, the term denotes a system that speaks out the screen contents.

² http://www40.statcan.gc.ca/l01/cst01/comm13i-eng.htm (last accessed March 24, 2010).

³ Ibid.
information falls on the Web user because not all of the information is filtered through professional gatekeepers, nor are there any universal standards for posting information online (Metzger, 2007). The degree to which information we find online impacts us depends on how credible we find it. Credibility, thus, serves as a useful marker for quality assessment on the Web (Rieh, 2002).

Credibility is a multifaceted concept with two primary dimensions: expertise and trustworthiness (Hovland, Janis, & Kelley, 1953). When users find some information credible enough, it might persuade them to change their knowledge (Self, 1996) or change their attitude or behaviour (Petty, Cacioppo, Sedikides, & Strathman, 1988). Credibility is not an objective property of the information or its source, but is a subjective perception by the receiver of the information (Fogg & Tseng, 1999; Gunther, 1992; Sundar, 1998). Importantly, however, credibility perceptions may be influenced by objective properties of the information or its source (Freeman and Spyridakis, 2004).

Credibility is important not so much in itself as in how it shapes further action based on the decision it leads the information seeker/user to take. Consequently, being able to arrive at the right decisions depends on being able to perceive credibility effectively rather than perceiving credible sources as not being so, and sources that are not credible as being so. Fogg (2003a) identifies the former as ‘incredulity error’ and the latter as ‘gullibility error’.

The construct of credibility and its practical significance have been examined by researchers across a number of fields such as communication, information science, psychology, marketing, and the management sciences, as well as interdisciplinary areas such as human-computer interaction (HCI) using a variety of theories and approaches (Rieh & Danielson, 2007). Credibility perception, as an area of multidisciplinary research, is increasing in importance, particularly in the online context. Numerous empirical studies have been conducted to examine credibility perception on the Web (for instance, Ferebee, 2006; Flanagin & Metzger, 2007; Fogg et al., 2001, 2003c; Freeman & Spyridakis, 2004; Hong, 2006; Huerta, 2003; Metzger, Flanagin, & Zwarun, 2003; Sillence, Briggs and Fishwick, 2006). On the social Web, where anyone can contribute content, traditional criteria for judging information credibility such as source trustworthiness and expertise prove insufficient, prompting research on newer approaches to
credibility assessment (Eysenbach, 2008; Hilligoss & Rieh, 2007; Lankes, 2008; Mattus, 2007; Meola, 2004).

An essential feature of the Web is the multimodal nature of its content. Online information is often presented combining multiple media such as text, graphics, audio, video, and such. Visual objects such as images, visual elements such as scrolling text, visual attributes such as colour, and visual spatial arrangements such as appealing layout of content are some of the features used in designing web pages to enhance content/presentation. In the context of credibility perception, “design look” (Fogg et al., 2003c, p. 5), “visual appeal” (Polanski, 2005, p. 79) and “visual design” (Robins & Holmes, 2008, p. 397; Robins, Holmes & Stansbury, 2010) largely influence credibility perception on the Web. These findings lend credence to the cliché “Seeing is believing.” Evidently, these visual aspects of the Web are not available to Web users who are blind or visually impaired, who typically hear online content as spoken to them by the screen reader. “Is hearing believing?” is the question that naturally emerges.

A deeper examination of the credibility-related literature shows that only the visual modality of Web access has been considered in extant studies, with very few exceptions, such as a theoretical consideration of podcast credibility (Tsagkias, Larson, Weerkamp, & de Rijke, 2008). None of the studies have included participants who use nonvisual modalities primarily to access the Web (such as screen reader users). About 314 million people are visually impaired worldwide, of whom 45 million are blind.5 How many of them use screen readers and the Web is not known. There are no published reports about how such users evaluate online information. Credibility perception through nonvisual modalities is, thus, an area requiring research.

According to a published by the Government of Canada, the percentage of Canadians with disabilities who use the computer and the Internet at school and at work is comparable with

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4 The term visual is used in this document in the context of online interactions to denote all aspects relating to the interface that require the sensory ability of sight to be perceived. A more detailed note is given in Section 1.2.

5 http://www.who.int/mediacentre/factsheets/fs282/en/ (last accessed May 12, 2010).

the percentage of those without disabilities (see Figure 1.1). More young people (between the ages of 15 to 34) use computers and the Internet than any other group (see Figure 1.2).

Figure 1.1. Computer Use by Location, Persons with and without Disabilities, Canada, 2000 (%)

Figure 1.2. Internet Use, Persons with and without Disabilities, Canada, 2000 (%)
The above facts underscore the importance of these technologies being accessible to people with disabilities. Computer technology and the Internet have tremendous potential to broaden the lives and increase the independence of people with disabilities (Kaye, 2000). According to the Participation and Activity Limitation Survey (PALS) conducted in 2006, almost 1.9 million adults with disabilities (age 15 and over) used the Internet at least once in the previous 12 months (44.7%), with working-age adults with disabilities using the Internet more than seniors (62.2% versus 19.8%). The proportion of Canadians with disabilities that use the computer and the Internet could have only increased in the past 4 years. The need to understand the online information practices of Web users with visual impairments assumes further significance in light of these statistics.

Individuals who are blind or severely visually impaired generally interact with the Web using a browser via the same screen reader program that they use for accessing other applications on their computer. Most receive the web content in auditory form through the computer’s speakers; some also receive it in tactile form through a refreshable Braille display device connected to their computer. One reason for low use of the Braille display is its high cost. While a commercial screen reader for use with computers might cost under US$1,000, refreshable displays that produce the onscreen content in Braille are priced around US$5000. Understanding the process of credibility perception involving a screen reader would require an understanding of how a typical screen reader program works online, to appreciate its capabilities and limitations. The screen reader reads out the text content of web pages displayed on the screen. It also indicates to the user the interaction elements such as buttons, forms, links, and

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8 Ibid.
11 Discussions about screen readers in this dissertation relate primarily to the JAWS screen reader working on the Microsoft Windows platform. Some other screen readers, such as VoiceOver on Apple Macintosh and Orca on Linux, operate differently from JAWS.
menus when encountered. The user then activates those as desired using a keyboard. Screen reader users typically do not use a mouse.

Treviranus (1997) points out the significant limitations that screen reader users face online (which continue to exist even today):

- Information is presented only in text form.
- Information access is necessarily sequential, unless the web page is designed to facilitate navigation with a screen reader.
- Visual objects are inaccessible except through text alternatives, if provided.
- Users hear only small portions of text at a time, leading to a loss of context.
- Information overload occurs when users are forced to hear repeating portions of common text, such as website headers on every page, that visual users easily avoid.
- Users interact with the computer only through the keyboard, which makes mouse-only interactions, so prevalent on the Web, impossible for them to negotiate.

These drawbacks slow down navigation for screen reader users and make it difficult for them to locate the information they want, sometimes causing frustration (Lazar, Feng, Allen, Kleinman, & Malarkey, 2007). This situation is compounded by the fact that visual cues on web pages that aid navigation and interpretation are not directly available to them. Their online interactions are also limited by how well they can use their screen reader to negotiate web pages.

Issues relating to online interactions via a screen reader, examined under the umbrella of Web accessibility, form a sizeable portion of the literature on HCI (Petrie, Hamilton & King, 2004; Petrie & Kheir, 2007; Strain, Shaikh, & Boardman, 2007; Theofenos & Redish, 2003; Watanabe, 2007). While there is a body of HCI literature about barriers to information access when using a screen reader and factors of interface design that facilitate accessibility, there is a lack of empirical research about whether these factors would influence credibility perception. Very few studies relate to the role of the screen reader in the seeking, evaluation, use, and

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12 Web accessibility is the degree to which users with disabilities are able to interact with the Web and make use of the information and services provided online.
sharing of information on the Web by people who are blind or visually impaired. This is a potential area for research.

A survey of the information studies (IS) literature for studies about the online information practices of people who are blind or visually impaired reveals that only some studies consider their use of the Internet, and none of them deal with online information practices of screen reader users (Beverly, Bath, & Barber, 2007; Chandrashekar & Caidi, 2007; Craven, 2003; Hollier, 2007; Kinash, 2004; Williamson, Schauder, & Bow, 2000). A study of the credibility perception of screen reader users in the context of online information practices will contribute to this space in the IS literature as well.

Finally, reports in the disability studies literature about Internet use by people with disabilities mostly examine the issue from an emancipatory, rather than a technical/functional, perspective (Bradley & Poppen, 2003; Cook et al., 2005; Grimaldi & Goette, 1999).

1.2 Problem Statement and Research Purpose

To summarize the outcome of the brief review of literature presented in the previous section, there is a space that deserves further research in each of the research streams given below:

- research relating to credibility: to examine credibility perception in the context of nonvisual online interactions by Web users who are blind or visually impaired using a screen reader

- research in HCI: to examine how online information accessibility might interact with the online information practices of screen reader users

- research in IS: to examine the everyday information practices of screen reader users as a context for online information credibility perception

The objective of my research is to seek an answer to the questions that emerge at the confluence of these three research spaces, as shown in Figure 1.3.
My research explores the following questions at the confluence of these three research spaces:

RQ1: How do screen reader users who are blind or visually impaired perceive the credibility of online information in the course of their everyday information practices?

RQ2: How does the screen reader mediate their credibility perception process?

To find answers to the above questions, I obtained a general understanding of how screen reader users engage in online information interactions, examined the overall context of their everyday information practices on the Internet, and finally analyzed how they perceive the credibility of online information. Results of the analyses are likewise presented in three chapters, addressing online information interactions and online information practices in Chapters 5 and 6 respectively before presenting the answers to the two research questions about online information credibility perception in Chapter 7.

Figure 1.3. Research Space
Presented next is a brief contextualization of key terms occurring in the research questions: *everyday online information practices, Web users who are blind or visually impaired, screen reader mediation,* and *online information credibility perception.*

**Everyday online information practices.** Rather than examining information seeking in a specific domain such as healthcare or academics, my work focuses on the seeking, using, and sharing of information online by the participants in the course of their everyday lives. Savolainen (2008, p. 2) conceptualized everyday information practices as “… a set of socially and culturally expressed ways to identify, seek, use and share the information available in various sources such as TV, newspapers and the Internet.” My research focuses on that part of the everyday information practices that occurs in an online context.

**Web users who are blind or visually impaired.** Three terms that require clarification here are *Web, blind or visually impaired,* and *visual.*

Although popularly used interchangeably, the terms Internet and Web do not denote the same thing. The Internet is a massive public broadcast medium founded in the 1960s. It is comprised of several subnetworks, the largest and most popular of which is the World Wide Web, or simply the Web. The Web is a part of the Internet. Technically, the Web is even separate from the two other equally popular online technologies of email and instant messaging. These differ in their underlying protocols or communication structures.

The essential feature of the Web is that it is a hyperlinked collection of web pages, and it allows users to jump across pages that are linked. These web pages are accessed using a web browser, which is a software application. Some popular web browsers are Internet Explorer, Firefox, Opera, and Safari. The focus of my research is primarily on users’ interactions with the Web. Therefore, I use the term Web throughout this dissertation in that context. While referring to the overall online information practices of users, which includes their email and other online practices as well, I use the term Internet. The difference between the two terms, however, is not of consequence to the results or conclusions of my work.
The term, blind, actually embraces a broad spectrum of vision impairments that include several degrees of residual sight. While there could be people who have zero vision, most people who self-declare as blind might actually have some residual vision, central or peripheral. Likewise, people with visual impairments might have a range of vision loss. Rather than classifying participants based on medically or legally defined vision conditions, I went by self-declared functional capabilities. Screen reader users who responded to the survey were asked to indicate whether or not they had enough vision to view the computer screen. Recognizing that blindness could be congenital (blind from birth) or adventitious (lost vision later in life), participants were asked to mention the year when they had last viewed the Web visually (if ever). They were also asked to describe their vision condition in their own words, to enable verification of eligibility and to provide a rich context for describing their online experiences.

The term visual is used in this document in the context of online interactions to denote any of the representational aspects of the web page that require the sensory ability of sight to be perceived. Although text is also represented visually on web pages, speech synthesizers can automatically convert digital text into forms that can be received through other modalities such as auditory or tactile. But nontext features such as those mentioned earlier, viz., visual objects such as images, visual elements such as scrolling text, visual attributes such as colour, visual/spatial arrangement of content, etc., cannot be converted into other forms automatically. The term visual thus denotes features of web pages that the screen reader will not be able to read out automatically. If meta-information in text is provided about these features as part of the web page code, the screen reader can make that information available to the user.

Throughout the dissertation, the term screen reader users is used to denote the participants rather than web users who are blind or visually impaired. The intention is to emphasize the primary focus of this research, which is to examine nonvisual credibility perception in the context of using a screen reader.

Screen reader mediation. A screen reader is a software program that enables users to interact nonvisually with applications using a computer or other technological devices such as mobile phones. It reads out the contents displayed on the screen using a speech synthesizer and signals the users about the navigational options and operational controls on the screen, which the users then operate using the keyboard. The screen reader can also simultaneously send its output
to a refreshable Braille display. Mediation by the screen reader relates to how the screen reader conveys to users what is visible on the web page and how users respond to that to accomplish their online information interactions.

**Online information credibility perception.** Online information, as considered in this work, is the sense that a user makes of web content during interaction with websites. Information credibility is the believability of some information or the persuasiveness of its source. Credibility perception is the result of the conscious and unconscious evaluations the user makes of factors relating to the information to decide how to deal with it.

### 1.3 Research Approach

My research explored the everyday online information practices of screen reader users to understand how they perceive the credibility of the online information they seek, use, and share, and how the screen reader mediates this process. An exploratory approach was employed since not much information is available from the literature about the area being studied. A sequential multimethods design was adopted to identify the salient issues through data collected from a relatively large sample, followed by a deeper examination of those issues through interviews with a smaller subsample. Multiple data collection methods were used, viz., questionnaire survey, hands-on online information activity session (with participant observation and think-aloud protocol), and semi-structured interview. Using multiple methods provides a degree of convergent validity to the data collected.

Both quantitative and qualitative data about everyday online information practices were sought from adult residents of Ontario who are blind or visually impaired and who have been using a screen reader to interact with the Web for at least 1 year. A questionnaire survey conducted in the first phase of the research (between April and July 2008) elicited 60 responses. Thirteen of the respondents were purposively selected for further data collection through hands-on sessions and interview in the second phase of the research (during June 2009). Descriptive statistical analysis of qualitative data and qualitative content analysis of descriptive data were used to arrive at the results and insights described in Chapters 4 through 7.

The focus of the research remained on systematically understanding the information interactions, information practices, and credibility perception of web users who are blind or...
visually impaired in an online context, and how the screen reader mediates these processes. To that end, the data gathered were reflexively analyzed along these multiple dimensions to understand the linkages between these processes. No attempt was made in the research to look for correlation or causality with respect to observed phenomena. A holistic, qualitative understanding was its primary aim.

1.4 Significance of the Research

My research is based on the philosophy that for any system, studying the processes of users who operate under constrained conditions expands our understanding of the system and could possibly lead to better design of the system for all. This thinking is based on the “curb-cut phenomenon” (Helander, Landauer & Prabhu, 1997, p. 817). When sidewalks were redesigned with curb cuts to accommodate wheelchair users, it also proved beneficial for people using skateboards, rollerblades, bicycles, shopping carts, and baby strollers. Benefits that occur when developing information products with accessibility in mind are likewise referred to as the “electronic curb-cut effect.”13 Insights drawn from this study about how screen reader users who are blind or visually impaired perceive the credibility of online information might prove useful in understanding how any web user might approach credibility perception on the social Web, given existing constraints to applying traditional evaluation methods in that area.

Statistics show that of the 836,000 Canadians who have significant visual limitations, 370,000 (about one in three) live in Ontario.14 But there are no readily available statistics about how many Ontarians who are blind or visually impaired use a computer with a screen reader and what their online information practices are.

This research allowed me to

- collect data about the information practices of an understudied population.
- examine the mediation of online information interactions by a screen reader.
- extend the understanding about credibility perception via nonvisual modalities.

• make the following academic, technical, cultural, and social contributions.

From an academic perspective, my research examines credibility perception of online information in the context of nonvisual online interactions, a modality not studied in depth hitherto. It draws from, and contributes to, the interdisciplinary areas of credibility research, IS and HCI. This is the first study to collect data about the everyday online information practices of a sample of 60 screen reader users living in Ontario, most of them from the Greater Toronto Metropolitan Area. They can be used as a comparative base in future research involving online activities of this population.

In theoretical terms, this research contributes to the ongoing academic discourse around credibility perception by offering insights about this subject in the context of using nonvisual modalities. Looking deeply into how the screen reader mediates online information interactions, this study contributes to a deeper understanding of the interplay between online information accessibility and credibility perception.

Technically, the findings from this research that relate to the JAWS screen reader could inform the design of both websites and screen readers for improving the accessibility and usability of online information for screen reader users. Eyes-free web browsing is inevitable for users with vision impairment, as much as it is for sighted users in environments that restrict the use of vision. Thus, studying issues experienced by screen reader users could inform the design of well-structured web content for use in visually restrictive environments, such as looking up online information while driving or using small screen mobile devices.

Culturally, this study provides a reflexive opportunity for screen reader users to examine their own information practices, which might encourage them to participate in, and contribute to, other research studies involving screen reader users.

Socially, in the context of the increasing focus on information sharing on the Web, this study stresses the need for information inclusion not only from the angle of consumption, but also from the angle of contribution. Enhancing the participation of screen reader users who are blind or visually impaired in the social Web would enable them to contribute to it according to their potential. This work provides a snapshot about the current scenario of online information accessibility for Ontario residents who are blind or visually impaired and about their level of
online social participation. The findings from this research hold political and social significance in light of the provincial initiatives for promoting accessibility under the Accessibility for Ontarians with Disabilities Act, 2005. It is also significant from a federal perspective, in light of the ratification of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) by Canada on March 11, 2010, which makes access to information a fundamental right of all Canadians.

1.5 **Summary**

This chapter described the context that prompted my examination of nonvisual online interactions of individuals who are blind or visually impaired using a screen reader during their everyday information practices to study how they perceive the credibility of online information and how the screen reader mediates this process. It provided an overview of the research space and introduced the two questions that drove my research, contextualizing key terms used in them. The approach and significance of the research were described briefly to bring out the “how” and “why” of the exercise.

Key literature from relevant areas is reviewed in the next chapter, leading to the conceptual framework that guided the research. Chapter 3 presents the research methodology, followed by four chapters describing the results in terms of participant description, online information interactions, everyday information practices, and information credibility perception. Chapter 8 discusses three key themes emerging from the results. Chapter 9 summarizes the key research outcomes and presents the research contributions and implications for future research.
Chapter 2 – Literature Review and Conceptual Framework

“I like it better when I do things on my own than depending on people. That’s just the way I am. I feel better that way. The computer is a LOT to me. You can do a lot of things independently without relying on other people.”

— Participant P38

2.1 Introduction

This chapter presents a review of past research from which a conceptual framework is constructed to guide this exploratory study of online information credibility perception by screen reader users. The literature review is presented in four parts. Section 2.2 provides a brief overview of the epistemological approach adopted in this research from the perspective of disability studies. Section 2.3 reviews selected literature from credibility research, examining the components of credibility and the different approaches adopted in studying it. Section 2.4 examines aspects of human-computer interaction (HCI), such as web accessibility, that come into play during online interactions using a screen reader. Section 2.5 looks at literature pertaining to information practices, with a focus on users with visual impairments. Section 2.6 brings together salient components from the review into a conceptual framework that guides this research. Section 2.7 summarizes the chapter.

2.2 Research Approach from a Disability Studies Perspective

My research involves the study of individuals with a visual disability. It is important, therefore, to articulate some underlying assumptions adopted from the field of disability studies. Starting with a brief look at the historical development of the concept of disability, this section examines how my research aligns with the social model of disability, and provides definitions relating to visual disability.

While the presence of people with disabilities in society has remained constant, the treatment of people with disabilities has changed over time (Deutsch & Nussbaum, 2000). More than disability itself, the social construct of disability has defined how individuals with a disability live and function within society. Disability has been categorized and constructed in
Western societies in the past three centuries in several different ways or "models," each representing a majority view of how society reacts to people with disabilities. Significant among these are the charity model, the medical model, and the social model. The charity model, which emerged in the 19th century, depicts people with disabilities as needing help and as being objects of pity, dependent, and low achievers by ideal standards (Fulcher, 1989). With the shifting of society towards medically based interpretations of disability in the early to mid-20th century, a person with a disability came to be considered physically inferior to an able-bodied individual (Fulcher, 1989). Use of technology in the medical model is more an attempt towards physical rehabilitation and repair. The social model, which emerged in the mid-1970s, considers disability as related to the way an able-bodied society organizes its physical, political, economic, and social relationships. It makes a crucial distinction between impairment as a condition of the individual body or mind and disability as the social experience arising out of the impairment (Nagi, 1991). The model focuses on the range of barriers to full participation that exist in a society that privileges “normalcy” and marginalizes difference (Oliver & Barnes, 1998). The concept of assistive technology is viewed in this context as an attempt to integrate individuals with society. Critics of the social model of disability, however, maintain that it completely brackets the impairment, whereas impairment does have its individual and social consequences (Shakespeare & Watson, 2001).

World bodies such as the World Health Organization (WHO) and Statistics Canada have adopted the social model. The International Classification of Functioning, Disability and Health (ICF) released by WHO in 2001 is based on the social model of disability. Since 2001, Statistics Canada has adopted the WHO ICF model in the design of their survey of disability called the Participation and Activity Limitation Survey (PALS), conducted every five years. Kostanjsek’s (2004, p. 2) definition of disability embraces the spirit of the WHO classification and provides a background for this research through its articulation of activity limitation and participation restriction:

In the context of health, disability is an umbrella term for impairments, activity limitations and participation restrictions. It denotes the negative aspects of the interaction between an individual (with a health condition) and that individual’s contextual factors (environmental and personal factors).
In the context of accessing web-based information, impairments that restrict the ability to use a computer result in a functional limitation. Such impairments could be related to vision (reduced or no ability to see the screen content or point the mouse), hearing (reduced or no ability to hear audio outputs), motor action (reduced or no ability to type on the keyboard/click the mouse), or cognition (reduced or no ability to understand the content and interaction instructions). Assistive technologies help in providing alternative access in these situations.

In studying the online access and participation of web users with visual impairments, my research approach aligns with the social model of disability. Assistive technology and accessible web design, in this context, are the efforts of the system or environment to meet the needs of the individual. Some researchers in the field of disability studies have viewed information and communication technologies in a positive light, in much the same way as medical and other forms of assistive technology, as tools that enable people with disabilities to escape the isolation and stigma that sometimes accompany their disabilities. Internet access has been shown to improve how individuals with disabilities evaluate their level and quality of communication with others (Bradley & Poppen, 2003) and their sense of independence and self-determination (Grimaldi & Goette, 1999; Cook et al., 2005).

Some definitions are presented next. Visual impairment impacts visual perception, which is the ability to interpret information from visible light reaching the eye. The resulting perception is also known as eyesight, sight, or vision. Individuals with visual impairments have vision loss that significantly or totally limits their visual capability, which cannot be corrected by conventional means (Arditi & Rosenthal, 1998). As per the WHO fact sheet of May 2009, about 314 million people are visually impaired worldwide, of whom 45 million are blind.\(^{15}\) Approximately 87% of visually impaired people live in developing countries.

According to the WHO definitions, there are four levels of visual function: normal vision, moderate visual impairment, severe visual impairment, and blindness.\(^{16}\) Visual impairment (also referred to as vision impairment), as per these definitions, includes low vision as well as


\(^{16}\) Ibid.
blindness. The American Foundation for the Blind (AFB), on the other hand, distinguishes blindness (inability to see anything with either eye) from visual impairment (a condition of visual acuity of 20/70 or worse in the better eye with best correction, or a total field loss of 140 degrees.) The AFB recognizes possible additional factors influencing visual impairment as contrast sensitivity, light sensitivity, glare sensitivity, and light/dark adaptation. The AFB further defines legal blindness as a level of visual impairment that has been defined by law to determine eligibility for benefits. This refers to central visual acuity of 20/200 or less in the better eye with the best possible correction, as measured on an ophthalmologist’s (Snellen) vision chart, or a visual field of 20 degrees or less. In Canada, legal blindness as defined above is the eligibility criterion for services through the CNIB (formerly called the Canadian National Institute for the Blind).

In summary, this section presented a brief historic background of the concept of disability and considered how this research aligns with the social model of disability. In keeping with the AFB definitions as prevalent in North America, I chose to refer to the participants as “screen reader users who are blind or visually impaired.” While considering eligibility for participation in the study, I went by self-reporting rather than any medical evidence from the respondents. The AFB defines “self-reported vision loss” as that determined on an individual basis based on that person's perceived visual ability and its effect on daily functioning. The next section looks at literature relating to information practices of web users who are blind or visually impaired and also identifies everyday information practices as the broad context for the study of credibility perception.

2.3 Information Practices

Credibility perception needs to be studied in a particular context. This research looks at the everyday information activities of screen reader users to study their online information credibility perception. Literature pertaining to online information seeking by web users who are blind or visually impaired is examined in this section. The concept of everyday information

18 Ibid.
practices as postulated by Savolainen (2008) is identified as the appropriate framework for examining online information activities.

According to an estimate by the Canadian Library Association Working Group in 2005, only 5% of the world’s publishing output in English is made accessible in alternate formats for people who cannot use print (Epp, 2006). Possibly, most of the information in printed form might be inaccessible even today to people who are blind or visually impaired. The rapid expansion of the Internet, on the other hand, has potentially made everyday information more easily available to them today via a screen reader than when they depended upon others to read the daily news to them. Not enough data is available, however, about the actual use of online information by people who are blind or visually impaired. Furthermore, the few studies that deal with this subject have not examined their use of the Internet from an everyday information practices angle (Beverly, Bath, & Barber, 2007; Chandrashekar & Caidi, 2007; Craven, 2003; Saumure & Given, 2004; Williamson, Schauder, & Bow, 2000). These studies are described briefly below.

Beverley, Bath, and Barber (2007) conducted 28 semistructured interviews with visually impaired people, in relation to two information seeking models (Moore’s and Wilson’s). Moore’s (2000) model of social information need was formulated specifically as a framework of six dimensions for analyzing information needs of visually impaired people, but has since been applied to other groups as well. Their study claims to have developed these dimensions into an ordered hierarchy of importance from the perspective of visually impaired people in the study. Wilson’s (1999) revised model of information behaviour, although developed as a general model, was shown to be applicable to the specific group of people in the study. Although the study indicates that data were collected on "the Internet as a new source of information," the paper hardly mentions the Web or use of online information by visually impaired people. This appears unusual for a paper published in 2007. At the same time, it stresses the need for a study about online information interactions of web users who are blind or visually impaired.

Chandrashekar & Caidi (2007) proposed a model for inclusive design of digital libraries. Their theoretical paper underscores the importance of designing online resources in a manner that is accessible to web users with disabilities. The paper specifically addresses the needs of screen reader users, but it focuses on a specific online activity, namely, digital library access.
Craven (2003) studied access to electronic resources by individuals with vision impairments at the Centre for Research in Library and Information Management (CERLIM), UK. He reported that users with vision impairments who used a screen reader took longer overall to complete each task than sighted users did. Sighted users could quickly scan a page for relevant information and links, while screen reader users took a much longer time to listen to the text being read out. He also found that when a page contained a lot of information, the screen reader users had to repeatedly survey it at regular intervals. Furthermore, keystrokes logged for each task showed that a combination of around 16 different keystrokes (up and down arrow keys, tab key, shortcut keys and specific control-key combinations) were required to access pages via a screen reader, while sighted users consistently used at most six keys.

Saumure and Given (2004) examined academic information behaviours of visually impaired undergraduates, specifically focusing on the adaptive technology they used. They identified some limitations the students experience in accessing electronic material.

Williamson, Schauder and Bow (2000) investigated information seeking by blind and sight-impaired people in Australia, with particular emphasis on the role of the Internet. Their results report general views of the participants about the Internet as an information source.

The present research focuses on the everyday online information activities of screen reader users and the process of credibility perception in that context. It looks at both the cognitive and social aspects of these information activities. 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" (p. 4). He conceptualized human information behavior to include communication with others. Rieh, Hilligoss and Yang (2007) have proposed an integrated framework of information and communication behavior. Their findings reveal how information behavior and communication behavior are interwoven in the process of information seeking. The social nature of information interactions is recognized more with the increasing use of the Internet.

Savolainen’s (2008) conceptualization of the study of information interactions gives it the status of a social practice. According to him, everyday information practices are “… a set of socially and culturally expressed ways to identify, seek, use and share the information available in various sources such as TV, newspapers and the Internet” (p. 2). Caidi, Allard and Quirke
(2010) emphasize that information practices have to be studied in the everyday social and cultural contexts that they support. My research focuses on that part of the everyday information practices that occur in an online context. The purpose of information seeking in everyday contexts could be for orienting oneself with one’s world or for managing specific problem situations (Savolainen, 2008, p. 83). Orienting information serves the need of monitoring everyday needs. Problem-specific information may be used for solving individual problems or performing specific tasks.

As noted by Savolainen (2008, p. 183), information sharing has not been widely researched, despite being a significant constituent of everyday information practices. Chatman’s (1991) work around “information poverty” amongst some marginalized groups, Fisher and Naumer’s (2006) and Pettigrew’s (1999) studies about “information grounds” that facilitate information sharing, and McKenzie’s (2002) “information sharing by proxy” represent some lines of prominent thinking and research in this area. Information sharing refers to the communicative aspects of everyday information practices. What is more interesting about information sharing as conceptualized by Savolainen is that it focuses on the ritualistic aspects of participation and community, which are key to information practices online (2008, p. 9).

2.4 Credibility Perception

This section provides a brief background of the concept of credibility and discusses its study in the online context across several disciplines over the past decade. Characteristics that govern online information credibility perception are examined, leading to identifying trustworthiness of websites and quality of web content as two characteristics to be used in the present study. Furthermore, the importance of examining the role of the medium in online credibility perception is identified. A distinction is then made between two approaches to the study of credibility, viz., system approach and process approach as observed from the literature, and process approach is identified as suitable for the present study.

Credibility refers to the believability or persuasiveness of some information and/or its source. A user’s perception of the credibility of a piece of information is a view they form consciously or unconsciously about its believability (Fogg & Tseng, 1999). When users find some information credible enough, it might persuade them to change their knowledge (Self, 1996) or to change their attitude or behaviour (Petty, Cacioppo, Sedikides, & Strathman, 1988).
While the perception of credibility is a subjective process, it is also governed by objective qualities of the information and its source (Freeman & Spyridakis, 2004).

In the course of everyday life, we often read information presented on websites. Reading is an important aspect of information practices. It is also a defining characteristic of civilization. In ancient Greece, all Athenian citizens were expected to know how to read. Interestingly, the concept of credibility was also first recognized in ancient Greece. Aristotle’s writings on rhetoric included notions of *ethos* (appeal based on the character of a speaker), *pathos* (appeal based on emotion evoked), and *logos* (appeal based on logic or reason presented). In the case of some genres of websites such as institutional websites, one could consider *ethos* as arising from the trustworthiness and expertise exhibited by websites as proxies of the source of information, *pathos* as generated by the users’ experiences with the website as the medium of interaction, and *logos* as relating to the perceived quality of the content provided by the website. In the context of credibility of online information, the website, therefore, plays a dual role as a proxy for the source and as the medium of interaction.

Online information is obtained by web users through interaction with a website and its content. To study the credibility perception of online information, it is necessary to identify characteristics of website and web content that might aid in the process. Section 2.3.1 and 2.3.2 examine trustworthiness of websites and quality of web content as two such characteristics for websites and web content respectively.

Flanagin and Metzger (2007) found that credibility perception depends on the genre of the website, such as whether it is academic, commercial, or personal. Entangled with this is the fact that different genres of websites have typical design layouts, and the layout is also important in influencing credibility perceptions. Past research has shown that site design, which is mostly a visual property of web pages, can be an important element of perceived credibility (Fogg et al., 2001; Johnson & Kaye, 1998).

### 2.4.1 Trustworthiness of Websites

Persuasiveness of information has been considered across different fields in terms of different concepts: *trustworthiness and expertise of the source* in communication and media; *trust* in e-commerce (Cheskin Research, 1999); *believability and quality of the information* in the
health sciences (Hong, 2005); and information quality and cognitive authority in information science (Hilligoss & Rieh, 2007; Olaisen, 1990; Rieh, 2000, 2002).

Trust in e-commerce denotes a concept closely resembling credibility. Trusting something is the natural outcome of perceiving that thing as credible. Cheskin Research (1999) identified six components for cultivating trust online: seals of approval, brand, navigation, fulfillment, presentation, and technology.

A parallel concept to source credibility in the field of information science is cognitive authority. The term cognitive authority was coined by Wilson (1983) to explain the kind of authority that influences thoughts that people would consciously recognize as being proper. “The authority’s influence on us is thought proper because he is thought credible, worthy of belief” (Wilson, 1983, p. 15). In other words, cognitive authorities are among those regarded as credible sources of information. Rieh (2000, 2002) employed this theory to examine the concept of quality and authority in the Web from the perspective of information-seeking behavior. Her research characterized cognitive authority as having six facets: trustworthiness, reliability, scholarliness, credibility, “officialness,” and authoritativeness; of these, trustworthiness was perceived as the primary facet (p. 153). Fritch and Cromwell (2001) proposed a theoretical model for ascribing cognitive authority to Internet information. This model concerns how online assessments of authority are made by the information seeker at the levels of author, document, institution, and affiliations, which then are integrated into a global judgment of online information credibility.

Trustworthiness is thus an important criterion in the study of credibility. According to Flanagin and Metzger (2007), “Websites may be considered to be analogous to individuals or organizations as information sources whose characteristics engender greater or lesser credibility” (p. 321). This research adopted trustworthiness of websites as one of the criteria to be studied in the context of online information credibility perception.

2.4.2 Quality of Web Content

Hovland and Weiss (1951), in their seminal research on media credibility, defined expertise as one of the primary components of source credibility. Source expertise translates as quality of the message. It follows that quality of web content is an important characteristic to be
studied in online information credibility perception. Huerta’s (2003) PhD research on factors affecting the credibility of online information claimed empirically that people give more credibility to messages with higher quality of content and those from highly reputable sources. In her examination of the credibility of blogs, Van House (2004) suggests source dependability and information quality as the two main components of credibility. “In questions of credibility, cognitive authority, or epistemic trust, the trustee is concerned with whether the information provided by a source is complete, accurate, unbiased, appropriate, and accurately understood; and with whether the source is honest and competent” (p. 3). Quality of content is thus an important criterion in the study of credibility.

However, a clear definition for quality is hard to suggest (Rieh, 2000). Garvin (1988, p. 43) observes that, in everyday interactions with the Web, individuals might view the products or objects that satisfy their preferences best as the ones having the highest quality. Mattus (2007) conducted a study of how students assess the credibility of scientific information in web-based environments. She describes information quality as something that exists between the text and the reader, something that cannot exist without a context that has been shaped by the reader. In the present study, the term quality was used as such, leaving the interpretation to the participants as they saw it.

In her paper about the influence of structural and message features on website credibility, Hong (2005) argues that message features need to be treated separately from structural features of the Web as a medium that influences information credibility, such as navigation tools like site maps (Fogg et al., 2001), URLs containing .org or .edu (Rieh, 2002). She claims that much of the recent research about credibility in the online context conflates message features and structural features. Wathen and Burkell (2002) also raise the question of whether new media introduce new factors into credibility assessment (p. 135). The Web as a medium of information interaction has been examined from the perspective of being one of the "media" of information dissemination (Flanagin & Metzger, 2000; Metzger et al., 2003). But examining the website as a medium of interaction has not been done so far. The study of credibility perception during screen reader-mediated online information interactions might reveal new insights about the Web as a medium in the credibility perception process.
During their online information interactions, screen reader users interact with websites and web content to obtain the desired information. The above discussion shows that trustworthiness of websites and quality of online information could be two fundamental criteria for adoption in this study. It also identifies the importance of examining the role of the medium in online credibility perception. This last aspect is covered in Section 2.4 on screen reader online interactions under the subsection on web accessibility.

2.4.3 System Approach and Process Approach to Credibility Studies

Across a number of fields such as communication, information science, psychology, marketing, management, and health sciences, as well as interdisciplinary efforts such as HCI, researchers have examined credibility and its practical significance using a variety of theories and approaches (Rieh & Danielson, 2007). Studies about online credibility have examined either the system designers' perspective or the users’ perspective. The former could be viewed as a system approach (how an information system can be designed to make it appear credible) and the latter as a process approach (how users perceive the credibility of the information system). Examples of each of the two approaches are discussed below with the purpose of determining the approach to be followed in the present study.

System approach. The following studies that examined the effect of system-specific criteria on credibility perception illustrate the system approach: Dutta-Bergman (2004) studied the extent of completeness of information on website credibility; Rains and Karmikel (2009) examined web-use orientation, message characteristics, and structural features; Freeman and Spyridakis (2004) considered the effect of physical address; Hu, Liu, and Zhuang (2002) and Wang (2005) studied third-party endorsements; Metzger (2007) observed the effect of privacy policy and privacy seal; Hong (2006) studied the effect of structural and message features on credibility perception; and Flanagin and Metzger (2007) examined the role of site features, user attributes, and information verification behaviors on the perceived credibility of web-based information.

Fogg and his colleagues at the Stanford University conducted some of the early large-scale studies on web credibility as part of their work examining the persuasiveness of technologies. Persuasiveness is the ability to change attitudes or behaviours or both, but it is not the same as coercion or deception (Fogg, 2003a). Fogg’s questionnaire survey on web
credibility, with around 50 randomized items describing website elements, was conducted in 1999. Responses collected from 1,481 participants were analyzed, the magnitude of the scores reflecting the degree of credibility perception for each response. The results were used to derive a set of design guidelines for improving the credibility of websites.

Yet another large-scale experiment on web credibility involving over 4,000 participants was conducted by Fogg in 2003 (Fogg et al., 2003c). The participants were asked to visit a pair of sites from a pool of 100 selected websites and then provide comments and ratings regarding the perceived credibility of the two sites. The focus of all of Fogg’s studies was on the credibility of websites (i.e., the source) and not on credibility of information found on websites per se. The main finding of their research is that credibility depends primarily on the “design look” of websites, with “information design/structure” being reported as the next most popular factor.

Studies by Fogg and his colleagues are deficient in at least two respects: first, they have not examined web credibility from the perspective of nonvisual web interactions; second, they do not take into account the influence of the interaction experience of the user with the website on the user’s perception of credibility. These two aspects also denote a gap in credibility literature in general, which the present research aimed to address.

From the above examples of studies using the system approach, it appears that while these studies are important from the perspective of system design, they do not focus on understanding the credibility perception process in its entirety. For this, a process approach is necessary. A process approach puts the focus on the users and on understanding the process of their credibility perception. Presented next are some empirical studies that belong to this type. Studies of this type are fewer in number than system approach studies.

**Process approach.** Eysenbach and Kohler (2002) observed the search and evaluation behaviours of around 20 users while they retrieved health information from the Web through a hands-on session. He compared the results with the characteristics of health websites that users, during an earlier focus group, reported they would use in evaluating credibility. During the focus group, users had indicated their use of a variety of symbols that would enhance believability in online health information, such as site owner credentials, currency of content, etc. In their actual search behaviour, however, they neglected such resources, relying on search engines and their order of presentation of results to select sites to browse. Putting the focus on the user thus reveals
actual credibility perception behaviour that complements their reports. Studies by Fogg et al. (2001), Freeman and Spyridakis (2004) and Flanagin and Metzger (2007) have also reported a lack of correspondence between self-reported and actual information behaviours. These results stress the importance of combining self-reporting by participants with observation of their online information behaviour while conducting credibility perception studies. The current study included both a survey and a hands-on session with interview.

Another study with a process approach was Rieh’s (2002) research about academic information seeking. She studied the online information searching behavior of 15 academicians with regard to their judgments of information quality and cognitive authority and found that users are confronted with decision-making points continuously in their web interactions, and they make predictive judgments and evaluative judgments iteratively until they finish searching. Participants in her research repeatedly went through numerous pairs of predictive and evaluative phases about minute aspects of the web pages and their content during their online interactions.

Hilligoss and Rieh (2007) conducted a study primarily focused on better understanding how people make credibility judgments in a wide variety of everyday life information seeking contexts. They proposed “a unifying framework of ‘credibility assessment’ in which credibility is characterized across a variety of media and resources with respect to diverse information seeking goals and tasks” (p. 1,468). Based on their qualitative study with 24 participants, they identified three distinct levels of credibility judgments: construct, heuristics, and interaction. The construct level pertains to how a person constructs, conceptualizes, or defines credibility. The heuristics level involves general rules of thumb used to make judgments of credibility applicable to a variety of situations. The interaction level refers to credibility judgments based on content, peripheral source cues, and peripheral information object cues. They found context to be the social, relational, and dynamic frames surrounding the information seeker and providing boundaries of credibility judgments. Hilligoss and Rieh (2007) observed three stages in the credibility judgment process: prediction, evaluation, and follow-up judgments (verification/re-evaluation/clarification/refusal). Their findings indicated that participants relied on multiple types of media and resources within one information-seeking episode.

Wathen and Burkell (2002) also proposed a process model for how users judge the credibility of online information (p. 141). It was a theoretical model based on their interpretation
of evidence available through a review of the literature. Theirs was the first attempt to consider a temporal layout of the credibility perception process. Until then, no one had examined whether credibility perception is a one-shot attempt or a staged assessment, with information “passed” or “failed” for credibility at each stage. Their model laid out online credibility perception as a three-stage process, with the user performing three tasks. The stages were, evaluation of surface credibility, evaluation of message credibility, and content evaluation. At every one of the three stages, they expected that the user would make a decision whether to stay on or move away from the website based on the results of the assessment tasks undertaken. They also expected that these stages might not be linear, given the iterative and interactive nature of online activities.

From these examples, the focus in credibility studies using a process approach is on the user and on understanding how the credibility perception process actually happens. The present research aims to explore how screen reader users perceive the credibility of online information, so it would require adopting a process approach. One aspect that is unique to screen reader users’ online interactions is the mediation of user-browser interactions by an additional piece of technology. Designing such a study requires an examination of web accessibility in the context of the Web as a medium of interaction. The next section examines relevant past research involving online interactions using a screen reader from the multidisciplinary area of HCI.

2.5 Web Accessibility

2.5.1 Screen Reader Online Interactions

Assistive technologies help people with disabilities to enhance or substitute their physical and cognitive functions in order to be able to perform activities such as using a computer (Cook & Hussey, 2002). Through the use of personal computers, people with special needs have been able to enhance their autonomy, social inclusion, and communication capacity (Taipale & Pereira, 1995). Thus, HCI plays an important role in the provision of information and social opportunities to people with disabilities (Abascal & Civit, 2002).

A screen reader is a software program that enables users to interact with computer applications nonvisually. It reads out the contents displayed on the screen and signals the users about the navigational options and operational controls on the screen, which the users then operate using the keyboard. The screen reader can also simultaneously send its output in Braille
notation to a special hardware device connected to the computer called the refreshable Braille display. Some details about how the screen reader functions and how users conduct online interactions with it are given below.

Popular screen readers work with the browser and interpret the code that is used to construct web pages. They can automatically convert text into sound but cannot automatically decipher nontext objects, although they can read out text alternatives to them if provided. They are not capable of conveying visual/spatial information such as content layout on web pages to the user unless relevant meta-information is provided by the web page code through "markups." When it comes to providing inputs to the computer, screen readers do not help directly. They convey the interaction control points such as links, buttons, form fields, etc., to the users, who then provide necessary inputs through the keyboard using their sense of touch. Since the traditional mouse cannot be used nonvisually, visual navigation features that require mouse interaction are not available to these users unless keyboard equivalents are provided. Thus, in their role as third-party interpreters of “printed” information, screen readers are not as effective as a sighted assistant might be, and yet they provide independence and privacy in information access to users who are blind or visually impaired. Screen reader users can, for example, engage in communication privately, perform financial transactions, and access desired information available in electronic text form at their own time, space, and pace.

As mentioned earlier, besides text, web content might be presented through pictures, graphics (images and animation), audio, video, etc. Meta-information required for online interactions is often conveyed through visual elements such as colour, icons, buttons, symbols, graphics, image map links, physical layout, juxtaposition, typography, etc. Such visual elements, besides contributing to the aesthetics of a web page, also provide visual cues to sighted users that facilitate orientation, navigation, and finding/evaluating/using information. Visual cues help users find “the metaphoric ‘signposts’ within an information space, and from those signposts to easily understand their current position in that information space, their possible interaction alternatives and the usefulness and appropriateness to their task of the various navigation paths on offer from that point” (Paay, 1998, p. 539). For example, applications using technologies like AJAX provide visual cues through automatic page refresh to help users understand what the application is doing and which parts of the page content have been modified recently.
Visual dominance is a well-known psychological observation (Mayes, 1992) that refers to how sighted people attach greater value to the visual properties of objects and usually heed the visual signal if conflicting information is received from different senses. It is natural that people generally design their world with visual elements. Much like the physical world, the Web is also designed primarily for visual use. In the absence of explicit user requirements, designers can be expected to design for themselves. Considering the obvious possibility that most designers are sighted, designing for nonvisual access would not occur in the normal course (Barnicle, 2000). People with visual impairments have constantly had to adapt to living in a world designed mostly by, and for, sighted people (Crow, 1996). It is not surprising that the situation is similar for them on the Web as well. However, after testing 100 websites with 51 users with disabilities, Petrie, Hamilton, and King (2004) claimed that accessibility could coexist with visual design.

An important distinction between sighted users and screen reader users in accessing information through a computer screen is that the former receive it as visual communication while the latter receive it as aural communication of the screen contents. Visual communication depends on the eye’s ability to actively access parts of the two-dimensional screen display, the reader being active and the display passive. The characteristics of visual representation are very different from those of auditory representation. Visual representation provides spatially organized information of a scene. It allows easy access to both an overview and specific details. Auditory representation on the other hand, has a more temporal organization. It is possible to process many pieces of visual information almost simultaneously, but the aural channel is largely serial (Raman, 1997). Although markups on HTML documents could be used to give some sense of structure, authors of HTML documents do not always provide such markups. This usually restricts web users who are blind or visually impaired from deriving as much meta-information about the organization of the information as sighted users can.

The visual presentation of web pages encodes implicit structural and navigational knowledge that a screen reader cannot “see” or make sense of as sighted users could (Yesilada, Harper, Goble, & Stevens, 2004). In the context of accessing information on a web page, activities such as getting an overview, determining the structure, moving to specific locations, and making sense of images, graphics, animation, and video pose challenges to screen reader users (Treviranus, 1997). A study conducted by the Nielson Norman Group (Coyne & Nielson,
2001, p. 5) estimated that “the Web is about three times easier to use for sighted users than it is for users who are blind or who have low vision.”

In summary, screen reader users experience several challenges in accessing online information. These challenges might impact the way they perceive information credibility online. Accessibility is the term used to convey the extent to which online resources are available to screen reader users. Websites also play a role in online interactions using a screen reader. The way they are designed mostly determines their accessibility. This aspect is examined in the next subsection.

2.5.2 Accessibility of Websites

Accessibility is a nebulous concept, interpreted and expressed in multiple ways and contexts in both scholarly works and popular media. There is no generally accepted definition for it (Petrie & Kheir, 2007). The International Standards Organization defines accessibility as “the usability of a product, service, environment or facility by people with the widest range of capabilities” (ISO 9241-171 [2]).

Usability, in turn, is defined by the ISO 9241 standard on Ergonomics of Human System Interaction 2 (Part 11, 1998) as “the extent to which a product [service or environment] can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.”

The ISO definition of accessibility implies that to ensure accessibility is to ensure usability across the maximum possible user diversity. A view of accessibility that is more focused on users with disabilities is put forth by the World Wide Web Consortium (W3C) through their Web Accessibility Initiative: “Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web.”19

Substantial efforts are being made by bodies such as the W3C to ensure that the Web is accessible to users with various individual user-web interaction needs. Guidelines, such as the

19 http://www.w3.org/WAI/intro/accessibility.php, para 1 (last accessed April 24, 2010).
W3C’s Web Content Accessibility Guidelines (WCAG),\(^{20}\) and their equivalents in other countries, have been published to guide designers. Also, regulations such as the Americans with Disabilities Act\(^ {21}\) and Section 508 of the Rehabilitation Act\(^ {22}\) in the United States and the Disability Discrimination Act\(^ {23}\) in the United Kingdom are based on the WCAG guidelines to promote website design with accessibility in mind.

The Federal Government of Canada, through the Treasury Board, has implemented Common Look and Feel (CLF) standards for all Government of Canada (GOC) websites. CLF uses the W3C standards to ensure that GOC sites are accessible to as many users as possible, including those with disabilities. Soon, the government of Ontario is expected to release the Accessible Information and Communication Standard under the government of Ontario’s Accessibility for Ontarians with Disabilities (AODA) Act, 2005. This standard will include requirements for compliance with the WCAG 2.0 standards for web accessibility.

The web today includes features that mimic desktop applications such as drag-and-drop of elements. Unless programmed for, such user actions are not possible using only the keyboard. The Web also provides a platform for instant exchange of data, such as photographs, messages, videos, music, etc. It allows for the dynamic updating of content on different parts of a web page. In technical terms, this is achieved with the use of technologies like AJAX, JavaScript, Rich Internet Applications (RIA), DHTML, or even a combination of all of them. Such dynamic changes on web pages are mostly not detectable or usable by users of assistive technologies such as the screen reader. In order to make the dynamic web content accessible for people with disabilities, Web Accessibility Initiative (WAI) group of the W3C has laid down specification for Accessible Rich Internet Application (ARIA).

\(^{20}\) W3C Web Content Accessibility Guidelines 1.0; see http://www.w3.org/TR/WAI-WEBCONTENT/ (last accessed April 10, 2006).


\(^{22}\) Section 508 of the Rehabilitation Act http://www.section508.gov/ (last accessed April 10, 2006).

Studying the effect of the medium of interaction on credibility perception is important in the online context. A large-scale study to evaluate factors influencing website credibility (Fogg et al., 2001) reported that 46.1% of comments were about "design look" and 28.1% were about “information design/structure.” Robins and Holmes (2008) conducted a study comparing credibility judgments for websites in which the visual design had been varied. They suggested that favorable “first impressions” are formed about websites with better visual design. Through an experiment with 91 participants using a mock digital library interface, Aumer-Ryan (2008) demonstrated a “carrier effect” through which interface design and the “form” of information were found to negatively impact users’ perception of the quality of the information “content.”

Theoretical claims have been made that accessibility would have an effect on credibility perception. In their book *Understanding Web Credibility: A Synthesis of the Research Literature*, Lazar, Meiselwitz and Feng (2007, p. 149) present a fairly radical view of the relationship between accessibility and credibility.

The issue of accessibility is closely related to credibility…. Many of [the] design features that establish credibility might not be available to someone who is visually impaired. In its place, accessibility, the ability to access content, the time spent making sites accessible, is what leads to a perception of credibility. For users with disabilities, the sites that are viewed as most credible are the sites that are accessible. Sites that are inaccessible are viewed as the least credible (and since the information is not possible to ascertain, the credibility is irrelevant). Users with disabilities return again and again to the sites where they know that they will not experience problems accessing the information. These sites, in turn, become the sites that are viewed as credible. Similar to how graphical design influences the perception of credibility, accessibility also influences the perception of credibility, although neither of these is necessarily the best way to ascertain the credibility of web-based information.

While the authors have conducted research with blind and visually impaired web users (notably about the frustrations they experience while using a computer), the views expressed above are not directly based on any empirical study. However, their remarks confirm that studying information accessibility is very important to the study of information credibility perception involving screen reader users. *Exploring accessibility and credibility together is important to better understand the connection between the two.* This research examines in depth the influence of online interactions using a screen reader on credibility perception.
Literature reviewed in this section indicates the challenges involved in online interactions using a screen reader. These challenges suggest that mediation by a screen reader might influence both the ability and the motivation of its users’ online interactions. The next section, therefore, examines the connection ability and motivation might have with credibility perception, using a theory from cognitive psychology that is popular among credibility researchers.

2.5.3 Ability and Motivation

The Elaboration Likelihood Model (ELM), formulated by Petty and Cacioppo (1986b), states how any external or internal variable has an impact on evaluative or nonevaluative judgment. It is a theory about processes underlying changes in perceptions of objects, the variables that induce these processes, and the strength of the perceptions resulting from these processes. Most of the work on the ELM has emphasized evaluative judgments. Since credibility perception involves evaluative judgment, several researchers have used the ELM to build their theory on credibility: some experimental studies have used this model to control for certain variables (Hong, 2006); some have used it as a theoretical framework for discussing their results (Freeman & Spyridakis, 2004); and others have used it to build their own models for study (Huerta, 2003). According to Petty and Cacioppo (1979), issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. Flanagin and Metzger (2007) observed through their empirical study that issue salience or issue involvement could influence credibility perception. This aspect requires attention while designing hands-on user sessions relating to credibility perception.

The ELM postulates dual routes (central and peripheral) to attitude changes that are based on different degrees of effortful information processing activity. Central route attitude changes refer to those based on relatively extensive and effortful information processing activity aimed at scrutinizing and uncovering the central merits of an issue. Peripheral route attitude changes are based on a variety of low-effort attitude change processes.

The more motivated and able people are to assess the central merits of the attitude object, the more likely they are to effortfully scrutinize all available object-relevant information. This forms the higher end of the elaboration continuum. At the lower end of this continuum, information scrutiny is reduced. Attitude change can still result from a low-effort scrutiny of the information available (e.g., examining less information or examining the same information less
carefully), or it can result from less resource-demanding processes such as classical conditioning (Staats & Staats, 1958), self-perception (Bem, 1972), or the use of heuristics (Chaiken, 1980). One possible inference of interest from this model is that without deep motivation or with reduced ability, people will rely more on peripheral cues for making judgments.

The ELM is based on three postulates.

1. The correctness postulate: People are motivated to hold correct attitudes.
2. The elaboration continuum postulate: Although people want to hold correct attitudes, the amount and nature of issue-relevant elaboration in which they are willing or able to engage to evaluate a message varies with individual and situational factors.
3. The tradeoff postulate: As motivation and/or ability to process arguments decreases, peripheral cues become relatively more important determinants of persuasion.

The amount of effort devoted to thinking will not be constant across people and situations. Both motivational and ability factors are important in determining how people prefer to elaborate or extend their information evaluation activity. Both motivational and ability factors can stem from the person or his situation; they may vary with personal traits such as intelligence or impairment and situational conditions such as distraction. When both motivation and ability are high, people will presumably engage in considerable cognitive effort, and when both are low, the effort will be low.

In summary, Sections 2.3 through 2.5 examined literature from three multidisciplinary areas to investigate the dimensions along which the present research could be designed. The following section integrates concepts identified through the review into a framework to guide the research.

2.6 Conceptual Framework

There has been well over a decade of research about credibility perception on the Web. Yet, two aspects have not received the attention they deserve. One of them is credibility perception during non-visual web interactions. Given the visual nature of the Web, it is not a surprise that studies so far have predominantly considered only the visual modality. But, the visual nature of the Web is precisely the reason that warrants a study of user groups such as the blind and visually impaired. The other aspect is the effect of the Web as a medium of interaction
on credibility perception. Research so far has only examined the effect of the Web as a medium of information dissemination. My research studied credibility perception through non-visual modality by individuals who are blind or visually impaired using a screen reader, and considered the effect of the Web as a medium of interaction on credibility perception as mediated by the screen reader.

In view of the paucity of relevant information about the population group being studied, I adopted an exploratory approach in conceptualizing and designing the research study. Roseman (1977) proposes three stages to exploratory research: early (teasing out of relationships); middle (selective examination of specific relationships); and late (direct preparation for proposition testing). My research broadly covered the first two stages. I adopted a sequential, multimethod research design that allowed me to identify salient issues in the first phase using a relatively large sample and to examine them deeper in the second phase using a smaller subsample. As indicated in Chapter 9, findings from my work point to future research avenues for further examination of specific aspects in this area.

A conceptual framework for my research is put together in this section based on the literature review presented earlier in this chapter where the following dimensions pertaining to the three relevant research spaces of information practices, credibility perception and web accessibility were identified:

**Information practices**

1. Everyday online information practices

**Credibility perception**

2. Trustworthiness of websites
3. Quality of web content

**Web accessibility**

4. Accessibility of websites
5. Ability of the user for online interaction
6. Motivation of the user for online information seeking

A discussion of the rationale for including these dimensions is given below:
**Everyday online information practices.** Credibility perceptions are contextual. Users might not give the same importance and scrutiny to information that does not concern them as they would to information that does. Literature shows that credibility studies are generally done within specific domains such as healthcare, media and communication, marketing, scholarly information seeking, etc. In the absence of adequate literature about the information seeking practices of the potential participant group, it is not possible to design a domain-specific study. On the other hand, the context of everyday information practices (Savolainen, 2008) is relevant to all web users. People seek information in everyday contexts to orient themselves with their world or to manage specific problem situations (Savolainen, 2008, p. 83). Everyday online information practices are, therefore, suitable for this research as the context for studying credibility perception in a holistic manner.

**Trustworthiness of websites.** Trustworthiness of source is recognized across different disciplines as the primary characteristic of information credibility. However, identifying what is “source” in an online context is a challenge. An important characteristic of online information is that it is necessarily disconnected from any physical origin (Lankes, 2008). The notion of source is complicated in an online context because there could be many layers in the delivery of online information, such as the author of the material on a particular website, the sponsor of the site, or even the medium itself (Flanagin & Metzger, 2007; Metzger et al., 2003; Sundar, 2008).

All the same, while studying credibility perception in an online context, it could be surmised that users make choices about websites as a first step to online information seeking. In this sense, a website could be considered as the first-level source. It is common knowledge that web users do have notions about which websites they would trust, which they wouldn’t, and why. A website plays the role of proxy for the source to varying extents depending on the genre of the website. As a proxy for the information source, it is important to study the trustworthiness of a website.

**Quality of web content.** The term web content is used here to denote informational content hosted on web pages. However, information activities of the web user involve interactions with both the website and the web content. In other words, both website and web content are essential features in the study of online information interactions. In essence, the website and the web content are not two separate entities, although they are seen as being so.
They are two sides of the same coin. From a structural perspective, there is a website; from a semantic perspective, there is web content. Information activities of a web user consist of interactions with both the website and the web content. Viewed another way, the user navigates the structural component called the website and interprets the semantic component called the web content. Again, navigation and interpretation are as intertwined as website and web content. A user cannot navigate the website without interpreting web content and vice versa. Quality of web content essentially determines choices the user would make about interacting with the website to obtain the desired information. In other words, quality of web content forms an important dimension of the credibility of online information. For example, if a website’s content indicates that it has not been updated recently, this could result in a user perceiving the information available on the website as less credible.

**Accessibility of websites.** For the purposes of this research, the term website itself holds two meanings. On the one hand, it signifies the structural aspects of integration of web pages into a single unit, and on the other hand, it is used to denote the owner or publisher of content. In the context of credibility of online information, the website therefore plays a dual role as a proxy for the information source and as a medium of interaction. The role of the website in accessibility is that of a medium of interaction. While accessibility of websites and web content is relevant to all web users, it gains prominence when a screen reader mediates information interactions. Since poor accessibility might affect navigation of websites and/or interpretation of web content, both of which are important for information evaluation, accessibility must be included as one of the dimensions in a study of credibility perception involving screen reader users. Accessibility might have both direct and indirect consequences on credibility perception, as a limitation to information interaction and/or as an emotional outcome of accessibility problems that might influence credibility perception.

**Ability of the user for online interaction.** Ability, in this context, refers to the effectiveness with which a user conducts online information interactions. A user who is proficient in the use of online technologies might manage online interactions better than one who is not. Accessibility and ability are thus related. In view of the potential problems that face a screen reader user during online interactions due to inaccessibility of websites and web pages, the ability of the user needs to be examined.
Motivation of the user for online information seeking. Ability alone might not determine how users engage in online interactions. It might also depend on their attitude towards the Web, disposition to trust, concerns about using online information, or changes in emotional outlook during online interactions. Any or all of these could impact their motivation to engage in the information interaction. The ELM referred to in Section 2.4 states that different levels of ability and motivation in a user might result in different types of evaluative judgments by users. Considering the effect screen reader interaction and accessibility might have on the user, both ability and motivation deserve to be studied in this credibility perception research.

The dimensions discussed above are depicted diagrammatically in Figure 2.1.

As can be seen from the diagram, the three research spaces overlap at the centre of the diagram affording an examination of the information practices of the target group to explore their credibility perception, while studying at the same time how Web accessibility affects both these processes. Everyday online information practices forms the broad context for my research to study credibility perception in terms of the trustworthiness of websites and the quality of web content. The first research question, “How do screen reader users who are blind or visually impaired perceive the credibility of online information in the course of their everyday information practices?” is formulated in this context. Accessibility of websites is examined for its
effects on *users’ ability and motivation* in evaluating online information by navigating websites and interpreting web content. The second research question, “How does the screen reader mediate their credibility perception process?” is formulated in this context.

Importantly, the conceptual framework formed the basis of the design of the survey questionnaire for Phase I of data collection, with questions being framed along its dimensions. Table 3.1 in Chapter 3 provides the linkages between the survey questions and the conceptual framework. Interim findings from the survey were used to design Phase II of research. The conceptual framework will be revisited in Chapter 7 while discussing the research findings.

### 2.7 Summary

This chapter began with a brief historic background of the concept of disability and considered how this research aligns with the social model of disability. It then presented a review of selected literature from the areas of information practices, credibility perception, and web accessibility, to identify concepts around which the study could be designed. A conceptual framework for the research was put together using the concepts identified and the research questions were situated in the framework. The next chapter provides details of the research methodology used.
Chapter 3 – Research Methodology

“Mainly, I tend to be fairly trusting. Most people aren't out to intentionally mislead each other. The Internet is a tool and can be misused like any other. Overall, I've had a tremendously positive experience with the Internet. It's a matter of doing your homework and taking appropriate precautions.”

— Participant P05

3.1 Introduction

This research explored the everyday online information practices of screen reader users to understand how they perceive the credibility of the online information they seek, use, and share, and how their use of the screen reader mediates this process. An exploratory approach was employed since not much information was available from the literature about the areas being studied. Multiple data collection methods were used, viz., questionnaire survey, hands-on online information activity session (with participant observation and think-aloud protocol) and semistructured interview. Using multiple methods provides a degree of convergent validity to the data collected.

Both quantitative and qualitative data about everyday online information practices were sought from adult residents of Ontario who are blind or visually impaired and have been using a screen reader to interact with the Web for at least 1 year. Sixty responses were received to the initial questionnaire survey conducted between April and July 2008, all from users who were unable to interact visually with the computer. Interviews and hands-on online activity sessions were conducted with 13 of the survey participants during June 2009.

In this chapter, I describe the design and implementation of the study and provide details about data collection and analysis. Section 3.2 describes the research approach and the methods selected. Section 3.3 provides details about the sampling and recruitment of participants for the survey and the interview. In Section 3.4, I discuss the design of the instruments used in my research and describe the survey questionnaire and the interview guide. Section 3.5 describes the
implementation of the survey and interview processes. This is followed by a description in Section 3.6 of the methods used for the analysis of the quantitative and qualitative data gathered during the research. Section 3.7 provides a discussion of the validity of the research process. Section 3.8 concludes the chapter with a summary.

Starting with participant description, the following four chapters describe the results of the research and the insights drawn from them.

3.2 Research Design

The study of information credibility perception is an area of multidisciplinary research that is increasing in importance in the context of the ever-expanding Web. A review of the literature in the areas of credibility perception and screen reader use on the Web revealed that there are no available studies about online information credibility perception by screen reader users on which I could base my research design. Therefore, I used methods derived from human-computer interaction (HCI) studies in an information practices setting to explore online information credibility perception. I drew from the following studies to design my research as explained in the next section:

- studies conducted with screen reader users in the fields of HCI (Lazar et al., 2007; Strain, Shaikh, & Boardman, 2007; Theofenos & Redish, 2003; Watanabe, 2007),
- studies conducted with users with vision impairments in the field of information studies (IS) (Beverly, Bath, & Barber, 2007; Craven, 2003; Hollier, 2007; Kinash, 2004; Williamson, Schauder, & Bow, 2000), and
- studies conducted with sighted users in the field of credibility research (Eysenbach & Köhler, 2002; Flanagan & Metzger, 2007; Freeman & Spyridakis, 2004; Rieh, 2000).

I based my research on a sequential multimethod design. The first phase was an electronic questionnaire survey, where I received 60 responses to the call for survey. This was followed by a second phase, comprising semistructured interviews and hands-on online activity sessions conducted with a subset of 13 purposively selected survey participants. This approach proved to be the most suitable to meet the research purpose because it provided several advantages.
First, using a sequential design with a survey in the first phase provided the following benefits:

1. The large set of data collected helped in deriving a basic understanding of the information practices of the participants and the technologies they used for online interaction.
2. Analysis of the survey data provided a preliminary idea of participants' credibility perception process.
3. The survey data informed the sampling and instrumentation aspects of the interview design, besides enabling effective design of the hands-on online sessions.
4. Findings based on the first phase (survey) data initiated new lines of thinking by drawing my attention to some surprises as well as paradoxes (which are explained in the subsequent chapters).
5. This helped me elaborate and expand upon some of the initial findings and provide richer detail through additional, focused data collection during the interviews.

Second, using multiple methods for data collection provided the following benefits:

1. It enabled confirmation and corroboration of findings through triangulation of methods and data.
2. It expanded the scope and validity of the findings; the survey provided an initial, broad examination of the general issues, and the interviews and hands-on sessions facilitated a deeper examination of the more salient issues.

Miles & Huberman (1994, p. 41) have listed several arguments in support of research designs that link quantitative and qualitative data. By reflecting on how my research design provided benefits as given above, I could see that these are in alignment with their views.

3.2.1 Electronic Survey.

This research sought to collect data from adults living in Ontario who are blind or visually impaired who use a screen reader to interact with the Web. To get a better sense of the
population, I chose to collect data along the following dimensions through an electronic questionnaire survey:

- use of information technologies (computer, assistive and Internet),
- online information practices, and
- online information evaluation experiences.

The purpose of the survey in the first phase was to provide a broad understanding of the realm of study, to enable first-level theory generation, and to provide a range of participant profiles from which a subsample could be purposively selected for deeper examination. Data from the survey also provided a rich picture of the context in which the research findings would be embedded, thus facilitating transferability.

### 3.2.2 Hands-on Online Information Activities.

Studies relating to online credibility perception by Fogg et al. (2001b), Eysenbach & Köhler (2002), and Flanagin & Metzger (2007) have reported that self-reported data about credibility perception should be supplemented by observational study of online behaviour to arrive at a comprehensive understanding of the phenomena studied. Fogg’s (2003b) Prominence-Interpretation theory further provides a theoretical basis for it. It posits that two things happen when people assess credibility online: a person (a) notices an element (prominence) and (b) makes a judgment about it (interpretation). If one or the other does not happen, then the element does not contribute to the credibility judgment.

The method of observing users engaged in task performance to understand the processes involved in user-system interaction is commonly used in HCI studies. Users are asked to think aloud while doing the tasks, and this data is collected and analyzed. In usability testing, participants are asked to perform benchmark tasks in a laboratory setting, and their performance is measured and recorded. A variation of the method is used in IS to understand the interaction from the user’s perspective. In her doctoral research study, *Information Quality and Cognitive Authority in the World Wide Web*, Rieh (2000) studied the information selection behaviour of participants through online task activities followed by interviews. The object of study in such research is the user and not so much the system. Online activity is based on scenarios that reflect the realistic context of information use in everyday life. The focus here is to use the method to
observe the participants while they are engaged in online activities to understand their online information behaviour.

A hands-on online information activity session was conducted as part of the interview, where participants performed online information-seeking activities based on scenarios mimicking everyday information practice situations. I provided scenarios for online activities rather than merely displaying web pages to participants and asking them to evaluate their credibility; enacting scenarios affords an effective way of obtaining insights about participants’ credibility perception. What I also got out of the online activities was an opportunity to observe how participants interacted with websites using their screen reader.

Think-aloud protocols were collected during the online activities to externalize participants' thought processes and interpret their actions. I made notes of my observations of aspects such as their use of the screen reader, their online information selection behaviour, their negotiation of visual elements on the Web using their screen reader, etc., that could not be captured through the audio recordings, and expanded these notes soon after the session completion. These data provided a deeper understanding of the mediating role played by the screen reader in participants' online credibility perception.

Previous studies (Coyne & Nielson, 2001; Craven, 2003) have reported that screen reader users overall took longer to complete hands-on tasks than sighted users. Therefore, only two short scenarios were included besides the initial website-browsing exercise done for practicing the think-aloud procedure. The overall time limit for doing online activities, including time spent on think-aloud practice, was set at 30 minutes; the remaining 90 minutes of the participant’s session was devoted to interviewing.

3.2.3 Semi-structured Interview.

The interview session was designed to allow in-depth querying of a subset of purposively selected survey participants on their survey responses, with additional inquiry around themes emerging from the survey and points noted from the online activities to provide further data for answering the research questions. To keep the interview flexible enough to allow for digressions and further probes as warranted, a semistructured or semistandardized (Berg, 2007) format of
interviewing was followed. Questions were used from a preprepared interview guide (as in Appendix V), with additional probes as needed.

I arranged for video recording of the screen of the participants’ computers to capture the data about the web pages they visited during the interview. The participants themselves were not recorded. I also arranged for audio recording the interview session to enable transcription and use of the data at a later date.

3.3 Research Implementation

3.3.1 Sampling and Recruitment.

Survey participants.

Over 40% of Canadians with disabilities (approximately 1.8 million people) live in Ontario, of whom about 20% have vision-related disabilities (PALS 2006). To enable collection of rich and diverse data, participation in the research was not restricted on the basis of age, education level, or type of screen reader used. The eligibility criteria for participation in the survey were that participants should be English-speaking adults living in Ontario who self-identified as being blind or visually impaired, and they should have accessed the Web for at least 1 year using a screen reader. The following groups of people were not considered:

- screen reader users who are not blind or visually impaired (those with a learning disability also use screen readers).
- people with visual impairments having sufficient useful vision to use screen magnification tools (only nonvisual interaction using a screen reader was researched).

An announcement about the survey (as in Appendix I) was widely circulated between April and July 2008, and interested individuals were requested to contact the researcher to obtain the survey questionnaire via email. The announcement was circulated through the following avenues:

• organizations such as the Canadian National Institute for the Blind, Balance for Blind Adults, Students for Barrier-Free Access and the National Educational Association for Disabled Students.
• accessibility services units of universities and colleges in Ontario.
• popular Internet mailing lists.
• an announcement over Voiceprint radio/TV in June and July 2008.
• word of mouth.

The announcement also mentioned that individuals receiving the message could pass on the information to interested and eligible friends and family members. This was done to give a fair chance for participation to eligible individuals. I sent the survey information letter and consent form (see Appendix II) and the survey questionnaire (see Appendix III) as email attachments to eligible people who contacted me during the survey period. The information letter mentioned that as compensation for their time, they would be entered in a raffle, where they had a 1-in-4 or better chance to win one of the following cash prizes:

- one first prize of $100;
- four second prizes of $50 each;
- ten third prizes of $20 each.

The letter also clarified that participation in the survey was voluntary, and that participants could refrain from answering any question, without negative consequences, if they felt uncomfortable about it. It assured them that participation in the survey did not involve any foreseeable risk, yet they were free to withdraw from the study at any time without negative consequences. The information letter also provided details about the arrangements made for protecting their anonymity and the confidentiality of their data.

While returning the completed survey, the participants were also asked to return the completed consent form. The form contained affirmations about their having read and understood various details in the information letter. To indicate their consent, participants were asked to type in their name and the current date on the form following "I agree." They were asked to type in "yes" (or "no") to a question that asked if they were willing to be considered for a follow-up interview session. If willing, they were asked to provide their preferred email address.
Interview participants.

Rather than aspiring to achieve statistical generalizability or representativeness, qualitative research usually aims to reflect the diversity within a given population. From among the survey respondents who had indicated their willingness to participate in a follow-up interview, a subset was purposively selected to provide diversity along the dimensions of age, gender, education, student status, vision condition, self-perceived technology proficiency, and propensity to trust.

With regard to vision condition, there were two groups: people who were born blind and people who became blind later in life, either gradually or abruptly. In the latter group were two subgroups: those who had never seen the Internet and those who had visually experienced the Internet earlier and were not able to now. Among the survey participants, there were three people who had lost their sight before they saw the Web. I did not include any of them in the interview subset. Of the eleven participants who had seen the Web, I included two: P17 and P38. Interesting insights derived from them are discussed in Chapter 4. Broadly, these two participants suggested that with the fast-changing Web, any mental maps of web pages they might hold based on visual interactions done years ago might not be helpful now. Further research is required to examine whether differences do exist across the different groups indicated above.

3.3.2 Research Instruments.

Survey questionnaire.

The broad conceptual framework adopted for this exploratory research, as derived in the previous chapter, was used to guide the design of the survey instrument. Open-ended questions were formulated to collect data about trustworthiness of websites, quality of web content, and accessibility of web interactions. The option to enter additional details was provided even with category-response questions about the technologies participants used for online interactions and their day-to-day online information activities.

The survey instrument (a 10-page questionnaire as in Appendix III) was prepared using Microsoft Word. Care was taken to design the questionnaire for easy usability with a screen reader program. The questionnaire was set in free format without any form controls because
documents in this format are easily usable with a wide range of screen reader types. Lazar et al. (2007) reported in their study with screen reader users that the form features in Microsoft Word tended to crash JAWS and Window Eyes screen readers. I distributed the questionnaire via email. I did not consider a Web-based format because, in the absence of published information about the online technologies (such as browsers) used by the target population, it would be difficult to pretest the accessibility of a web-based questionnaire. Instructions for completing the questionnaire and dispatching it were provided on the first page of the questionnaire.

The survey included both open-ended and closed questions that could be navigated and filled in using a computer, screen reader, and keyboard. Each answer option in multiple-choice questions was placed on a new line to facilitate navigation (albeit this resulted in increasing the number of pages in the document). Every effort was made to keep the questionnaire as short as possible without sacrificing data. The instrument was pretested with three screen reader users outside the population intended for the research. They were asked to note the start and end times for each section on the survey questionnaire itself. This was done to compute how long it took them to complete each section. An average of the times indicated was used to estimate the length of the final questionnaire so it could be finished within 1 hour. Some questions that were not very closely aligned to the research objectives were removed to keep within the estimated length.

The following modifications suggested by the pretesters were carried out:

- Specify “Answer ” on the line following each question to indicate that the options for the question are over.
- Where open-ended answers are asked for, leave a blank line.
- Provide categorical answer options one below the other instead of across the page, and provide list names like a, b, c, d, etc., so that the desired option can be indicated as a letter rather than marked as a cross within brackets.
- Add the option "All of the above" (suggested in some cases).

The questionnaire was divided into three sections designed to capture responses from the participants in the following areas:

- Section 1: Demographic information
- Section 2: Use of computer, assistive and Internet technologies
• Section 3: Online information practices and experiences

Most of the questions were dichotomous, categorical, or continuous-scale (Likert-type) questions, with several of those allowing for additional text input for added details. A few were open-ended questions aimed at capturing details about the following:

- other information sources used
- websites considered highly/poorly accessible
- websites considered highly/poorly trustable
- information considered to be of good quality
- general remarks or particular online experiences relating to how participants assessed trustworthiness and quality of online information

The conceptual framework derived in Chapter 2 (see Figure 2.1) was used as a guide for data collection. Table 3.1 gives the breakdown of survey question numbers along the dimensions that constitute the conceptual framework, besides demographics.

Table 3.1. Breakdown of survey questions along the conceptual framework dimensions

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Dimension</th>
<th>Survey question numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Demographics</td>
<td>1 - 8</td>
</tr>
<tr>
<td>2.</td>
<td>Trustworthiness of websites</td>
<td>51 – 54, 66</td>
</tr>
<tr>
<td>3.</td>
<td>Quality of web content</td>
<td>43, 46, 66</td>
</tr>
<tr>
<td>4.</td>
<td>Accessibility of websites</td>
<td>45, 47 - 50</td>
</tr>
<tr>
<td>5.</td>
<td>Ability of user</td>
<td>14 – 31, 35</td>
</tr>
<tr>
<td>6.</td>
<td>Motivation of user</td>
<td>9 - 13</td>
</tr>
<tr>
<td>7.</td>
<td>Online information practices</td>
<td>32 – 34, 36 – 42, 44, 55 - 65</td>
</tr>
</tbody>
</table>

The survey was not aimed at measuring credibility perception. It was designed to gather an understanding of how the participants assessed the trustworthiness of websites and quality of online information (which are two fundamental aspects of online credibility perception). Responses were sought about extreme cases (such as highly trustworthy and poorly trustworthy websites) as a means to broadly understand the processes and underlying factors relating to online credibility perception. In ordering the questions, I took care to avoid a serial effect in the design of the survey instrument, where several questions early in the questionnaire might
establish a pattern of response in the participant, "leading" to biased results in their responses. Earlier studies that used a questionnaire with participants with disabilities, such as the PhD work of Hollier (2007), proved useful as references in designing my questionnaire.

**Interview protocol and online activity session guide.**

The interview protocol and online activity session guide (as in Appendix V) was prepared in consultation with experts in the conduct of studies of users with vision impairments. The first interview session was conducted as a pilot by including debriefing at the end. The feedback did not result in any significant modification to the guide, and so that data was included in the analysis. The semistructured interview was designed to gather data in the following areas:

- Web accessibility and web technologies
- online interaction proficiency
- finding and using information on websites
- information access/sharing/verification across media
- online communication/online participation

The hands-on session comprised of a practice session and two online activities. The purpose of practice session was to familiarize participants with the think-aloud method of vocalizing their thoughts during online activity. It consisted of navigating the home page of [http://commcent.org](http://commcent.org) and thinking aloud during the process. This session also provided data about navigation behaviour of participants on an unfamiliar website. The website used for this exercise was developed complying with the WCAG 2.0 web accessibility standards for an earlier research project. The purpose of using this website was to ensure that participants do not get distracted with accessibility problems during the think-aloud practice session.

Following the practice session for the think-aloud, I had a warm-up conversation with the participants about swine flu (both as a current news topic and as a health concern), which segued into two spells of online activity interspersed with clarifying questions. According to Petty & Cacioppo (1979), issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. I tried to assess the participants’ issue involvement in performing swine-flu-related information seeking by asking whether any one close to them had been affected
by it. All the participants answered in the negative, which placed them all on a comparable footing with respect to issue involvement.

The first online activity was to seek “orienting” information\textsuperscript{25}. Participants were asked to find the latest news about swine flu. Swine flu was much in the news in the period just preceding the time when the interviews were conducted. Since participants would possibly have engaged in such activity prior to the interview, it was assumed that they would not find the activity very difficult. The term swine flu was used rather than H1N1 since that term sounded more colloquial.

The second online activity was to seek “problem-specific” information\textsuperscript{26}. Participants were given a scenario where their friend wants them to find information about swine flu prevention measures. This activity was planned to provide an opportunity for the participants to exhibit their information selection and evaluation behaviour.

3.3.3 Research Process.

Survey process.

The eligibility criteria for participation in the survey were that participants should be English-speaking adults living in Ontario who self-identified as being blind or visually impaired, and they should have accessed the Web for at least 1 year using a screen reader. Upon receipt of the completed survey questionnaire, the responses to questions about age, vision condition, and location were examined to check whether the respondent was eligible. An email acknowledgment of receipt was then sent to the respondent. His or her name was entered into the participants list, and the corresponding serial number from this list was entered on the header line of the questionnaire response document. The document was saved on the researcher’s computer in a folder named "Survey responses" with the file name "xx Survey response" where xx was the participant number from the list. Sixty responses had been received when the survey was closed on July 31, 2008. At the end of the survey period, 15 cash prizes totalling $500 were awarded to winning participants selected through a raffle.

\textsuperscript{25} Orienting information serves the need of monitoring everyday needs (Savolainen, 2008, p. 83).

\textsuperscript{26} Problem-specific information may be used for solving individual problems or performing specific tasks (Savolainen, 2008, p. 83).
Interview process.

After drawing up a list of 20 potential candidates for the interview, I sought their confirmation through an email that included an interview information letter and a consent form (as in Appendix IV). The information letter contained details about the venue options, hands-on online sessions, video recording of the computer screen, audio recording of the interview session, payment of an honorarium, and measures taken for protecting their anonymity and data confidentiality, etc. Thirteen participants confirmed attendance.

To ensure a successful and ethically appropriate test session, it is important to create a climate of trust and comfort for the participants. This was partly achieved by providing them with the option of doing the session at a place of their choice. Participants were given the choice to attend either the hands-on session and interview at the university, where arrangements were made to provide them with the computer and assistive technology they required, or to bring their own laptop to the university, or to specify a location of their choice where they had arrangements for their own equipment and internet connectivity. The last option was added to allow participants to feel comfortable while doing the online activities. Seven participants brought their own laptop to the university, four used the computer at the university and two requested to have the session at their place of work.

The session consisted of a think-aloud practice, two scenario-based online activities, and a semistructured interview. The design was guided by the descriptions of studies from the literature with participants with visual impairment, as well as by my previous personal experiences of conducting four studies with blind and visually impaired participants. The session was designed to take around two hours. The scenarios were based on health information seeking, and a “simulated work task situation" (Borlund & Ingwersen, 1997 pp. 225–246) was created to dispel any feeling in the participants that they were being tested in any way. However, the term task implies measurement of performance, which was not my focus in having the hands-on session. Therefore, I used the term online activity based on given scenario. In my opinion, this made the participants feel more at ease and not as if they were being assessed.

The consent form that the participants had filled in and sent by email to indicate willingness to participate in the interview was printed out and brought to the interview session. At the start of the session, I read out the interview information letter and got the participants'
confirmation that they understood what was read out. The interview information letter (see Appendix IV) provided them with details about the session, informed them about audio/video recording of the test session, apprised them of their right to withdraw from the session whenever they chose, and requested them to sign the consent form to indicate their willingness to participate in the interview. I then made an honorarium payment of $50 as a token of appreciation for their time and obtained their signature on the printed consent form. The first participant carried a signature card, which is a plastic card the size of a business card that has a horizontal cut to guide the placement of the signature. He also remarked that not everyone might carry such a card. I took a cue from this and prepared a signature card myself from an unused plastic identity card by cutting out a portion of it. I then used the card during the subsequent interviews. Positioning the signature card on the consent form made it easy for the participants to sign.

The participants were first asked to ensure that their computer was set up and ready with the screen reader software and to confirm their readiness to start the task. A brief practice of the think-aloud method was done at the start of the interview using the website http://commcent.org. This website had been designed and developed to conform with accessibility standards for another project that I had worked on. This website was selected to minimize distraction for the participants due to problems in interacting with the website using their screen reader, so that they could focus on understanding the think-aloud process. Using the same website for all participants helped in observing the differences among them in how they used it and reacted to it. The process of think-aloud was explained as voicing thoughts, feelings, and opinions while doing the task. In case participants wanted to say something while their screen reader was talking, they were advised to pause the screen reader (by pressing the CTRL key), and then resume the screen reader (by pressing the CTRL key again). This ensured that the recording did not contain any sound overlays that would make transcription difficult. This method of pausing and restarting the screen reader using the CTRL-key (fondly called the "shut up" key by some participants) is the accepted practice among users of screen readers and has been reported in past studies (Theofenos & Redish, 2003).

According to a popular theory in psychology, all information to be processed by our brain is held in our working memory, and the capacity of this working memory is sharply limited (Baddeley, 1999). This prompted studies about the cognitive load that the think-aloud method
might impose on screen reader users and how suitable it was as a usability study method (Chandrashekar et al., 2006b). Strain, Shaikh, & Boardman (2007) studied the effect of three variations of the think-aloud method with screen reader users and reported their observations, which are summarized below:

1. Synchronized Concurrent Think-Aloud (SCTA): Here, the participant could choose to pause the screen reader audio in the middle of an interaction. The participant then discussed what was happening on the page and what they were experiencing. This method resulted in no conflicts with the screen reader audio since it was paused during dialogue. However, the natural task flow was interrupted. Strain, Shaikh, & Boardman found that participants who were comfortable thinking aloud and who were confident in stopping and starting the screen reader preferred SCTA. They observed that participants were more likely to pause the screen reader when the site was easy to traverse and when they were progressing successfully in a task.

2. Traditional Retrospective Think-Aloud (RTA): Here the participant could move quickly through the webpage, complete (or quit) the task, and then discuss the experience afterwards. Once the task was completed (or quit), the participant would then discuss the experience using RTA. Strain, Shaikh, & Boardman found that participants were likely to rely on RTA in two extreme cases—when the task was quick and was completed before a think-aloud could be attempted, or when more cognitive effort was needed, such as in a frustrating situation, and the participant did not remember to think aloud.

3. Modified Stimulated Retrospective Think-Aloud (MSRTA): With this approach, the participant would interact with the interface without interruption. After attempting or completing the task, the moderator would ask the participant to slowly walk through the interface and explain what he or she felt was happening. During the walkthrough, the moderator could pause the screen reader as needed to probe for additional information. Strain, Shaikh & Boardman found that MSRTA was useful in situations when the focus was on testing prototypes.

Application of the think-aloud method in my research was different from its traditional application in HCI studies; instead of using it to measure the usability of an interface, I used it to gather as much descriptive data as possible about the screen reader users’ online interactions. I
attempted to extend the existing studies about use of think-aloud method with screen reader users by trying a "moderated concurrent think-aloud process" where the participants were instructed to pause their online activity after every logical decision-making point and recount what they did; in case they failed to think aloud up to 1 minute, I asked them to pause and recount what they did in the past minute. Most participants were good at stopping the screen reader and talking periodically. The method worked well and provided plenty of qualitative data about their online interactions and reasons for the choices they made during information seeking. The minute details this data provided about their screen reader interactions facilitated the identification of prominent interaction paradigms that led to some insights about the possible relationship between proficiency and interaction style.

At the close of the think-aloud practice, viz., when participants felt comfortable with the procedure, they were engaged in a conversation about what they thought about the current publicity swine flu was receiving. This established a rapport with them and segued into the online activities session. Participants’ answers to this opening question provided a glimpse of their overall attitude, which helped during the data analysis while making sense of what they said as a whole.

Participants were thereafter requested to do two tasks related to seeking health information, as detailed in the Interview Guide in Appendix V. The tasks were explained to them one after the other. Due care was taken to provide adequate time for completion of assigned online tasks. During the second online activity, I asked the participants to go through the Google search results and select one website that they would choose to visit and one they would choose not to visit. I then probed deeper into why they would visit one and not the other. This method provided useful data for understanding website selection behaviour from the points of view of information seeking as well as information credibility perception.

During the hands-on sessions, I tried to get a first-hand feel for how the participants went about seeking information and what strategies they used for selecting information for use, how they tried to orient themselves on websites, how they navigated to the required information, how they tried to interpret it, to what extent they were aware of intervening technologies, what their constructs and views about accessibility were, etc. I observed the participants as well as the
screen and took notes during the online activities, which I expanded into a written summary soon after the session was over.

Following the online activities, a semistructured interview was conducted with the participants for around 90 minutes using the interview guide in Appendix V. I also tried to elicit participants' reactions during the interview about the online experience they just had and probe them about their thoughts on credibility perception markers they noticed. Open-ended questions were used to explore factors that are unique to their use of the screen reader. Interview questions were based on a prepared interview guide. A semistructured interview method was preferred; it enabled addition or deletion of probes to interviews between subsequent subjects, so as to refine the examination as demanded by the context within the broad framework of the research design. Notes were taken during the interview session, and a summary was written soon after the session was over.

Audio recording was done using an Olympus MP3 recorder. For redundancy, I also recorded the session using the QuickTime application on my laptop. This was done to have a backup just in case the battery ran out and the recorder stopped. However, such a situation did not occur during the sessions. Some of the participants had set the speech rate of the screen reader JAWS too fast for me to follow easily, but I did not ask them to reduce the speed. Instead, I adjusted the audio replay speed of the audio file while transcribing.

Video recording during the first interview was done with a mini DV tape recorder pointed at the computer screen. Recording was continuous—it had to be done for the entire duration of the interview. Both recording and data extraction proved to be laborious. I then purchased a Flip handheld video camera, with which I could point and shoot at the screen whenever desired. This way I could limit the screen recording simply to times when an online activity was going on. I could extract the video file by connecting the camera to a USB port on my computer and transferring the file. This greatly reduced the effort in recording and data extraction.

I discovered that recording the screen during online activity was not very useful because there was no visual feedback about how the web page was being used. Furthermore, many times there was a mismatch between the audio feedback from JAWS and the portion of the screen that was visible. In other words, when JAWS was reading something, something else was appearing on the screen. The reason for this is that when screen readers work with browsers like Internet
Explorer or Firefox, they virtualize the page and read it from a serialized buffer, whereas the layout on the screen is determined by the style used to render the page visually. The video was useful, however, for knowing when the user activated controls to move to another part of the same page or to another page.

At the end of each interview, I thanked the participant for their participation and informed them that I would contact them again if any clarification of data became necessary. For ensuring participant comfort while conducting online activity and interview sessions with screen reader users, the following practices from my research experience proved helpful:

- offering to provide the interview information letter in a desired alternative format.
- meeting the participants at the entrance of the building and escorting them to the venue of the interview.
- arranging to accommodate a dog guide at the interview venue.
- welcoming and accommodating accompanying assistants.
- identifying myself and talking to the participants directly.
- when offering seating, placing the participant’s hand on the back or arm of the chair and providing a verbal cue.
- letting the participants know what I was up to when I was not talking (such as taking notes).
- letting them know when I was leaving the room for any reason.
- being more verbal in general in my communication.
- preparing and using a signature guide card while obtaining participants’ signatures.
- organizing specific adaptive technologies as required.

3.3.4 Data Analysis.

Descriptive statistical analysis of quantitative data.

All category data from the 60 survey responses were entered into a spreadsheet. Additional qualifying data provided were entered as comments. Answers to open-ended
questions were also entered here so that there was one integrated document providing participant-wise and issue-wise views of the entire data.

Next, all quantitative data were transferred to an SPSS program and frequency tables were generated for each variable. No further descriptive statistical analysis, such as crosstab or correlation, was attempted because the focus of the research was deliberately held at a macro level of evolving a broad understanding of the phenomenon of online information credibility perception. Deeper analyses of the data could be undertaken later as part of further research.

Answers to open-ended questions were transferred into another spreadsheet, further broken up into units of analysis and coded/sorted to assist in the generation of a conceptual schema as described in greater detail in the next subsection.

**Qualitative content analysis of descriptive data.**

Qualitative data for this work came from answers to open-ended questions in the survey, from transcripts of audio recordings of the interview sessions, and from the observational notes I made during the interview sessions. The interview recordings included both the conversations between the interviewer and the participant and verbal think-aloud protocols articulated by the participants during online activity. I used the technique of qualitative content analysis for analyzing this collection of data.

Grbich (2007) describes content analysis in general as a “... systematic coding and categorizing approach for exploring large amounts of textual information in order to ascertain the trends and patterns of words used, their frequency, their relationships and the structures and discourses of communication” (p. 112). According to Berg (2007) content analysis is chiefly a “coding operation and data interpretation process” (p. 304).

Content analysis, in its original form, dealt with “the objective, systematic and quantitative description of the manifest content of communication” (Berelson, 1952, p. 18). Over a period of time, its use has expanded to include interpretations of latent content, making it a tool for qualitative analysis of a variety of data and to various depths of interpretation (Graneheim & Lundman, 2004, p. 105). The visible, obvious aspects of the text, or what the text "says," are referred to as manifest content, and the underlying meaning of the text, or what the text "talks about" is referred to as the latent content. Analysis of the former deals with interpretation of the
content aspects of the text, while analysis of the latter involves interpretation of the underlying meanings of the text (Downe-Wamboldt, 1992). Qualitative content analysis is thus a research technique used for making “ ... replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use.” (Krippendorff, 2004, p. 18).

My use of content analysis for making sense of the descriptive data collected takes a qualitative approach and is grounded in the assumption that reality can be interpreted in various ways, and understanding depends on subjective interpretation. My analysis dealt with manifest content at the level of categorization and with latent content at the level of deriving themes. To analyze descriptive data, I followed qualitative content analysis procedures as outlined in Berg (2007) and Foss & Waters (2007).

At the start of the analysis, I read through the data pertaining to each participant several times to obtain a sense of the whole. Thereafter, I extracted portions of the text that formed units of analysis into another file. A unit of analysis, for me, was a set of words or sentences that related to the same central meaning and was pertinent to my research (Downe-Wamboldt, 1992). I did not attempt to reduce or condense a unit of analysis except by removing words that were superfluous, irrelevant, or unrelated to the central meaning. During the coding process, I remained within the bounds of the context and kept myself as close to the data as I could. Throughout the data analysis process, I consistently attempted to co-create a story with the data remaining as close to open coding as possible; I also tried to minimize being influenced by theories I was familiar with.

I reflexively analyzed the data from the perspectives of information accessibility, information practices, and credibility perception, assigning labels or codes to the data units that both reflected their meaning and were relevant to answering the question(s) I was attempting to answer. For this, I coded the data multiple times using the above perspectives. I then brought units with the same label together to form categories. I reflected upon these categories and organized them into a hierarchy of themes based on their latent meaning in a way that made sense in the research context. This hierarchy of themes formed the conceptual schema that helped me in answering the research questions.

Recognizing the limitation of content analysis, viz., that it does not allow the testing of causal relationships (Berg, 2007, pp. 328, 329), I resisted the temptation to draw conclusions
from the frequency of occurrence of different themes where such situations actually presented themselves to me.

3.4 **Trustworthiness of the Research Process**

In this section, I describe the measures I took to ensure that the research methods were carried out scrupulously and meticulously. This is essential because it is the procedures used to generate the findings that speak for the trustworthiness of the findings. As proposed by Lincoln & Guba (1985) and Patton (1987), I use the concepts of credibility, dependability, and transferability to describe trustworthiness in the context of the qualitative path that I took to generate the research findings. Although I speak of these concepts individually, they are of course intertwined and interrelated.

3.4.1 **Credibility.**

The focus of my research, viz., an exploration of the screen reader user’s online interactions, was selected in view of my prior practical and theoretical experience in studying this area over the past five years through several research projects.

In the selection of participants I ensured diversity and wide representation across age, gender, education, ability, etc., by conducting a survey that brought in the perspectives of 60 participants, contributing to a rich variation in the phenomena studied (Patton, 1987). Further, I purposively selected 13 from among these 60 by again varying across these dimensions based on data collected to closely study them through interview and hands-on sessions, thereby also achieving triangulation of methods and data.

It cannot be denied that a text always involves multiple meanings, and my interpretations as the person who collected and analyzed the data are influenced by my personal history. My prior experience in conducting studies with screen reader users speaks for my familiarity with the context and for my ability to interpret data meaningfully. At the same time, holding a position of empathic neutrality, I strove to be nonjudgmental while compiling the findings. My research put me in a reflexive position throughout the process with respect to my own perspectives about the issues at hand as I attempted to gather and understand multiple perspectives from as many as 60 participants. I resorted to note taking throughout the research period to trace the developments over time.
I pretested the survey instrument and conducted a pilot interview to ensure the internal validity of the data collected. I made the best attempts to adhere to forming categories and themes so that no relevant data were inadvertently or systematically excluded or irrelevant data included. To illustrate similarities within categories and differences between categories, I have included representative quotations from the transcribed text while describing the findings and discussing them. Throughout the process, there were frequent discussions with the cohort group and with the supervisors about progress in the research, which ensured explication of my thinking at various stages of the data analysis and forced consistency or validation of changes in the thinking.

3.4.2 Dependability.

The second aspect of trustworthiness, viz., dependability, is concerned with ensuring consistency, or explaining inconsistencies, in the data collected over a period of time and explaining alterations made, if any, in the researcher’s decision during analysis (Lincoln & Guba, 1985, p. 299). Through methodological and data triangulation, I sought to increase the dependability of the findings. Through audio recording of interviews and video recording of computer screen activity, I could capture the proceedings of the interview without much cognitive effort. Through later transcription of these, I could transform the data into an easily analyzable form. By comparing the themes that emerged with findings from related studies, I tried to examine points of agreement and departure.

3.4.3 Transferability.

The third aspect of trustworthiness, viz., transferability, is the “extent to which the findings can be transferred to other settings or groups” (Polit & Hungler, 1999, p. 717). To facilitate transferability of the findings presented in this document, detailed descriptions of the participant selection, data collection, and data analysis methods have been provided earlier in this chapter. A detailed description of the participants is provided in Chapter 4 and of their online information practices in Chapter 6, to serve as a background to understanding the research findings. Extensive use of verbatim quotations throughout the presentation of findings and their discussion exposes my interpretation of the data and provides a chance for the reader to look for alternative interpretations. As indicated in Chapter 4, I created three personas to illustrate the results in certain contexts and to improve reader engagement with the dissertation text.
3.5 Summary

This chapter presented the research methodology used, describing the research design, the multiple methods used for data collection, their sequencing and implementation, the data analysis methods used, and the steps taken to ensure trustworthiness of the research results. Methodologically, a sequential multimethod research design helped in the exploration of an area where not much previous data are available. A survey of a large enough sample for broadly identifying important issues, followed by a deeper examination of those issues through interviews with a purposively selected subsample, proved to be an efficient way of identifying and analyzing issues that were most relevant to this research. Adopting moderated concurrent think-aloud protocol as a variation of the concurrent think-aloud protocol method of data collection to suit screen reader users was found to be effective in generating copious data.

The next chapter provides a description of the participants, followed by presentation of results in Chapters 5 through 7.
Chapter 4 – Participant Description

“The screen reader! Oh, I don’t know how I lived without it before. I cannot imagine a life without it now.”
— Participant P23

4.1 Introduction

This chapter provides a description of the participants in terms of their demographics, technology use, and personal attributes to provide a context for the results of the research presented in the following three chapters. The concept of online interaction proficiency is introduced and explained in Section 4.3 as a prelude to the discussion of online information accessibility in the next chapter. Section 4.4 introduces three personas created based on the online interaction proficiency data to illustrate high, low, and intermediate levels of online interaction proficiency. These personas are featured in scenarios presented in the next three chapters to illustrate the diversity in user proficiency, while explaining certain results. Section 4.5 presents a concluding summary of the chapter.

4.2 Participant Description

This section begins with a summary profile of the 60 participants and thereafter provides specific details about demographics (age, gender, education, student status, and vision condition); tools used for online interactions (computer, browser, assistive technology, and Internet connectivity); motivation (attitude towards the web, concerns about online information, and propensity to trust); and ability (self-perceived technology expertise and experience in using the computer, Internet, and screen reader).

4.2.1 Summary Profile.

The sample of screen reader users who participated in this research provided the advantages of near-uniformity along the dimensions of vision condition and technology use, and diversity along the dimensions of demographics and Web use proficiency. All participants used the speech feature on their screen reader to access the Web (11 of them also used the Braille output). Over 95% used the JAWS screen reader with Internet Explorer. Two-thirds of the
participants were male. About half of them were between 31 and 50 years of age, with the remaining distributed almost equally above and below this age range. About 40% of them perceived themselves to be of average or lower technology proficiency, while the rest perceived themselves to be advanced or expert.

Looking at demographics in greater detail, 40 (67%) of the participants were male and 20 (33%) were female. Fifteen (25%) were 30 years of age or less, 13 (22%) were 50 years of age or more, and 32 (53%) were between 31 and 50 years of age. Fifty-five (92%) of the participants could not view the computer screen, while 5 (8%) could do so with high magnification, yet all participants used the speech feature on their screen reader to access the Web. As for educational background, 18 (30%) had completed high school, 22 (37%) held undergraduate degrees, 20 (33%) had completed graduate school, and 14 (23%) of the participants were students at the time of the survey.

The participants appeared to be using the computer and the Internet actively. Fifty-seven (95%) used the computer every day, of whom 55 (92%) had used a computer with a screen reader for over 5 years. Most of the participants had good connectivity to the Internet, with 54 (90%) using a broadband or wireless Internet connection. An equal number were connected to the Internet from home. Fifty-one (85%) used the Internet every day, with one of them [P44] declaring that he used it 12 hours a day. Fifty-six (93%) had used email for over 5 years with a high traffic of sent and received emails. Forty-two (70%) of these 56 also participated in email lists. Thirty-seven (62%) perceived themselves to be “expert” or “advanced” in using the computer, 40 (67%) in using the screen reader, and 35 (58%) in using the Internet. Their attitude towards the Web was very positive, with 53 (88%) of participants saying that their using the Web as an information source was “very wise”/“wise,” and 55 (92%) saying it was “very beneficial”/“beneficial.”

There were considerable similarities amongst the participants in terms of the technologies they used to access the Internet. Fifty-eight (97%) used Microsoft Windows on PCs or laptops, while 2 (3%) had recently migrated from Microsoft Windows systems to using Apple Macintosh MacBook systems. As for the browser, 57 (95%) used Internet Explorer and only 7 (12%) used the open-source browser Firefox (with some using both). Elaborating upon the above summary, the details under each of the three major heads are presented in the following five sections.
4.2.2 Demographics.

This subsection provides details about the 60 research participants with regard to their age, gender, education, student status, vision condition, and residential location.

Age, gender, education, and student status. All the participants were English-speaking adult residents of Ontario who were blind or visually impaired and had interacted with the Web for over 1 year using a screen reader. Demographic details sought were age (in four given ranges), gender, highest level of completed education, and current student status. The participant group provided a good mix across these attributes for exploratory research. Graphical representations of the distribution of the participants along the dimensions of age, gender, and education are given in Figures 4.1, 4.2, and 4.3 respectively.

![Figure 4.1. Participant distribution by age](image1)

![Figure 4.2. Participant distribution by gender](image2)
Figure 4.3. Participant distribution by education

Gender-wise distributions of age and education levels indicating number of participants (and percentages in brackets) are given in Tables 4.1 and 4.2 respectively. Two-thirds of the participants were male (N=40) and one-third was female (N=20).

Table 4.1. Participant Distributions by Age and Gender

<table>
<thead>
<tr>
<th>Age range</th>
<th>Total N (%)</th>
<th>Male N (%)</th>
<th>Female N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 to 30</td>
<td>15 (25.0)</td>
<td>8 (20.0)</td>
<td>7 (35.0)</td>
</tr>
<tr>
<td>31 to 50</td>
<td>32 (53.3)</td>
<td>21 (52.5)</td>
<td>11 (55.0)</td>
</tr>
<tr>
<td>51 to 64</td>
<td>10 (16.7)</td>
<td>9 (22.5)</td>
<td>1 (5.0)</td>
</tr>
<tr>
<td>Over 65</td>
<td>3 (5.0)</td>
<td>2 (5.0)</td>
<td>1 (5.0)</td>
</tr>
<tr>
<td>Total</td>
<td>60 (100.0)</td>
<td>40 (100.0)</td>
<td>20 (100.0)</td>
</tr>
</tbody>
</table>

Table 4.2. Participant Distributions by Education and Gender

<table>
<thead>
<tr>
<th>Education</th>
<th>Total N (%) N (%)</th>
<th>Male N (%) N (%)</th>
<th>Female N (%) N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td>18 (6) (30.0)</td>
<td>8 (2) (20.0)</td>
<td>10 (4) (50.0)</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>22 (4) (36.7)</td>
<td>16 (0) (40.0)</td>
<td>6 (4) (30.0)</td>
</tr>
<tr>
<td>Masters</td>
<td>15 (3) (25.0)</td>
<td>12 (2) (30.0)</td>
<td>3 (1) (15.0)</td>
</tr>
<tr>
<td>Doctorate or Professional</td>
<td>5 (1) (8.3)</td>
<td>4 (1) (10.0)</td>
<td>1 (0) (5.0)</td>
</tr>
<tr>
<td>Total</td>
<td>60 (14) (100.0)</td>
<td>40 (5) (100.0)</td>
<td>20 (9) (100.0)</td>
</tr>
</tbody>
</table>
The age ranges specified in the survey were 18-30 years, 31-50 years, 51-65 years and above 65 years. A majority of the participants (around 50%-55%) were in the age group 31-50 years and this trend was similar for both males and females. However, there were relatively more female participants under 30 years than over 50 years while this was reverse for the male participants.

The highest level of completed education of survey participants is shown in Table 4.2. Figures in brackets indicate how many of them were students pursuing the next level of education. Eighty percent of the participants had either completed education beyond high school or were currently pursuing college. About one-fourth of them were students when they participated in the survey.

**Vision condition.** Of the 4.4 million people with disabilities living in Canada, around 1.8 million (41%) live in Ontario, of whom around 20% have vision-related disabilities (PALS 2006). Survey participants were asked to indicate if they had enough vision to view the computer screen, and mention the year when they had last viewed the Web visually (if ever). They were also asked to describe their vision condition in their own words, to enable verification of eligibility and to provide a richer context for describing their online experiences. Some examples of how participants defined their own vision condition are given below.

Completely blind with little light perception. (P11)

I am aware of strong lights (no colours, no clear shapes). (P15)

I can see where the screen is and I can see a blur of colours on the screen, but nothing specific. (P16)

Almost totally blind with a little peripheral vision remaining to see the height, size and whether [there are] dark or light colours. (P21)

I mainly see grey shadows in my right eye and have no vision in my left eye. I am considered legally blind. I am able to make out some colour and some shapes and shadows with my right eye on some days. Otherwise I usually see the world very blurry. (P38)

---

Table 4.3 gives details of the current vision condition of the participants, as well as their history of visual Web access.

Table 4.3. History of Visual Web Access

<table>
<thead>
<tr>
<th>Visual Web access</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never saw the Web®</td>
<td>41</td>
<td>68.3</td>
</tr>
<tr>
<td>Had sight earlier, but lost it before seeing the Web®</td>
<td>3</td>
<td>5.0</td>
</tr>
<tr>
<td>Had sight earlier and has seen the Web®</td>
<td>11</td>
<td>18.3</td>
</tr>
<tr>
<td>Can see the computer screen only with high magnification¹</td>
<td>5</td>
<td>8.3</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>

¹ No useful vision to interact visually with the computer screen

Of the 60 blind or visually impaired participants, all of whom use a screen reader with their computer, 55 reported having no useful vision to view their computer screen, and 5 reported some useful vision, but not enough to make sense of the screen content except with high magnification. They primarily used a screen reader to access the Internet.

**Residential Location.** Participants were asked to provide the first three characters of their postal code to check whether they were residing in Ontario. Most of the participants were living in Toronto or around it in the Greater Toronto Area (GTA). Figure 4.4 provides the breakdown by postal districts (with the postal districts of GTA grouped into one).
The GTA, covering a total area of around 7,000 km, is the most populous metropolitan area in Canada. About half of the province's population of more than 13 million\textsuperscript{28} lives in the metropolitan area, with 2.5 million people living in Toronto proper, and over 5 million around it in the GTA.\textsuperscript{29} It is not surprising that most of the participants, who are Internet users, reside in this metropolitan area.

4.2.3 \textit{Tools Used for Online Interaction.}

In the survey questionnaire, participants were asked to indicate the tools they primarily used to access the Internet. There were questions about the type(s) of computer used, the operating system(s) used, the browser(s) used, the type(s) of Internet connectivity used, the location(s) from where they accessed the Internet, and the assistive technologies(s) they used. Participants were asked to select from among popular options provided on the questionnaire or to specify their own answer if they used some other option.

\textbf{Computer, browser and connectivity.} Fifty-seven of the 60 participants (95\%) reported using Internet Explorer from either a PC or laptop with Microsoft Windows to access the Internet (see Tables 4.4 and 4.5). One participant who used the Safari browser had recently changed over from Windows to an Apple Macintosh computer. Around 90\% used either broadband or wireless connectivity to the Internet (see Table 4.6). Over 90\% were connected from home (see Table 4.7).

<table>
<thead>
<tr>
<th>Computer type</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>39</td>
<td>65.0</td>
</tr>
<tr>
<td>Laptop</td>
<td>29</td>
<td>48.3</td>
</tr>
<tr>
<td>Total\textsuperscript{@}</td>
<td>68</td>
<td>113.3</td>
</tr>
</tbody>
</table>

\textsuperscript{@} used both PC & Laptop

\textsuperscript{28} Population as of July 1, 2009, Statistics Canada, \url{http://www40.statcan.gc.ca/l01/cst01/demo31a-eng.htm}

\textsuperscript{29} \url{http://www.ontario.ca/en/about_ontario/004657} (last accessed on March 25, 2010).
### Table 4.5. Browser Used

<table>
<thead>
<tr>
<th>Browser</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Explorer</td>
<td>57</td>
<td>95.0</td>
</tr>
<tr>
<td>Firefox</td>
<td>7</td>
<td>11.7</td>
</tr>
<tr>
<td>Safari</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>65</td>
<td><strong>108.3</strong></td>
</tr>
</tbody>
</table>

@ 5 used both IE & Firefox

### Table 4.6. Internet Connection

<table>
<thead>
<tr>
<th>Internet connection</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadband</td>
<td>45</td>
<td>75.0</td>
</tr>
<tr>
<td>Wireless</td>
<td>17</td>
<td>28.3</td>
</tr>
<tr>
<td>Dial-up</td>
<td>6</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>68</td>
<td><strong>113.3</strong></td>
</tr>
</tbody>
</table>

@ 8 used both broadband & wireless

### Table 4.7. Access Locations

<table>
<thead>
<tr>
<th>Access location</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>55</td>
<td>91.7</td>
</tr>
<tr>
<td>Work</td>
<td>14</td>
<td>23.3</td>
</tr>
<tr>
<td>School</td>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>72</td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

@ 12 used from Home/Work/School
A discussion of the terms Web and Internet in discourses relating to online interactions was presented in the introductory chapter. To clarify the understanding of the usage of these terms by the participants during the interview, they were asked whether the terms Web and Internet mean the same or different things to them. Ten of the 13 participants thought that Web and Internet are the same, while 3 of them knew that there was some technical difference between them, although they did not know what that was. One of the 3 said, “Well, the Web is a subset of the Internet. People say ‘I’ll check on the Internet.’ What they really mean is ‘I’ll check on the Web’” (P31). Participants’ use of the terms Web and Internet throughout this document needs to be seen in this light.

Screen Reader. The term screen reader is generic for a system that reads out the contents of the screen on a computer or mobile device. There are several screen reader programs available, both commercially and in the form of free, open source software. Some popular commercial screen readers used for accessing the computer/Internet are JAWS, Window-Eyes, HAL, and VoiceOver. Free, open-source screen readers such as NVDA and Orca, as well as low cost products such as System Access, are also available. However, JAWS is reportedly the most popular screen reader in use in North America.

Table 4.8 shows the screen reader programs used by participants. Fifty-three participants used JAWS. None of them used Window-Eyes. The participants who used HAL and Voiceover

34 NVDA screen reader, NV Access Inc., http://www.nvda-project.org (last accessed on March 31, 2010).
37 A large scale survey of over 1,000 screen reader users conducted during Dec 2008/Jan 2009 by WebAIM, a non-profit organization affiliated with Utah University, found that 74% of participants used JAWS and 23% of the participants used Window-Eyes. http://www.webaim.org/projects/screenreadersurvey/ (accessed April 13, 2009).
stated that they had earlier used JAWS. Thus, JAWS emerged as the common screen reader that all participants could use and share experiences about. In view of this, discussions using the term *screen reader* in this document will primarily be based on the features of JAWS, unless otherwise stated.

### Table 4.8. Screen Reader Used

<table>
<thead>
<tr>
<th>Screen reader used</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAWS</td>
<td>53</td>
<td>88.3</td>
</tr>
<tr>
<td>HAL</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Voiceover</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td>ZoomText with Speech</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>

Even though most of the participants used the same screen reader, they used different versions of it. Table 4.9 shows the different versions of JAWS screen reader used. At the time of the survey (April–July 2008) JAWS 9.x was the latest version. The features improve with versions, yet it is commonly reported that not all the new features are used by all; users tend to make do with the set of known features rather than go through the tedious process of learning new ones unless compelling reasons exist. One reason for this tendency is that minimal training is available for users of assistive technologies, and most screen reader users are self-taught or they learn through peers, as explained later in this chapter.

### Table 4.9. JAWS Version Used

<table>
<thead>
<tr>
<th>JAWS version used</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAWS v 9.x</td>
<td>26</td>
<td>49.0</td>
</tr>
<tr>
<td>JAWS v 8.x</td>
<td>12</td>
<td>22.6</td>
</tr>
<tr>
<td>JAWS v 7.x</td>
<td>10</td>
<td>18.9</td>
</tr>
<tr>
<td>JAWS v 6.x</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td>JAWS v 4.x</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

Another point about screen reader versions is that they are usually released to adapt to major changes in mainstream technologies. As a result, screen reader users are often forced to
use less than up-to-date technologies for overall compatibility. Participant P03 decided to get Windows XP installed on her latest laptop, which came with Windows Vista, because several of the programs she was using with her screen reader were not compatible with the Vista environment.

4.2.4 Motivation for Using Online Information.

The Elaboration Likelihood Model discussed in Chapter 2 is a theory of persuasion widely used in studies relating to credibility. It postulates that the level of effort invested by a user in information evaluation as a route to persuasion depends on the motivation and ability of the user. To analyze the participants’ online credibility perception process in light of this theory, data were collected about the motivation and ability of participants for online interactions. With respect to motivation, responses to questions about participants' attitude towards the Web, their concerns about online information, and their propensity to trust were collected as indicators of their intrinsic motivation to use online information (refer to Appendix III for the survey questionnaire).

Attitude towards the web. Two questions in the survey were directed at how participants felt about the wisdom as well as benefit of using the Web as an information source. As seen from Table 4.10, 88.3% of the participants felt that this was wise or very wise. Ninety-one percent felt that it was beneficial or very beneficial. None felt that it was unwise or harmful. Participants generally held a positive attitude about the usefulness of the Web as an information source. This suggests an overall high motivation for their using the Web.

<table>
<thead>
<tr>
<th>All things considered, my using the Web as an information source is...</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very wise</td>
<td>23</td>
<td>38.3</td>
</tr>
<tr>
<td>Wise</td>
<td>30</td>
<td>50.0</td>
</tr>
<tr>
<td>Neither wise nor unwise</td>
<td>7</td>
<td>11.7</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Very beneficial</td>
<td>34</td>
<td>56.7</td>
</tr>
<tr>
<td>Beneficial</td>
<td>21</td>
<td>35.0</td>
</tr>
<tr>
<td>Neither beneficial nor harmful</td>
<td>5</td>
<td>8.3</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>
Graphical representations of the results are provided in Figures 4.5 and 4.6.

**Figure 4.5.** How wise is using the Web as an information source?

**Figure 4.6** How beneficial is using the Web as an information source?
Concerns about online information. Participants were asked how frequently they felt concerned about trusting the information they found online and about the quality of information they found online. The distribution across the answer options for both the questions was almost the same (see Table 4.11), indicating that they had similar levels of concern about trustworthiness and quality of online information, and possibly that one implied the other. Around half of the participants chose the option “sometimes” in both cases. Perhaps this indicates that concern depends on context.

<table>
<thead>
<tr>
<th>How frequently do you feel concerned</th>
<th>Never (N (%)</th>
<th>Rarely (N (%))</th>
<th>Sometimes (N (%))</th>
<th>Often (N (%))</th>
<th>Almost always (N (%))</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>about trusting the information you find online?</td>
<td>4 (6.7%)</td>
<td>13 (21.7%)</td>
<td>31 (51.7%)</td>
<td>9 (15.0%)</td>
<td>3 (5.0%)</td>
<td>60 (100%)</td>
</tr>
<tr>
<td>about the quality of the information you find online?</td>
<td>2 (3.3%)</td>
<td>14 (23.3%)</td>
<td>33 (55.0%)</td>
<td>8 (13.3%)</td>
<td>3 (5.0%)</td>
<td>60 (100%)</td>
</tr>
</tbody>
</table>

In the course of their general comments, participants verbalized their concerns about the safety and security around using online information.

Overall, the web is a wonderful source; yet we have to use it wisely. (P34)

[The] Internet is an information highway you can meet pleasant informative people as well as robbers and murderers. Beware of [the] highway. (P39)

Information on the Internet is often contradictory. Other people’s vouching is important to know what is good. (P51)

Don’t know if I can trust the web. Quality may be good, but I never use websites [sic] … too many scammers, too many viruses, too many hackers … (P27)

This shows that while the Web is looked upon as a useful resource, use of the Web is not devoid of concerns.

Propensity to trust. Participants were asked to indicate their degree of agreement (on a Likert-type scale between "strongly agree" and "strongly disagree") to three statements provided that reflected their general propensity to trust others. As seen from Table 4.12, overall, the group had a positive propensity to trust others.
It appears from the data collected about intrinsic motivation that the participants overall had a high motivation to access and use online information. They were also aware of the risks associated with the Internet.

### 4.2.5 Ability to Interact with the Web.

Data were collected about the participants’ technology experience and self-perceived technology expertise in using the computer, Internet, and assistive technologies as indicators of their online interaction ability.

**Technology experience.** Several questions in the survey were designed to bring out the extent to which the participants used Internet tools and technologies. They were asked about the frequency of usage of the computer and the Web (every day/a few times a week/a few times a month), about the duration of use of the computer and email (under 2 years/2 to 5 years/over 5 years) and about the number of emails they typically sent and received per week. The distributions of responses are presented graphically in Figures 4.7, 4.8, 4.9 and 4.10.
Figure 4.7. Frequency of Computer Use

Figure 4.8. Frequency of Web Use
Figure 4.9. Duration of computer and screen reader use

Figure 4.10. Duration of email use
Tables 4.13 and 4.14 below give the frequency and duration of computer/Internet usage respectively by the participants. Ninety-five percent used the computer every single day. Eighty-five percent used the Web and email every day. Ninety-one percent had been using a computer with screen reader to access the Internet and email for over 5 years.

Table 4.13. Frequency of Computer/Internet Use

<table>
<thead>
<tr>
<th>Technology used</th>
<th>Computer with Screen Reader N (%)</th>
<th>Web &amp; Email N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every day</td>
<td>57 (95.0%)</td>
<td>51 (85.0%)</td>
</tr>
<tr>
<td>A few times a week</td>
<td>3 (5.0%)</td>
<td>7 (11.7%)</td>
</tr>
<tr>
<td>A few times a month</td>
<td>0 (0.0%)</td>
<td>2 (3.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>60 (100%)</td>
<td>60 (100%)</td>
</tr>
</tbody>
</table>

Table 4.14. Duration of Computer/Internet Use

<table>
<thead>
<tr>
<th>Technology used</th>
<th>Computer with Screen Reader N (%)</th>
<th>Web &amp; Email N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above 5 years</td>
<td>55 (91.7%)</td>
<td>56 (93.3%)</td>
</tr>
<tr>
<td>2 to 5 years</td>
<td>4 (6.7%)</td>
<td>4 (6.7%)</td>
</tr>
<tr>
<td>Under 2 years</td>
<td>1 (1.7%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>60 (100%)</td>
<td>60 (100%)</td>
</tr>
</tbody>
</table>

One of the participants (P44) remarked at this point in the questionnaire that he used the computer “15 hours a day” and the Internet “12 hours a day.” Another (P41) remarked, “Don’t know what I’d do without the computer.” One respondent who reported using the Web only a few times a month clarified as follows: “I go on the internet every single day to listen to radio stations or to watch some videos. However, in terms of searching, you can say these days a few times a month.” (P04) Email use was quite popular among the participants, as illustrated in Table 4.15. Around 40% of the participants sent over 50 emails per week, while around 60% of them received over 50 emails per week. Email, being text-based, has been a popular tool with screen reader users even from the days preceding the popularization of the Web.
Self-perceived technology expertise. In the survey questionnaire, participants were asked to rate their level of expertise in using the computer, the screen reader, and the Web by choosing, for each of those, from among five options: beginner, novice, average, advanced, or expert. As shown in Table 4.16, over 60% of the participants perceived themselves to be advanced or expert in computer usage, over 65% in screen reader usage, and a little under 60% in Web usage. These are also illustrated graphically in Figures 4.11, 4.12 and 4.13.

Table 4.16. Self-perceived Technology Expertise
Figure 4.11. Expertise in using a computer

Figure 4.12. Expertise in using a screen reader
The distribution of computer and screen reader expertise reported by the participant group closely matches that reported in a large-scale online survey of a sample of over 1,000 screen reader users conducted in Dec 2008/Jan 2009 by WebAIM, a non-profit organization within the Center for Persons with Disabilities at the Utah State University.38 The distribution of Web use expertise closely matches that reported by the same group in their second large-scale online survey of a sample of 586 screen reader users conducted in October 2009.39 WebAIM used only three levels in their second survey: beginner, intermediate, and advanced. The beginner and novice groups in my survey taken together matches the beginner in their survey; the average in my survey matches the intermediate in theirs; and the advanced and expert groups in my survey taken together matches the advanced in their survey. I consider the above similarities an indication that the sample used in my research is sufficiently diverse in computer, screen reader, and Web proficiency to serve the survey objective. To recap, the objective of the survey was to collect background data from as diverse a sample as possible so that a subsample

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representing sufficient diversity along key dimensions could be purposively selected for a deeper study through hands-on online sessions and interviews.

In summary, this section presented a profile of the survey participant group in terms of their demographics (age, gender, education, student status, and vision condition); the tools used by them for online interactions (computer, browser, assistive technology and Internet connectivity); and their personal attributes of motivation and ability to use online information. The next section introduces and explains the concept of online interaction proficiency using data collected about the participants’ ability to interact with the Internet. Section 4.5 builds on this concept by introducing three personas based on data from interview participants to represent three levels of online interaction proficiency (high, intermediate, and low). This concept threads through the following three chapters, where the three personas appear in scenarios to illustrate the role of the user’s online interaction proficiency in their information practices and credibility perception.

4.3 Online Interaction Proficiency

Within the scope of this research, online information interaction happens when a user interacts with websites and web content for the purpose of seeking, using, or sharing information. Online interaction proficiency is the term I am using to represent how effectively the user is able to interact with online information.

For a web user who is blind or severely visually impaired, the screen reader is the primary user agent and the browser is the secondary user agent. The screen reader (say, JAWS) sits between the user and the web browser (say, Internet Explorer). The user’s interaction is not with the web page as rendered by the browser—it is with the virtual buffer created by the screen reader out of the Document Object Model (DOM) of the HTML code of the web page. At one level, the screen reader is an extension of the browser because it improves the functionality of the browser by enabling web users who are blind or visually impaired to nonvisually interact with it. At another level, the screen reader is an extension of the user. The extent to which the screen reader can play its part also depends on how well the user can communicate with it. This is where the proficiency of the user comes into play.
Online interaction proficiency is a composite concept. The survey questionnaire had probed into several factors relating to this, such as brand and version of the browser and assistive technologies used, expertise and experience of the user in using the computer, screen reader, and the Internet, etc. During the interview, where it was possible to observe and converse with the users interacting with the Internet using their screen reader, the following aspects were examined in greater detail:

- expertise in using the computer, the Internet, and the screen reader
- experience in using the computer, the Internet, and the screen reader
- training in using the computer, the Internet, and the screen reader
- effectiveness in managing troubleshooting situations

Analysis of the data obtained from the interview participants about these four aspects is presented below.

4.3.1 **Expertise.**

As seen in Section 4.2.5, participants had been asked in the survey questionnaire to rate their level of expertise in using the computer, the screen reader, and the Web by choosing, from among five options for each of those: beginner, novice, average, advanced, or expert. During the interview, which took place about a year after the survey, the interviewees were again asked to answer this question. Barring three participants whose self-assessment of their expertise levels changed (P51 from average to advanced in JAWS, P59 from novice to average in computers, and P23 from expert to advanced in computers) the rest of the participants reported the same levels as in the survey (see Table 4.17).
Table 4.17. Self-perceived Technology Expertise (STE)

<table>
<thead>
<tr>
<th>Participant #</th>
<th>STE during Survey (A)</th>
<th>STE during Interview (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P05</td>
<td>Ex Ex Ex</td>
<td>Ex Ex Ex</td>
</tr>
<tr>
<td>P17</td>
<td>Ex Ex Ex</td>
<td>Ex Ex Ex</td>
</tr>
<tr>
<td>P23</td>
<td>Ex Ex Ex</td>
<td>Ad Ex Ex</td>
</tr>
<tr>
<td>P03</td>
<td>Ad Ad Ex</td>
<td>Ad Ad Ex</td>
</tr>
<tr>
<td>P19</td>
<td>Ex Ad Ad</td>
<td>Ex Ad Ad</td>
</tr>
<tr>
<td>P31</td>
<td>Ad Ad Ad</td>
<td>Ad Ad Ad</td>
</tr>
<tr>
<td>P30</td>
<td>Ad Ad Ad</td>
<td>Ad Ad Ad</td>
</tr>
<tr>
<td>P51</td>
<td>Av Av Ad</td>
<td>Av Ad Ad</td>
</tr>
<tr>
<td>P34</td>
<td>Ad Ad Av</td>
<td>Ad Ad Av</td>
</tr>
<tr>
<td>P21</td>
<td>Av Ad Av</td>
<td>Av Ad Av</td>
</tr>
<tr>
<td>P33</td>
<td>Av Ad Av</td>
<td>Av Ad Av</td>
</tr>
<tr>
<td>P59</td>
<td>No Av No</td>
<td>Av Av No</td>
</tr>
<tr>
<td>P38</td>
<td>Av No No</td>
<td>Av No No</td>
</tr>
</tbody>
</table>

Note: The triplets of Self-perceived Technology Expertise (STE) indicators denote computer, screen reader and Web expertise respectively. No = novice; Av = average; Ad = advanced; Ex = expert.

In addition, the participants were also asked why they thought they had the level of expertise that they mentioned. Their replies revealed a range of profiles varying between those who could accomplish technical tasks themselves to those who had to seek help even for small problems with their computer.

I am not afraid to install or uninstall things, to go to the settings, to the control panel, or to configure things. I look for alternative ways of doing things. If I cannot read a document I try to convert it to another format. And every time I had switched from one laptop to another, I have done it myself. I need help to install JAWS and then that’s it. Then I have backed up, restored, done everything. (P03)

I can generally figure how to do things without even looking at the manual. I know enough to get what I need to get done quickly. (P05)

I consider myself an advanced user because I understand the working of JAWS. If an error comes up, I can resolve it myself probably 90% of the time or more. I can go to a web page and I can quickly determine whether the page is of any value to me. I know a lot of the JAWS features. I know a lot of html coding. So, I consider
myself an advanced user because I have the background information to make judgments and decisions in different situations. (P19)

I consider myself an advanced user of computer, Internet and JAWS, sort of measuring myself against peers because I think there are people who are more advanced than me but there are also a lot of people who use lesser applications with JAWS than I do. I also found when talking to people that when I encounter a new application or program that I have to go and learn, I am usually able to figure out how to navigate through, figure out some of the short cuts, some of the quickest ways to get where I need to get. I find that I am usually able to do a lot of that learning on my own. I love hearing what other people do and their tips and stuff, but when other people get stuck and say, ‘Oh, I don’t know; I’m stuck’ I’m usually, ‘Try this, try that.’ I have a little bit of a repertoire, stuff to try at least. (P30)

My being able to manage the computer is contingent on the computer working just fine. If there is a problem, I don’t know what to do. I will be running to the first person who knows anything about it. So, compared to some other users, I would say my knowledge of the computer is average. The troubleshooting point of view is exactly where you determine the average and the expert. (P51)

I don’t know everything about, like, how JAWS works. I’m pretty sure there are things that I still don’t know that I need to learn. But I think, like, sometimes I even help my friends with their computer problems, so … (P34)

I am an average user. I am not an IT person nor techie. I am not keeping on top of things with JAWS and with new websites now; I used to when I was a student. Getting my job done is more important now. (P21)

4.3.2 Experience.

During the interview, aspects relating to technology experience were further probed, and it was found that at least five of the interview participants have been using a computer for over 20 years, two of them for over 30 years. On the other end of the spectrum, three participants started using a computer only between 5 to 8 years ago. Table 4.18 shows the experience of each of the interview participants with the computer, JAWS, and the Internet:
Table 4.18. Experience with the Computer, JAWS, and the Internet

<table>
<thead>
<tr>
<th>Participant number</th>
<th>Age group (years)</th>
<th>Using Computer since (years)</th>
<th>Using JAWS since (years)</th>
<th>Using Internet since (years)</th>
<th>Using Email since (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P05</td>
<td>31 - 50</td>
<td>1987 (22)</td>
<td>1997 (12)</td>
<td>1996 (13)</td>
<td>1997 (12)</td>
</tr>
<tr>
<td>P03</td>
<td>31 - 50</td>
<td>1996 (13)</td>
<td>1996 (13)</td>
<td>1996 (13)</td>
<td>1996 (13)</td>
</tr>
<tr>
<td>P19</td>
<td>51 - 64</td>
<td>1976 (33)</td>
<td>1997 (12)</td>
<td>1989 (20)</td>
<td>1989 (20)</td>
</tr>
<tr>
<td>P30</td>
<td>31 - 50</td>
<td>1983 (26)</td>
<td>2000 (9)</td>
<td>2000 (9)</td>
<td>2000 (9)</td>
</tr>
<tr>
<td>P51</td>
<td>18 - 30</td>
<td>2004 (.5)</td>
<td>2004 (.5)</td>
<td>2004 (.5)</td>
<td>2004 (.5)</td>
</tr>
<tr>
<td>P34</td>
<td>18 - 30</td>
<td>2001 (.8)</td>
<td>2001 (.8)</td>
<td>2001 (.8)</td>
<td>2001 (.8)</td>
</tr>
<tr>
<td>P33</td>
<td>31 - 50</td>
<td>1990 (19)</td>
<td>1995 (14)</td>
<td>1996 (13)</td>
<td>1996 (13)</td>
</tr>
<tr>
<td>P38</td>
<td>31 - 50</td>
<td>2003 (.6)</td>
<td>2004 (.5)</td>
<td>2003 (.6)</td>
<td>2003 (.6)</td>
</tr>
</tbody>
</table>

4.3.3 Troubleshooting and Technology Support.

During the interview, the participants were asked to describe their technology troubleshooting strategies and experiences. Their responses revealed that they seek help from their community or close friends through a variety of routes.

Some go to “JAWS mailing lists, other mailing lists and web forums” (P31). Some would “go search or go on a mailing list 90% of the time” (P34). Some prefer to “type the basic question into Google and find an answer within pretty short order” (P05). But not everyone is keen to “search online and try to resolve tech problems” (P51). If they can’t figure it out right away, they “are not going to waste (their) time.” (P31). For some, it is “basically friends” (P03) who help. “If I know a friend who knows, then I will absolutely start with that” (P05). Some “try and contact friends or user groups or forums” (P19). Those who have in-house technical support available “like to go straight to the techies and solve the problem right there” (P33). If it is hardware-related, most go to the vendor.

While resorting to technical help, some have amusing experiences. Participant P03 shared one such experience:

It is very funny because when I am having a problem with the Internet connection and I call customer support and if I am by myself, invariably they ask me how many lights does my modem have. I tell them ‘I am blind, I don’t know.’ They don’t get it. ‘Then how are you doing all this?’ they ask. Some times when I call
customer support for something, say, to configure my email account, they will say, ‘Click on the red icon.’ ‘You know, I’m blind, I’m using the keyboard.’ ‘Click on the icon on the right.’ You know, they are trained to automatically deliver these kinds of instructions and they don’t know how to talk in a different way, so that’s also a reason why I became good at going to the control panel and familiarizing myself to be able to do things quicker when I was indeed asking for help. (P03)

When it comes to helping others with technology trouble-shooting, particularly when it relates to screen reader use, most are in the habit of helping and sharing what they know in the hope that “whoever [they] pass the information hopefully will pass it on to someone else [because] the more informed screen readers are of the various functionalities the better it is” (P30).

### 4.3.4 Training Received.

There was near uniformity across the participants in the quantum of training received. When they got their first JAWS screen reader (which might have been 10 to 12 years ago in some cases), they received training from the vendors on using the software to operate their computer. They did not get any further training, barring a few who sometimes got brief training through their workplace. Most of what they knew was self-taught. This is possibly a general trend among screen reader users.40

Each new JAWS version comes with additional features. It could be “very hard to keep up with learning to be able to use all the features” (P19). Some “learn by doing, by starting to use it” (P19) and some by “listening to JAWS tutorials that come with each new release” (P34). Those that do not have the need might find it even harder to learn.

When it comes to “Internet and all other stuff” (P05), they are “mostly self-learnt” (P05) “learning as they go” (P31), “basically teaching themselves” (P03) “by trial and error, going through menus, figuring out” (P51), “listening to instructional tapes” (P23), and “asking people specific questions about how to do specific things” (P31). As P33 put it, “Like even today I learned a few things just from here that I didn’t know before.”

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40 In a survey of 665 screen reader users conducted by WebAIM during Oct 2009, 72.9% reported that their skill in using the screen reader was self-taught, and 32.9% reported that they learned informally from friends, etc. http://www.webaim.org/projects/screenreadersurvey2/ (accessed December 18, 2009).
One of the biggest problems in learning new online technologies is the learning curve. Screen reader users, like anybody else, have to take the time out to learn new features. According to P30, “As the Internet is progressing it is always introducing new things that have to be learnt to work with JAWS.”

Many prefer to work with somebody sighted while learning because they feel otherwise they might waste a lot of time trying to figure it all out by themselves. One of the participants summarized the situation succinctly: “Accessibility is to a great extent based on expertise in using technology. The number of persons who don’t know how to use their screen reader effectively is astounding. There is just no training in Canada.” (P17)

It appears from the above discussion that the process of information evaluation might seem more difficult for users with lower proficiency than for those with higher proficiency, making them less tolerant under comparable situations. For novices, particularly those who lost their eyesight recently and are coping with learning to interact with the computer and the Internet using a screen reader, lack of training is especially challenging and puts them at a great disadvantage. P38, who lost her eyesight due to a medical condition a few years ago, remarked, "When I go to a new website I try to listen to the whole page from the beginning to end so I know what is there. That takes a lot of time. (P38)

In summary, several attributes related to the online interaction proficiency were examined so far in this section with reference to data collected during the interview. Based on a deep analysis of all the data pertaining to participants’ online interactions, three groups of online interaction proficiency – high, intermediate and low - were identified as shown in Table 4.19, the demarcation between them being anything but rigid. The purpose of such grouping is not to segregate the participants into three boxes, but to exemplify three levels of online interaction proficiency, which provide a good handle to understand how online interactions might be shaped by the users’ online interaction proficiency. A similar method of classifying participants into groups for deeper examination of the data has been reported in the human-computer interaction (HCI) literature (Murphy, Kuber, McAllister, Strain & Yu, 2007). In that study, participants were classified based on their reported Internet experience. In this work, the three identified levels of high, intermediate and low online interaction proficiency are used in subsequent chapters to
examine the effect of online interaction proficiency on online interactions, online information practices and credibility perception.

Table 4.19. Self-perceived Technology Expertise (STE) and Overall Online Interaction Proficiency

<table>
<thead>
<tr>
<th>Participant #</th>
<th>STE during Survey (A)</th>
<th>STE during Interview (B)</th>
<th>Numeric Avg of B</th>
<th>Overall online interaction proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>P05</td>
<td>Ex Ex Ex</td>
<td>Ex Ex Ex</td>
<td>5.00</td>
<td>High</td>
</tr>
<tr>
<td>P17</td>
<td>Ex Ex Ex</td>
<td>Ex Ex Ex</td>
<td>5.00</td>
<td>High</td>
</tr>
<tr>
<td>P23</td>
<td>Ex Ex Ex</td>
<td>Ad Ex Ex</td>
<td>4.67</td>
<td>High</td>
</tr>
<tr>
<td>P03</td>
<td>Ad Ad Ex</td>
<td>Ad Ad Ex</td>
<td>4.33</td>
<td>High</td>
</tr>
<tr>
<td>P19</td>
<td>Ex Ad Ad</td>
<td>Ex Ad Ad</td>
<td>4.33</td>
<td>High</td>
</tr>
<tr>
<td>P31</td>
<td>Ad Ad Ad</td>
<td>Ad Ad Ad</td>
<td>4.00</td>
<td>Intermediate</td>
</tr>
<tr>
<td>P30</td>
<td>Ad Ad Ad</td>
<td>Ad Ad Ad</td>
<td>4.00</td>
<td>Intermediate</td>
</tr>
<tr>
<td>P51</td>
<td>Av Av Ad</td>
<td>Av Ad Ad</td>
<td>3.67</td>
<td>Intermediate</td>
</tr>
<tr>
<td>P34</td>
<td>Ad Ad Av</td>
<td>Ad Ad Av</td>
<td>3.67</td>
<td>Intermediate</td>
</tr>
<tr>
<td>P21</td>
<td>Av Ad Av</td>
<td>Av Ad Av</td>
<td>3.33</td>
<td>Low</td>
</tr>
<tr>
<td>P33</td>
<td>Av Ad Av</td>
<td>Av Ad Av</td>
<td>3.33</td>
<td>Low</td>
</tr>
<tr>
<td>P59</td>
<td>No Av No</td>
<td>Av Av No</td>
<td>2.67</td>
<td>Low</td>
</tr>
<tr>
<td>P38</td>
<td>Av No No</td>
<td>Av No No</td>
<td>2.33</td>
<td>Low</td>
</tr>
</tbody>
</table>

Note: The triplets of Self-perceived Technology Expertise (STE) indicators denote computer, screen reader and Web expertise respectively. No = novice, Av = average, Ad = advanced, and Ex = expert. Numeric average is computed with values for expert = 5 to beginner = 1.

One additional aspect of interest regarding screen reader use is the speed at which users set the speech rate. Although it could be generally surmised that highly proficient users might be listening at a higher speed than novice screen reader users, a closer look is taken at the data in the next subsection.

**4.3.5 Screen Reader Speech Rate.**

The screen reader’s voice and its reading speed can be set to the user’s comfort level. In general, an expert screen reader user reads at a much faster speed than a novice. Table 4.20 gives the speech rates used by the participants, classified qualitatively into slow, medium, and fast based on the speeds at which they used JAWS during the online activity sessions. I use the term
slow to denote the default speed that comes with the generic setting at the time of installation. This is comparable to average human talking speed. I use the term medium to denote speeds where the speech was still intelligible to me as a non-screen-reader user and the term fast to denote speeds that were quite difficult for me to comprehend. In these cases, I had to reduce the speed of the session recordings while transcribing to get the script of JAWS.

<table>
<thead>
<tr>
<th>Participant #</th>
<th>JAWS Speech Rate</th>
<th>JAWS-Web proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>P03</td>
<td>Fast</td>
<td>High</td>
</tr>
<tr>
<td>P05</td>
<td>Fast</td>
<td>High</td>
</tr>
<tr>
<td>P17</td>
<td>Fast</td>
<td>High</td>
</tr>
<tr>
<td>P19</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>P23</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>P30</td>
<td>Medium</td>
<td>Intermediate</td>
</tr>
<tr>
<td>P31</td>
<td>Medium</td>
<td>Intermediate</td>
</tr>
<tr>
<td>P34</td>
<td>Fast</td>
<td>Intermediate</td>
</tr>
<tr>
<td>P51</td>
<td>Medium</td>
<td>Intermediate</td>
</tr>
<tr>
<td>P21</td>
<td>Slow</td>
<td>Low</td>
</tr>
<tr>
<td>P33</td>
<td>Slow</td>
<td>Low</td>
</tr>
<tr>
<td>P38</td>
<td>Slow</td>
<td>Low</td>
</tr>
<tr>
<td>P59</td>
<td>Slow</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 4.20 also gives the online information proficiency of the participants. All participants who used JAWS at the default reading speed were in the low-proficiency group. Three of the five participants who used JAWS at medium speed belonged to the intermediate-proficiency group while two, P19 and P23, were in the high-proficiency group. Likewise, three of the four whose JAWS speech rate was fast were in the high-proficiency group while one of them, P34, was in the medium-proficiency group.

Analyzing what various participants had mentioned about their preferred speech rate provided some explanations for these observed practices. P23 mentioned that he preferred quality to speed. It is to be noted that although he considered his speed to be “normal,” it was much faster than the default.
Some people use it at a very fast rate. But I can’t. I use it at normal speed. I guess maybe it is a question of training, and I haven’t trained my ears to fast listening. I guess it is because I am more interested in quality. So when I listen to it at a normal speed the quality is much better. Maybe I am more patient, or maybe I am more relaxed in life (laughs). (P23)

P19 said that he preferred not to use JAWS at very high speeds because his comprehension was not very good. He said, “I don’t like it (JAWS) really fast. Again it depends on what I am doing. I usually set it up at 35 to 40%. If I want to I can tell JAWS to go faster. My comprehension isn’t as good as a lot of people.”

While P19, as he is quoted above, preferred medium speeds normally and would increase it when needed, P34, who belonged to the medium-proficiency group, preferred to keep her JAWS at fast speed normally, and reduce it as and when required.

So when I’m reading something like this which I’m interested in, my JAWS is usually fast and so what I do is, I slow it down so I could understand it better. Depending [on] what I’m doing, like, sometimes if I’m trying to figure out, so [that] I don’t miss out anything, I kinda slow it down. (P34).

This practice of adjusting the speech rate a notch lower or higher was observed among other participants as well. Participant P03 said, “For pleasure reading, I sometimes read a bit slower. For reading news online, I might use it a bit faster. A lot depends on the time I have.”

Many of the participants brought their own laptops to the interview session. The first participant P51, who used the computer in the university, increased the speech rate from the default speed within the first few minutes of use. She said the following:

I think this computer is pretty much set for generic use and they just left it at default setting. It is pretty slow and I was getting a bit frustrated because it was taking so long. So I just used CTRL + ALT + PGUP to speed it up a little bit so that it is a bit more comfortable for me. (P51)

Thereafter, I made it a part of the interview protocol to ask the participants who used that computer to set the JAWS speed as per their requirement.

One of the high-speed JAWS users held the opinion that being able to read fast with JAWS helps during online interactions, but the Web needs to be designed to accommodate all types of users.
If you are a person who cannot understand your screen reader unless it is at a very slow pace, then that is another barrier. If you already are on a slowly loading webpage, and it is poorly accessible so it takes you forever to find the content, and if you are the sort of person who needs to listen to your screen reader slowly, how are you ever going to get there? This is just to emphasize that some people need to listen slowly, content providers cannot fix that problem, but they have to realize that 'Look, here’s already a challenge that people have; so there’s even more reason for you to make your content accessible.' (P17)

Following the discussion in this section about the importance of online interaction proficiency for effective online interactions, three personas are created in the next section as representatives of high, intermediate, and low online interaction proficiency. The purpose is to illustrate, through scenarios featuring these personas, the influence of the level of online interaction proficiency on some aspects of information practices and credibility perception.

4.4 Personas Based on Online Interaction Proficiency Data

The role of the Web user in online credibility perception is paramount. If there is no user, there is no perception. Different users might have different perceptions of the credibility of the same online information based on a multitude of factors, including their knowledge and the context of the information interaction. Online interaction proficiency is one composite attribute introduced in the previous section that might have a bearing on the effectiveness of the users’ information interactions. To illustrate this aspect during the presentation of the research results, three personas – Holly Hughes, an accessibility consultant; Mina Mansoor, a student; and Laura Lessig, a homemaker—were created based on participant data to represent high, intermediate and low online interaction proficiency respectively. They are represented in several scenarios later in this document. These personas are presented below after a brief discussion about the concept of personas.

Personas are traditionally used in the fields of interaction design and marketing. Pruitt & Adlin define personas as “detailed descriptions of imaginary people constructed out of well-understood, highly specific data about real people” (2006, p. 3). Personas are a method for enhancing engagement and reality (Grudin & Pruitt, 2002). Cooper (1999) first brought to HCI the concept of personas hitherto used in marketing. Personas can be used to understand phenomena by promoting reader engagement through scenarios. Scenarios are stories that have a setting, actors who have goals or objectives, and a plot or sequence of actions and events.
Data relevant to the online interaction proficiency as collected from 13 participants through the survey, interview, and observation during hands-on sessions are used to create these personas. The purpose of the three personas is to analyze the data for differences in online interaction behaviour based on the three proficiency levels – low, intermediate, high – among the participants and to illustrate those differences through scenarios featuring the personas. These personas do not represent stereotypical screen reader users, nor do they represent a single participant, nor are they statistical averages of several. Each persona represents any or all of the participants who fall in that category of proficiency. This dissertation experiments with the use of personas as a medium of communication between the researcher and the reader to represent user data/results in an easily understandable manner.

The objectives of adopting the persona/scenario method for presenting some of the research results are to:

- familiarize readers with the online interaction terminologies and practices of screen reader users through characters with a personality without compromising the confidentiality of the research participants.
- provide a context for readers to understand some of the results and insights presented.
- experiment with the use of personas in research reporting.

The three personas Holly, Mina, and Laura represent respectively high, intermediate and low proficiency in online interaction using a screen reader. These online interaction proficiency differences could possibly be observed in this research because the selection of participants for the interview was done by purposively drawing from the 60 survey participants to ensure diversity along age, gender, education, student status, vision condition, and technology expertise and experience. Neither the data nor the research method affords a way to study correlations between these criteria and the observed behaviours of each individual participant. However, this technique helps to explain some effects of the use of the screen reader on the online information practices and the online information credibility perception process of the participants, as can be seen in the chapters that follow.
4.4.1 **Holly Hughes, Accessibility Consultant.**

“If JAWS didn’t work, I couldn’t work.”

Holly is in her early 50s and works as an accessibility consultant with a prime IT company in Toronto. Holly was born blind. She married early and started working early. Holly first used email around 20 years ago. She started using the JAWS screen reader from version 3.0. Currently she uses JAWS 9.0 with Internet Explorer 7.0. She also uses another popular open source screen reader called NVDA. She started using FireFox 3.0 from May 2009 as required for her work. She uses a Braille display with her computer, which she plans to upgrade soon. She can afford that only because her company pays for it.

Holly understands the working of JAWS. If an error comes up, she can resolve it herself probably 90% of the time or more. When she goes to a web page, she can quickly determine whether the page is of any value to her. Holly knows most of the JAWS quick keys. She helps friends with their computer problems. She always likes to work with somebody when she is learning something new because otherwise she might waste a lot of time trying to figure it out.

Networking is very important for Holly. She spends a lot of time online networking with people and sharing information. However, she does not use any of the recent social networking tools. She has an account on Facebook, but she hardly goes there because the interface is complicated and even simple activities like checking messages take up too much of her time. She finds Facebook too cluttered and not marked up well. Similarly, she finds Twitter too verbose to find any useful information. She finds LinkedIn accessible and usable, so she uses that. She subscribes to blogs, podcasts, and newsletters. She gets most of her information from people, and she believes that doing so would be reliable. She likes wiki sites where she can also contribute as well as interact with people.

4.4.2 **Mina Mansoor, Student.**

“If there’s no screen reader, there’s no computer for me.”

Mina is a bubbly undergraduate student in her early 20s. She immigrated to Canada with her family in 2004 and has been living in Toronto since then. Mina is legally blind. Her right eye has no vision, but her left eye has 20/400 vision. This means that she can see with her left eye at
20 feet what a person with standard 20/20 vision can see at 400 feet. She uses a white cane while moving about. A GPS-based device adorns her hip pocket; it can "tell" her where she is at any point. She has a "talking" mobile phone, mostly to text her friends and sometimes to make calls.

Her first year at school in Toronto was a struggle; she had to learn to use a computer and the Internet with the help of the JAWS screen reader program and to touch-type as well. Back home, she was used to being read to, whereas using a computer was indispensable here. The only training she got was from the vendor, and that was minimal. Her learning was done mostly just by trial and error, going through the menus, figuring out, and teaching herself.

But soon she began enjoying her new-found independence and privacy, which made all her troubles worthwhile. Her school grades and credit card bills are now her own secrets because she can view them herself online. She can read and write love letters without the embarrassment of asking someone to do them for her. The motivation this provides her to become an expert in using her technologies is immense. JAWS does come with a set of quick key combinations for efficient functioning. But their sheer number is so overwhelming that Mina finds neither the patience nor the attention span to memorize them all. She knows some important keys that help her to quickly locate and use the information she wants without "crawling the Web" (her favourite term for browsing).

4.4.3 Laura Lessig, Homemaker

“The screen reader is pretty much my lifeline.”

Laura is a woman in her late 30s, married since 2000 and mother of an active three-year old. She has an undergraduate degree and was working in a provincial government office until 2005. Laura lost her eyesight in 2005 due to a medical condition in the brain that suddenly and permanently damaged her optic nerves. She can now mainly see grey shadows in her left eye and has no vision in her right eye. She can make out some colour, shapes, and shadows with her left eye on some days; otherwise her world very blurry. Laura is legally blind.

Laura uses a laptop computer at home with Windows Vista and JAWS screen reader version 8.0. As she was using a computer and the Internet even before she lost her vision, she was generally familiar with using them. She had, in fact, viewed websites visually till 2003. But with JAWS it was like learning everything all over again. With her little one around, she does
not have the time to learn to use JAWS as well as she would like. Laura is very dependent on JAWS because it helps her get entertainment and information, do her work, keep in touch with friends through email, etc. Yet, she perceives herself to be a novice in using it, “green as the grass outside.” She feels that she has not yet mastered all the JAWS commands for doing her work efficiently, and that she needs more training with JAWS.

Laura uses her laptop to access the Internet from her home through a broadband connection. She uses Internet Explorer to browse the Web. She uses the computer and the Internet a few times a week. She has been using email for about 10 years now. She sends and receives between 10 and 50 emails per week.

4.5 A Scenario of Web Page Navigation Using the JAWS Screen Reader

To provide a sample of persona use immediately after their description, a scenario of Holly, Mina, and Laura navigating web pages using the JAWS screen reader is presented below. While it might seem premature to present this scenario before discussing how the screen reader functions, it might familiarize the reader with some terms frequently used by screen reader users in the context of their online interactions. Appendix VI provides a list of JAWS quick keys used with common Internet interaction commands for reference.

Holly, with substantial experience and expertise in using the Web with a screen reader, is oriented towards obtaining a holistic picture of the content on a page and then zooming in to read what interests her. Mina, fairly conversant with the quick keys to get to the list of headings or links on the page, is focused on getting the information she is seeking. Laura goes over the page line by line trying to read everything, sometimes jumping to links that interest her.

Holly describes below how she would go about navigating a web page using JAWS. She uses the headings on web pages to navigate and to obtain an overview of the content.

I skim using headings with the h key and paragraphs with CTRL+arrow down. Headings give me an overview of the content. I use Ctrl+F for searching, but it searches only the current page. I find that very useful especially on [the] CNN website. It is very, very large and it would take forever and ever to scan down. So I would search on that. Basically I use the up and down arrow keys to move quickly through a new page, but I don’t listen to every line. If I want to go faster, I can use the Ctrl+up and Ctrl+down keys to jump over sections of the page. If I wanted to go real quick, I would do a list of links. (P19)
Unlike Holly, who likes to look over web pages thoroughly, Mina is more focused on quickly getting the information that she is seeking. She uses the Find command frequently.

I mainly use the headings list with Insert+F6. I also often use the links list with Insert+F7. I would probably use “n” to jump down quickly if I knew something was certainly there on a page and orient that way, if I am very familiar with the website. And then closer to it I will start arrowing down. That’s generally the quickest way. Often when I am looking for things I use the virtual Find on the page with Ctrl+F. Find is a heaven-send [sic]. Before I learnt Find, I was going scrolling down from top. Sometimes I go down with Tab link by link. I also use “n” to jump section by section and h to jump heading by heading a lot on websites. What I do depends on what I want and what is there. (P51)

As can be seen from the conversation below, Laura, who is not very proficient in using her screen reader on the Web, primarily navigates web pages line-by-line. Sometimes she navigates using links, which is generally known to be the next most commonly used method among JAWS users.

Interviewer: Do you always use [the] down arrow?
Laura: Ya.

Interviewer: It might take you a long time to go through web pages, right?
Laura: I don’t know. If I want to make a website easier, I use the links list. Or sometimes I just Tab through it.

Interviewer: Do you use headings to navigate any time?
Laura: I can try. I have learned the h thing but I don’t like it. I get bored that way. I just go down with the arrow key and look for the particular information I want and if I don’t find it I look again. If I still don’t find it, I just go out of the website. At the most five minutes. (P59)

From the manner in which Holly, Mina and Laura approach and accomplish the navigation of a web page as illustrated above, it can be surmised that the ease and extent to which the contents of a web page are imbibed by screen reader users might depend on their online interaction proficiency. Better coverage of web content might lead to better perception of the credibility of information derived from the web page. In this way, interaction proficiency is important for credibility perception by screen reader users and it will be repeatedly referred to in the following chapters while discussing the results of this research.
4.6 Summary

This chapter presented a description of the 60 survey participants in terms of their demographics, technologies used, ability to engage in online interactions and motivation to use online information. Further details on expertise, experience, training and troubleshooting were presented about the interview participants by synthesizing them into one characteristic, viz., online interaction proficiency. Data from the observations during the online activity sessions suggested that interaction proficiency varies amongst the participants and that it determines to what extent the participants are able to engage in online interactions. Therefore, it was decided to systematically examine this aspect because the ability to evaluate online information could impact credibility perception.

Three personas created based on data collected about the interview participants are described in this chapter. The personas Holly, Mina and Laura, representing three levels of proficiency, will be featuring in further scenarios in the course of the next three chapters where the results of this research are presented. Online interactions using a screen reader are discussed in detail in the next chapter.
Chapter 5 – Online Information Interactions

“Quick navigation should be possible. That makes me more inclined to revisit. I will discard good information if the website is not easily usable. If I look hard I can always find another website with same information. If earlier experience of navigation was easy, if site is user friendly, then I am more inclined to use the information. I trust websites that are clearly designed and easier to read.”
— Participant P51

5.1 Introduction

Building on the concept of online interaction proficiency developed in the previous chapter, this chapter discusses the mediation of online information interactions of the participants by the screen reader they use. To understand credibility perception by screen reader users, it is necessary to examine how online information interactions happen via a screen reader because the dynamics of such interactions might differ from direct interactions with web pages through a web browser. Data collected about website accessibility are used to analyze these dynamics. Participants in the survey were asked to name some websites that they considered highly accessible and some that they considered poorly accessible. They were also asked to provide reasons for their judgments. During the hands-on online activity sessions, participants were observed closely as they interacted with websites and were encouraged to speak aloud about what they were thinking and doing. During the interview session, several questions were posed to gather data about online information accessibility. Results and insights derived from analyzing the data are presented in this chapter.

The chapter begins with a portrayal of the phenomenological experiences of the participants with their screen reader in Section 5.2. It then introduces the concept of online information accessibility in Section 5.3, bringing out its dynamic and multidimensional nature. In Section 5.4, three important dimensions of online information accessibility are discussed. These dimensions, which emerged from the data analysis, are the screen reader’s capabilities/limitations, the design of the web page and the meta-information it provides, and the
user’s online interaction proficiency. Against this background, Section 5.5 examines the role of
the screen reader in mediating online information interactions in terms of the two fundamental
sets of activities involved in online information seeking and use, viz., orientation/navigation
within and across web pages and location/interpretation of relevant web content. Technology
opacity, a phenomenon observed during the research, is discussed thereafter in Section 5.6. The
chapter concludes with a summary view of the role of the screen reader in online information
interactions.

5.2 Phenomenological Role of the Screen Reader

The screen reader plays an indispensable role in the information experience of people
who are blind or severely visually impaired. Participant P03 is a woman who was born blind. All
through high school, her parents and friends had helped her by either reading to her or recording
her reading material. When she got access to JAWS, and especially to the Internet, she
“discovered the world.” Her comfort level with having technology reading to her instead of
people, despite its drawbacks, is evident in the following interview excerpt:

Interviewer: Regarding the role that the screen reader plays for you…you said
earlier that it made you feel independent...

P03: Empowered, that’s the word.

Interviewer: But at the same time it does not replace the human being…it does not
tell you about everything…like images, that’s what I mean.

P03: But on the other hand, if I was relying on a person to read everything on the
screen, I could not hit a button to stop it, or, "skip that, err," you know?

The screen reader enhances independent access to information for individuals who are
blind. Participant P19, who works as an accessibility consultant, expressed how critical JAWS is
for his work and life. He said, "JAWS is a very critical tool. There is no comparison with
anything. Life is so much more independent. You can read with JAWS. The Internet gives so
much more power to gain knowledge."

For participant P59, a resilient, congenitally blind woman, the screen reader provides
independence and autonomy. She says, "My screen reader helps me remain independent. It helps
me keep my autonomy. Helps me prove that I can compete in the regular world. Helps me do my
work."
According to participant P34, a young student, if there were no screen reader, it would not be possible for people who are blind to use the computer.

I like it better when I do things on my own than depending on people (laughs). That’s just the way I am. I feel better that way. The computer is a LOT to me. You can do a lot of things independently than relying on other people. (P34)

For many, it is the gateway to employment, as participant P21, who holds an enviable position at a university, says, "My God, without that [the screen reader] I don’t think I will be employed in this kind of a job."

In the opinion of participant P05, who is a highly skilled writer, knowing how to use the screen reader cannot always guarantee a job, but it does have its benefits.

Well, between it [the screen reader] and the Internet, it has opened the gateway to so much room for impact, I mean it is not a direct link to employment, I find. Everyone was thinking, back when I was growing up, that technology would guarantee you a job. It is not like that. But it will give you at least a chance to have an impact. I can reach out from here and help people. Because of the screen reader I have a voice. I have an audience. So, at least there is purpose, there’s direction. I can access government stuff if they want me to do a survey or something. Things like that I can just do in my own time. (P05)

Participant P51, an immigrant student, had struggled while she was living in her home country due to her progressively degrading vision condition. She had used the computer sparsely due to inadequate access to assistive technology. Upon her arrival in Canada, she began using the computer and the Internet via a screen reader. This transformed her into a more participative player in the online information world.

It [the screen reader] has made a HUGE difference. Like, before I got this I wasn’t doing anything online, right? The fact that I have Facebook now and the fact that I seem to be searching the Web and doing everything online, it is all very recent. Most other people have used it from high school or even well before that. And I never did. It [the screen reader] definitely makes me more independent and it matters more because it is more critical now. Earlier it didn’t matter much because I didn’t use the computer much. Things were set up in a way that you didn’t have to rely much on computers. Here, if I weren’t computer savvy, I would need help for every little thing. Without online banking I would be relying on people to sign me up for courses, to pay my bills. (P51)

Besides independence, another benefit of using a screen reader is privacy; and this mattered a lot to participant P23.
I don’t know from where to begin; first, in terms of privacy, for example, before the screen reader, I basically had to use a sighted person to access print material. And imagine how much embarrassment it caused me. I mean you cannot show your love letter to some one else, right? Or if you receive your report card from your school and you have an F or a D+, or your Visa bill or whatever. We have a lot of private stuff, you know. I couldn’t keep track of my bank account as well as I wanted. I received my Visa bill. Let’s say it was $650, I didn’t know what it was for so I just paid it off and that was it. And as I said, you know, when I wrote letters to people I could type it myself but when they wrote me back I had to get some one to read it, and again as I said, it wasn’t as private as I wanted it. But now, basically I can do everything myself. I email people. I keep track of my banking online. Only I know what grades I get in school, no one else knows it. I can get a D+ and say that I got an A because no one can check (laughs loudly).

(P23)

For participant P05, the screen reader provided a bit more than just privacy.

I can do online shopping too, especially. I can buy things and not go with people to stores. I can browse and search at my own pace. I don’t always want mom there saying, “Well, you got to watch your weight. You shouldn’t get those candies” or whatever. Just go online, find some candies and order them. And for all my dating it is absolutely essential, you know. I would cringe if I couldn’t do that privately.

(P05)

Although the screen reader usually speaks in a monotonous voice, that doesn’t bother users much. When asked about this, participant P03 said, "No. I love JAWS. I don’t mind its voice."

One important aspect of online interactions with a screen reader is the experience of different levels of accessibility of websites, which screen reader users frequently refer to in their discourses about web usage. The three quotations that follow illustrate this aspect, which is very important in the context of the study of online information practices and information credibility perception by screen reader users. When asked about why she considered certain websites to be highly accessible, participant P34 said, "I consider these websites to be highly accessible because they work well with JAWS and I can get the information I need on these websites without anyone’s help."

According to participant P09, when a website is not designed accessibly, the screen reader cannot read all of the content, leaving users feeling uncertain and uncomfortable. "My screen reader seems to read some of what is on the page relative to the actual information
contained. I cannot feel comfortable that I can receive all the information and couldn’t certify that fact," participant P09 said.

Explaining why he finds almost all Canadian federal government websites poorly accessible, participant P60 said this:

They [Canadian Federal Government websites] have made extremely poor use of HTML elements and in a lot of cases graphics are not properly labeled. As well, much of the material available for download is in PDF format that has been scanned in as a graphic as opposed to text, thereby making it completely inaccessible to screen readers. (P60)

Online experiences of web users who are blind or severely visually impaired are thus tied intimately to the screen reader and to their experiences of information accessibility during their online interactions.

5.3 **Online Information Accessibility—a Multidimensional Concept**

A review of the human-computer interaction (HCI) literature shows that, in general, the term *accessibility* is used in studies involving users with disabilities, and *usability* is used in other cases; a few studies have attempted to study the connection between the two concepts (Chandrashekar & Benedyk, 2006a; Petrie & Kheir, 2007; Theofenos & Redish, 2003). Before attempting to establish the multidimensional nature of accessibility, I present a brief discussion of its relationship to the concept of usability.

One of the participants, an accessibility consultant by profession, shared his views on accessibility and usability of websites during the interview as follows:

It is important to distinguish between accessibility issues and user usability issues. Usability has become a big knowledge area just in itself. When I think a website is not accessible, I am thinking more in terms of the structure of the web page, the design, whether it is keyboard accessible and stuff like that. If I am talking about the usability of a website I am more or less talking about the layout of it and the content of the information—is it understandable? Like that one thing we saw where the link said "learn more." That doesn’t tell me anything. That's not an accessibility problem because I can click on it. That’s a usability problem because I have to click on it to find out what it is. (P19)

As expressed by him, technical interface constraints that prevent a user from interacting with some features on a website could be considered an accessibility issue, and ease of accessing
what is accessible interactively could be considered a usability issue. Information on a website is accessible when the user is not faced with any barriers to accessing it. Information is increasingly usable with improvements to the interface.

I would elaborate on this, saying that, in the context of a human-system interface, accessibility of any feature of a system represents a threshold on the usability continuum. This threshold determines the point up to which it is not possible for users to interact with the feature through the interface. Users will be able to interact with the feature from this point. Usability, on the other hand, represents the extent to which interaction with this feature could be improved for users beyond this threshold. A feature has null usability up to the point of its accessibility threshold. In other words, it is irrelevant to talk about the usability of a feature when it is not accessible. Presenting this idea another way, a feature becomes accessible when the user crosses the barrier that divides his inability to access the feature from his ability to do so. How accessible the system is depends on how many of its features are accessible. How usable the system is depends on how improved the interaction becomes.

Speaking more generally, both in the real world and in the virtual world, there is a threshold at the intersection of a person’s capabilities and the environment that forms a barrier for the performance of any activity. A blind person cannot see at all; a sighted person cannot see in darkness. A person with low vision cannot read from a computer screen below a threshold magnification; a person with good eyesight cannot read from a mobile phone screen for the same reasons. The threshold separating accessibility and usability, thus, exists for everyone, and depends on the environment. It is also dynamic and depends on both the user and the environment.

Considering information accessibility on a web page from the above arguments, it depends on how many of the features on the web page are accessible. But mere crossing of the accessibility threshold clearly has no meaning. Usability of those features is also very important. To illustrate, a piece of text is inaccessible if it is presented on the web page as a scanned image. Making it available in text form makes it accessible. Providing more information about how the text is laid out increases its usability.

Participant P17 provided some more incisive viewpoints about accessibility and usability, which are self-explanatory.
Accessibility is a descriptive term and not a prescriptive term. You cannot say, "Here’s what the dictionary says accessibility is" because that’s not how it works. Accessibility is so tied up with usability that the definition has to be drawn out from a broader base. Earlier I saw usability and accessibility as similar and related, overlapping in a way, but now how I see them is that accessibility is making sure there’s actually no technological barrier to an individual in accessing the information and usability is making sure the site is usable for everyone.

Looking at the way that you actually have to think about usability from the perspective of someone who can see and the way you have to think about usability from the perspective of someone who has a disability, and engineering a site to have usability—usability is more tightly tied to accessibility than maybe what I thought before. Because you can’t be like, "Well, the accessibility guy just went through the site and now we know that there is no barriers and now we will have the usability guy go through the site..." No, because the things that make a site usable, or more easily usable, to someone who, for instance, can see the site, or who doesn’t need to just use keyboard navigation, those things overlap with, but are not exactly the same as what makes a site more usable for somebody who is using a screen reader or is a keyboard-only user. And you can have the same site usable to both groups. But usability needs to be addressed from a non-disabled perspective to correct all of the usability errors that might be there, but then it also needs to be addressed from an accessibility perspective.

For instance, advertisements; say you have ten Google ads down the left hand side of a page. As a sighted user if you look at the web page it is not a usability problem, because you just look to the centre of the page and you don’t even look at the ads. For a screen reader user, technology exists to arrow down past all those ads to get to the information and literally there is no accessibility problem. But that is going to be a barrier for screen reader users and they are going to say, "I’m not even going to bother spending any time on this site because even though technically I can access the information it takes me forever to get to the information I want to read." So that way accessibility and usability, which some people try to separate into two buckets, actually are the same thing in some situations. (P17)

Having discussed some nuances of accessibility and usability with respect to online information interactions using a screen reader, I will adopt the following operational definition of online information accessibility and proceed to show its dynamic, multidimensional and contextual nature:

Online information accessibility with respect to a web page for screen reader users is the degree to which they can seek/evaluate/use/share information in the course of an online information interaction.

The degree of accessibility of online information on a web page is prone to keep changing because web content keeps changing, and websites also frequently change their layout.
and design. Participant P23 expresses this as follows: "Something is accessible and you think it will remain accessible, and all of a sudden it becomes inaccessible tomorrow. So, you know, things are not moving in the same direction; things change."

There could also be a change in any of the multitude of technologies that go to make up the web page, as participant P34 points out.

> Technology changes from day to day, right? Sometimes you have something that is accessible and working very well, but then they come out with a new version or something else and it could totally throw you off until JAWS comes up with something to fix it. Ya (laughs). (P34)

All such changes mean that the information that the web page makes available to the user keeps changing. Apart from such changes happening on the Web, even the same web content might be perceived by different users as being accessible (or inaccessible) to different degrees, depending on how each one interacts with it using their screen reader, which in turn might depend on their level of online interaction proficiency. A user’s perception about online information accessibility also changes with their level of experience with the Web and their familiarity with the website they are using. The browser, the computer, and the quality of connectivity to the Internet might also play a part. Since most of these things are prone to changing, including the design of the web page, users’ perceptions about accessibility are also subject to change. Online information accessibility, in this sense, is a dynamic, contextual, multidimensional concept.

### 5.4 Dimensions of Online Information Accessibility

Earlier discussions about the screen reader in this document have indicated its capabilities and limitations, such as its ability to read only text. It was also seen that the web pages need to provide meta-information about visual/spatial elements in textual form to the screen reader. In the previous chapter, online interaction proficiency of the user was seen as a variant across screen reader users. Based on these points, this section will be examining the effectiveness of screen reader mediation of online information interaction along the following three dimensions:

1. Screen reader capabilities/limitations
2. Web design and meta-information provided
3. User proficiency in online interaction
Each of these is considered in greater detail in the next three subsections.

5.4.1 Screen Reader Capabilities/Limitations

To facilitate better understanding of the discussions that follow about the functioning of the screen reader, two screen shots are presented below of the home page of the website http://commcent.org. During the hands-on sessions, this website was used for practicing the think-aloud technique before commencing the online activities. The first screen shot (Figure 5.1) shows the visual rendering of the page by the Firefox browser. The second screen shot (Figure 5.2) shows a snippet from the output for the page through the Fangs41 screen reader emulator, which gives the text that would be heard when the web page is accessed through the JAWS screen reader.

![Screen shot of the web page http://commcent.org/](http://www.community-centre.org/)

Figure 5.1. Screen shot of the web page http://commcent.org/

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41 The Fangs screen reader emulator creates a textual representation of a web page similar to that of a page read by a modern screen reader. (http://www.standards-schmstandards.com/projects/fangs (last accessed May 4, 2010). Other similar outputs in this document were also generated using the Fangs screen reader emulator.)
From Figures 5.1 and 5.2, the following characteristics of a screen reader output can be inferred:

- It consists of a serial stream of text.
- Graphic elements are indicated by the word *Graphic* followed by a text description.
- The order in which the user receives the content is fixed, unlike visual access, where the user freely moves around in any desired order across the page.
- Some extra information is made available to the user about structural features of the page such as links, headings, lists, etc.

Informational resources on the Web are primarily designed for visual interaction through a browser. The screen reader allows web users who are blind or visually impaired to interact with these online resources by mediating the users’ interaction with the browser and converting visual information into audio or tactile form. Through this mediation the screen reader enables users to access what might have otherwise proved inaccessible due to their inability to interact with information in visual form. However, the screen reader can only read text and cannot, by default, interpret visual elements like images. This is because the underlying technologies are only capable of converting digital information in text form into audio form. Further, the screen reader can only provide the web content in a serialized, linear manner and cannot convey the visual/special features of the web page layout directly.
To interact with a computer, the user must perceive the output from the computer and provide input to the computer. Visual interaction with the computer screen happens in two ways: by way of perceiving the output from the computer that is displayed visually on the screen and by way of providing input to the computer using a mouse. The screen reader enables its users to partially perceive the output that shows up on the screen (since it conveys only text to the user) through a process of serial navigation, aided by keyboard manipulation and some shortcut keys that improve speed by enabling quick jumps. Any (nontext) visual item, such as a button or a picture, must be marked up with a text description in the web page code for the screen reader to convey information about it to the user. Information about (nontext) visual items that are not marked up is not available to the user. This is as far as perceiving computer output goes. When providing input to the computer, the screen reader does not itself enable the user to provide inputs on the screen. It can only inform the user about the presence of control elements (such as an interface button) on the screen that require input, and their attributes (such as the label OK). The screen reader allows simulation of mouse operations using the keyboard. For actually making the inputs, the user has to use the keyboard. Therefore, the control elements must be designed to be reachable using the keyboard.

Two aspects underlying all user interactions with online information are orientation/navigation within/across websites/web pages and location/interpretation of relevant web content. Interpretation is the process of making sense of the elements of the web content. As already noted earlier in this dissertation, website and web content are two views (structural and semantic) of the same entity, like two sides of the same coin. Likewise, navigation and interpretation also form an inseparable pair of intertwined activities. To navigate, the user has to interpret the web elements that make up the web content. To interpret the content, the user has to navigate. The distinction is used only to make a discussion about online information interactions simpler.

All the participants in the hands-on session used the JAWS screen reader. Therefore, specific details about its working are presented here. JAWS works with the browser (such as Internet Explorer) in three modes: the Virtual PC Cursor mode, the Forms mode, and the PC Cursor mode, which are explained below.
JAWS Interaction Modes

Upon opening a web page using the browser, JAWS typically take a snapshot of the page (actually a copy of the DOM\textsuperscript{42} —Document Object Model—of the HTML document), and places the contents in a virtual buffer that is linear and textual to allow the user to interact with the contents. This buffer is not visible on the computer screen. The mode in which JAWS allows users to interact with the virtual buffer is referred to as Virtual PC Cursor mode. Virtual PC Cursor mode is enabled by default when viewing HTML documents in supported applications such as Internet Explorer and Firefox. Using a set of keystroke commands (such as "h" to go to the next heading or the down arrow key to go to the next line) the user navigates the buffer. In this mode, the user has access to the HTML elements and their attributes (such as alt-text for images). This provides an easy way for the user to interact with HTML content of web pages. Refreshing the virtual buffer by pressing Insert+Escape reflects changes that happened to the web page.

However, when a screen reader user attempts to enter data in a form on the web page, he has to come out of the virtual buffer into the JAWS Forms mode, or else the keystrokes made will be used to interact with the buffer, rather than to supply input to the form fields. Upon encountering an edit field, the user presses the Enter key. This puts JAWS in Forms mode and allows the user to interact directly with the form element. When JAWS is in the Forms mode, the user cannot use the virtual buffer. But they can navigate through to focusable elements using the Tab key or use the ReadAll function to read the page contents. After the form interaction is completed, the user presses the Plus key on the Numpad, which returns control of the active Jaws cursor to the virtual cursor.

Some form control types such as combo boxes require additional effort from the user in switching back and forth between the two modes, as illustrated by the quote below:

I guess combo boxes are a bit tricky. Sometimes, in particular with Facebook, when you are trying to use a combo box, you are often in Forms mode and one of the problems that comes up is that you can’t read through the various options.

\textsuperscript{42} The Document Object Model is a platform-and-language-neutral interface that will allow programs and scripts to dynamically access and update the content, structure, and style of documents. \url{http://www.w3.org/DOM/} (last accessed May 10 2010).
You have to disengage from the Forms mode to go back and check the options available, then re-engage Forms mode to pick the next option. But little things like that could get very frustrating. (P51)

A third mode for using JAWS is the PC Cursor mode. This is similar to the Forms mode in that it doesn't use the virtual buffer. In this mode, the user interacts directly with applications. In this mode, the user usually interacts with desktop applications. Similarly, using this mode the user can interact with Rich Internet Applications (web applications that have many of the characteristics of desktop applications). However, it is not intuitive for screen reader users to think of using the PC Cursor mode when they are on the Web.

In summary, the screen reader is an indispensable tool for people who are blind or visually impaired because it makes access to online information possible for them. One limitation of the screen reader is that it can only provide a serial text output to the user. Therefore, non-text elements (such as images, graphics, animation, etc.) need to be marked up with textual descriptions. In other words, the web page code has to contain text alternatives for all non-text elements on the web page. For navigating a web page with the screen reader, the navigation controls (such as buttons and menus) need to be designed to be operable with the keyboard. Information access is necessarily sequential, unless a page is tagged appropriately to indicate tables, headings, lists, etc., in which case users could jump to them using quick keys. Navigation is necessarily serial, item by item, and there is no parallel intake of information as happens during visual interaction. Finally, there is no way to filter, sort, or manage information through a screen reader, as it provides a temporal flow of information to the user.

5.4.2 Web Design and Meta-Information

The mediation performed by the screen reader is essentially for conveying visually represented information on web pages in audio and/or tactile modalities. Text represented visually is conveyed with the least effort because there are established techniques for the automatic conversion of digital text into audio and tactile forms. However, techniques for automatic conversion of non-text visual elements such as images, graphics, animation, etc., into other modalities do not yet exist, and the screen reader therefore depends on text descriptions being provided for these elements as part of the web page code. Navigation within and across web pages and interpretation of web content by screen reader users depend on the level to which such text descriptions are provided by websites. These descriptions are important because visual
elements might provide navigational cues such as an image map with clickable hotspots, or they might assist in interpretation and provide credibility cues such as an image of the Verisign logo. While text descriptions might help screen reader users to perceive these cues, wherever physical action is required for these cues to be acted upon (as with image maps), the same needs to be made possible through use of the keyboard (in place of the mouse). This, again, depends on how the web page is designed and coded.

Participant P51 explained her notion of web accessibility in terms of simplicity, ease of navigation, and familiarity of websites.

Web accessibility for me is basically [the] website being accessible to the screen reader. I should be able to navigate it efficiently to get to the information I want. Having too many headings, having too many lists, having too many links, having too many edit boxes, also make websites inaccessible because then you are overwhelmed. As a screen reader user, you need things to be kept simple. Contrast Facebook with the CNIB website. (P51)

Besides text alternatives for visual objects, information about the visual/spatial layout of content and its attributes need to be conveyed by web pages through their code. Coding of web pages is usually done using the hypertext markup language (HTML). This is primarily a descriptive language. Using appropriate markup tags can add meaning, or semantic value, to web pages about the layout of content or their attributes. Semantic meta-information provided by the website consists of use of appropriate HTML tags for different types of content such as headings, quotations, lists, emphasis, paragraphs, tables, etc. Some examples of HTML tags are

- Heading tags (h1, h2, ..., h6)
- Quotation tag (blockquote)
- List tags (ul/ol/dl)
- Emphasis tag (em)

Using appropriate HTML tags allows the screen reader to treat different groups of text differently. Screen readers users can get the summary of a web page by reading out all the headings on the page.

Yet another disparity between the dynamics of viewing a web page visually versus through a screen reader concerns the layout of web content. Modern design techniques allow the
visual positioning of content to be different from the positioning of the content within the source code. Through the use of techniques like Cascading Style Sheets (CSS), it is possible to achieve a visual layout that is different from the ordering in the HTML code. This increases the disparity between the interpretations that the visual/spatial layout of content on the screen affords and that afforded by the serial view in the order of the source code that the screen reader affords.

As Internet users, we rely on preconceived notions of how web pages operate. If some web pages do not provide enough meta-information, screen reader users might find their past navigational experience unhelpful in obtaining similar results. One of the participants, who was unable to get to the text portion of a website after repeated attempts, remarked the following:

P34: See that’s another problem; like, right now I wasn’t sure I used the right way.

Interviewer: So, what did you do? Which keys did you press?

P34: Oh, I kept hitting "n" because usually that should take you to the text.

Web users usually rely on preconceived notions of how the content on a web page is ordered. To navigate effectively through the web pages they traverse, users must quickly form mental maps of the ordering of content on those pages. This is especially important for screen reader users because they cannot take advantage of the visual arrangement of content on web pages. JAWS parses web pages in a linear manner, in the order of the DOM of the web page.

In summary, screen reader users depend on meta-information provided by websites for interpreting non-text elements and for effective navigation. Websites must also design all interaction points navigable using a keyboard.

5.4.3 User’s Online Interaction Proficiency

In the previous chapter, the concept of online interaction proficiency was derived from data collected from the interview participants. It was also mentioned that online interactions of the participants could be studied from the perspective of high, intermediate, and low proficiency through the use of three personas created for this purpose. Analysis of participants’ remarks about accessibility of websites from this perspective showed that these don't objectively reflect the state of the websites their remarks refer to. How trained/experienced/comfortable they are with their screen reader and whether they know all the options/settings_COMMANDS available in
their screen reader to optimize their experience on the web are important factors that determine their perception of accessibility. How current their screen reader is and whether that version can take advantage of the accessible design features put in place on websites also matters.

Four scenarios provided below around (a) navigating new websites, (b) finding the current location, (c) determining the structure and (d) obtaining an overview illustrate how the level of users’ online proficiency results in different experiences during the same activity. The three personas, Holly, Mina, and Laura, are featured in these scenarios to highlight differences arising from interaction proficiency.

Scenario 1: Navigating new websites

Holly examines a new web page to first determine what meta-information the web page provides for easy navigation and interpretation. She also uses a variety of methods to approach new web pages.

Holly: The first thing I will do with a new web page is to examine it. I might go section by section by pressing “n” to get an idea of what is where. Often I don’t read the full line. Or if JAWS says there are headings, then I might look at the list of headings with Insert+F6 and figure out if I want to go to any of them. Insert+F7 gives the list of links. Those two are very handy.

Mina is careful enough to explore the complete web page, but on new web pages she primarily steps down line by line. Or she skips portions of the content for the sake of speed.

Mina: I do Ctrl+Home to be sure I am at the top. Then I use the down arrow to explore line by line. When I get impatient, I use “n” to make these big jumps from section to section.

Laura, by default, prefers to listen to each page completely, line by line. Or she simply checks the links, which do not provide a complete idea of the page content. At her speed, she is unable to cover much content.

Laura: When I go to a new web page I try to listen to the whole page from the beginning to end to get a good overview of what is on the page. That takes a lot of time. I sometimes check the links list using the Insert+F7 JAWS shortcut.
Scenario 2: Finding the current location

Three different replies received to the question, “How do you know where you are on a web page?” are presented below.

Holly was truly concerned about orientation on web pages and how JAWS makes it difficult for her to know where she is except through headings.

Holly: See, that’s the problem. Especially if there are no headings, you really have no idea where you are in the web page and you have no idea what sections are there. I could be looking at a list of links and I don’t know if it is in the main section or the navigation section. So, it is very hard in JAWS to tell where you are without proper markup.

Mina was not concerned much about knowing where she was on a page at any time. The focus was on zooming in on what she wanted and leaving the page.

Mina: I don’t try to find out where I am on a web page. I am very information-focused. I don’t care if that information is on the top left-hand side or bottom right-hand side so long as I can get to it and I can get to it quickly. For me it is all about being efficient and trying to find what I need to find. It is the information that counts. I don’t care where I am in a web page so long as I can track down what I want.

Laura was unaware that links cannot provide much information about orientation on web pages, nor was she concerned about knowing her current location on a page at any time.

Laura: To know my current location on a web page, I just look at the links and see which one I am at, and just use it. And if not, I just don’t worry about it.

Scenario 3: Determining the structure

When asked about how they try to determine the structure of a web page, Holly, Mina, and Laura exhibited a range of attitudes and awareness similar to those about orientation.

Holly: If a page is marked up nicely with headings and sub headings, I can tell where I am pretty easily by using the h key. It tells me how the content is laid out. I check the layout of the page by using Insert+F1. JAWS says how many links, landmarks, headings, and forms are present on the page. This gives an idea of what is on the page. It tells me if it is marked up. So if it has headings, then I can use the commands. If it is not that structured, I just have to use the up and down arrow keys to scan through.
Mina: When I go on a website I basically try to get the information. I don’t try to
determine the structure of web pages. I just start using it. I don’t care how the
page is set up. I usually visit a website with a view to find some information and
not to know what is on the entire page because it is not necessary.

Laura: Honestly, I don’t think about the structure of web pages, whatever it is. I
just go straight down link by link and listen to it.

**Scenario 4: Obtaining an overview**

When getting an overview of a web page, all three had their own strategies. Holly was
very focused and knew precisely what to do, while Mina was not sure what obtaining an
overview was all about. Laura’s method of reading the whole page line by line or using the list of
links revealed that her repertoire of commands was limited to those fundamental commands.

Holly: Headings give me an overview of the content, and how the content is laid
out. I skim the headings with the "h" key and paragraphs with Control +"down
arrow."

Mina: With Ctrl+Home I ensure I am at the top of the page. Then I go down link
by link with TAB. I also use “n” and h a lot on websites. Depends on what you
want and what is there. I use the virtual Find on the page. Often when you are
looking for things Find is a heaven-send [sic]. Before I learnt Find, I was going
scrolling down from top.

Laura: To obtain an overview of the information I read through the whole thing.
Or I just press the TAB to go from link to link and getting a feel for what’s there.
Sometimes I check the links list, pick a link and browse it.

The purpose of including the above scenarios is to highlight that besides the
capabilities/limitations of the screen reader and the design of the website, the user’s level of
online interaction proficiency also plays a part in the online information accessibility
experienced by them, which in turn affects the credibility perception because navigation of
websites and interpretation of web content are vital to credibility perception. This point has to be
kept in mind while considering further discussions in this chapter about screen reader-mediated
online information interactions.

5.5 **Screen Reader Mediation of Online Information Interactions**

Based on data gathered about accessibility, this section examines the role of the screen
reader in mediating online information interactions. Two fundamental sets of activities involved
in making sense of online information, viz., orientation/navigation within and across web pages
and location/interpretation of relevant web content on a web page are the focus of the examination. Some key web elements that impact these activities, as reported by the participants, are explained below. Orientation/navigation will be discussed with reference to text links, image maps and hotspots, dynamic menus, buttons, forms, CAPTCHA,\(^43\) and site maps. Location/interpretation of web content will be discussed with reference to text organization, images/graphics, Flash animation, scanned PDF files, automatic page refresh, website search, and page search. These factors were identified through analysis of participant responses about website accessibility.

### 5.5.1 Orientation/Navigation Within and Across Websites/Web Pages

Orientation/navigation typically involves going to different parts of the same web page or to different web pages on the same website or on another website. Participants expressed their concerns about navigation in the following ways. Participant P09 feels that “Better accessibility would greatly improve the general navigation experience.” According to participant P52, “[A website is accessible if] things are organized relatively uncluttered, is easily navigated and all functions of the website are accessible.” Participant P21 has the following specifications for an accessible website: “1. Should be quick to go through to find what is needed. 2. Less hassle in the input fields. 3. Provides sufficient description of image contents.” P52 defines poorly accessible websites as “…overly cluttered and content may require more work to obtain information than need be. Links are not accessible or apparent with text tags that describe their function. Also some functions are not available with speech access, example mychoice.ca forums.” Participant P53 does not trust some websites because they are “…too crowded with text and links. None of them contain any accessibility options. They are all difficult to navigate.”

Orientation/navigation will be discussed with reference to the following elements repeatedly mentioned by participants:

1. text links
2. image maps and hotspots

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\(^43\) CAPTCHA stands for Completely Automated Turing test to tell Computers and Humans Apart; it is a technique of access control where the user has to type in the characters provided in the form of a squiggly image into a text box to gain access to protected resources.
3. dynamic menus
4. buttons
5. forms
6. CAPTCHA
7. site maps

1. Text links

Text links without meaningful labels make it hard for screen reader users to decide whether they should follow them or not. While links are visually set off using colour and underlining, JAWS users recognize a link when JAWS says "link" before it reads out a link. If it is a link already visited by the user, it says "visited link." Users can use the short cut key "v" to cycle through the visited links. Using the TAB key takes the user from one link to the next. Pressing the Insert key and the Function key F7 together (Insert+F7) brings up a list of all the links on the current web page. This feature is used often to quickly read through the list and get an idea of the links on the page, as well to quickly move to a link on the list and invoke it, thus directly reaching that section of the content. When the links are read out in the list, they appear out of their context. Because of this, the label used for links needs to be meaningful. Visually, the context of the link is derivable from the content around it, and this indicates where the link will lead. But when viewed out of context in the links list, cryptic link labels such as "click here" or "more" are not helpful to JAWS users and could be a source of irritation because they might have to follow each link to know where it is leading or to read through the whole page to get the context. Eight participants\(^4\) wrote about problems encountered with unlabelled links.

2. Image maps and hotspots

The screen reader restricts the user’s ability to navigate websites where image-based navigation elements (such as image maps and hotspots) are not provided with text labels. When links are implemented through image maps or hotspots, parts of an image are marked with different links that can be activated using a mouse. On such image maps, the links—and even

\(^4\) (P03, P07, P13, P23, P25, P31, P50, and P52)
their meanings—might be discernable visually, even without text labels, (like a human anatomy image map leading to information about different body parts reachable by activating the respective body part in that image). However, unless each of these links is provided with an appropriate description in text, a screen reader will not be able to alert the user to their presence. In other words, for the screen reader to interpret the image map, which is a visual design element, text alternatives must be provided.

The same holds true for other control elements that are visually depicted, such as buttons, and tab pages; only then will screen reader users know they exist. Another aspect of such types of controls, which typically require mouse action, is that they should be designed to be operable using a keyboard. Only then will screen reader users be able to activate them and reach the information those controls lead to. Image maps and other visual control elements thus constitute a potential block to all further navigation if they are themselves inaccessible to the screen reader user. The implications this holds for information interaction is obvious. The possibility of user frustration from knowing that they are missing something also exists. Their ability to assess the website is also reduced, as expressed by participant P38, who says, “Due to the limitation of JAWS, sometimes it is very difficult to navigate websites. Cannot determine really how trustworthy websites are.”

Eight participants wrote about images and image maps used as links. Participant P30 said that on some websites (she couldn’t remember the names) all the links are just images with no labels. JAWS just goes, “image, image, image, image…” and there is nothing to read. She finds it frustrating and avoids them because they are simply unusable. In her opinion, smaller businesses don’t invest in a really well-structured website; restaurant websites are usually image-based.

3. Dynamic menus

Created using technologies such as Flash and Javascript, these menus usually unfold on mouse-over (when the mouse is hovered over the menu). A screen reader user cannot navigate into these menus unless they are designed to also be keyboard operable. This directly affects the

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45 (P09, P13, P14, P19, P32, P55, and P56)
ability of the user to navigate the website. Navigation of websites and interpretation of content might be difficult if all actions cannot be performed using the keyboard. Participant P19 feels that “Websites that use a lot of Flash, hotspots and mouse rollovers are real problem sites.” Seven\(^{46}\) participants mentioned difficulties with dynamic menus on websites.

4. Buttons

Visual controls such as buttons and tabbed pages have to be made keyboard accessible. Six participants\(^{47}\) mentioned difficulties they faced with these elements that made certain websites inaccessible for them. Unless buttons have a text label and are operable with the keyboard, the functionality is not available to the screen reader users. Further, designers often use images to serve as buttons on the web.

5. Forms

Forms that don’t have labels associated with their input fields could be confusing when linearized. Six participants expressed their difficulties with navigating online forms.\(^{48}\) When linearized, the form will have field narrations on either side of most fields, and users might not know which label is associated with which field. If labels are provided, the user hears an output as given below:

- "Edit: First Name"
- "Edit: Last Name"
- "Edit: Title"
- "Edit: Sex"

When labels are not provided, all that the user can hear is "Edit, Edit, Edit, Edit," and they do not know which data goes where.

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\(^{46}\) (P03, P09, P31, P32, P45, P48, and P50)

\(^{47}\) (P03, P09, P13, P25, and P50)

\(^{48}\) (P09, P17, P21, P25, P34, and P50)
6. CAPTCHA

Visual CAPTCHAs are a set of squiggly characters presented as an image that the user is expected to decipher and enter into the text input box provided. This is ostensibly to distinguish humans from malicious programs or bots so that the latter can be stopped from navigating further into the website or web page. Visual CAPTCHAs also block screen reader users. Obviously, providing the CAPTCHAs with alt-text is self-defeating, and without a text description, the screen reader cannot convey what the image means. CAPTCHAs are often used to guard access to email programs and commenting feature of blogs.

Ten participants\(^{49}\) expressed their frustration over the visual verification method (CAPTCHA) used on several websites and considered these websites as low in accessibility. Participant P03 was aware of alternative ways in which CAPTCHAs are implemented, such as through audio clues and logical questions. Yet, in her opinion, even such alternatives were not always accessible: “And, of course CAPTCHA; now there are more and more alternatives but still CAPTCHA is like ugh … because you might be lucky in that you might understand all your CAPTCHA right away, but again, you might not.” Because of visual CAPTCHAs on some blogs to guard against spam comments, Participant P30 is unable to offer her comment on such blogs, even though she frequently wants to participate in those conversations.

7. Site maps

Navigational aids, such as the site map, do not provide a sense of their intended purpose when mediated by a screen reader. A site map is experienced through the screen reader as a lengthy list of all possible links on a website. JAWS users usually access it through Insert+F7 on the site map page. The hierarchy of links is not experienced by the user because Insert+F7 gives an alphabetical list of links on the page and because the page is usually not browsed through line by line. The mental map participant P03 has of a site map reveals this point:

*Interviewer: Could you tell me how you obtain an overview of the information on a website?*

P03: Using headings and paragraphs, I skim. If there is a site map I use it.

\(^{49}\) (P01, P05, P17, P18, P30, P31, P46, P51, P53, and P55)
Interviewer: So, the site map gives you the structure of the website.

P03: But it is equivalent to the links—the list of links, I guess they are different, but I began thinking like that and have not changed.

Many other participants also thought that the site map is a long list of links. Participant P19 said, “I could go to the site map to get an overview of the site, but those tend to be very long lists of links.” Participant P21 likes site maps. He said, “If I could not find what I want with links list, then I go to site map and do the links list. Then I get a list of A to Z links.” And Participant P05 felt that site maps can sometimes be quite useful because “everything is laid out in links and that can be really useful.”

Participant P19 used site maps innovatively to search for information on websites as follows:

Well, I use site map sometimes. If I know there is a particular thing I am looking for, say "employment" on the CNIB site, I will go to the site map and search for it with JAWS Ctrl+F because it is very tedious to follow the links to look for things from one page to another. (P19)

Participant P30 also used a similar trick:

I do [use the site map] if it is a really large website. To give you an example, on the Air Canada website, I know they have a section for People with Disabilities and Accessibility. When I first went to the website I did a JAWS find for disabilities and it didn’t come up so I went to the sitemap and then did a find for disabilities and it came up. So that’s a really quick way for me to zero in on what I am looking for because otherwise the website is huge. I do this a lot on university websites, which tend to be really large too. (P30)

Some participants just did not look for or use site maps. “I don’t usually look for sitemap,” said participant P51. “Honestly, no.” said participant P23. Participant P34 also said, “I’ve never heard about site map. I’m not familiar with that.” Participant P38 felt this was due to lack of training: “I usually don’t use a site map because, honestly, I think ‘probably this is visual.’ In order for things like site map to be used, people should be made aware that they exist.” Participant P33 had “heard of sitemap but not used one any time.” If meta-information about site maps is provided appropriately to screen reader users, it might prove useful to them in orientating themselves on websites.
In summary, this subsection provided a glimpse of problems faced by screen reader users in orientation and navigation on websites/pages. The next subsection examines location and interpretation of content within web pages.

5.5.2 Location/Interpretation of Relevant Web Content

For viewing web page contents, screen reader users mostly use the down arrow (and up arrow) to move down (or up) through a web page line by line. JAWS will then read out each line and wait for the next key press to start reading the next line. Sometimes users do not wait to completely hear the line. Instead they quickly move from line to line, hearing only the first few words until they reach a point where they want to hear the whole line. A quicker way of moving through the page serially is to use the arrow keys in conjunction with the Control key, which helps the user to hear paragraph by paragraph. Listening to the first few words or lines of each paragraph is another way users skim through the content to explore what is available on the page. Another commonly used shortcut key provided by JAWS is the "n" key, which takes the user to the next nonlink text on the page. These usually happen to be sections of text and so, repeatedly pressing the "n" key helps the user to step quickly through the page contents.

Location/interpretation of content will be discussed with reference to the following:

1. text organization
2. images/graphics
3. Flash animation
4. scanned PDF files
5. automatic page refresh
6. website search
7. web page search

1. Text organization

Neat formatting of content using headings and spacing is reported to enhance the credibility of web content (Fogg et al., 2001). Such visual/spatial layout makes it easier for web users to navigate the content visually and quickly jump to different sections, besides being able to make sense of the content easily by looking at the hierarchy of the sections. When styling is
used for organization of text, unless it is done using heading markups, the style information is
not available to screen reader users. If heading styles are used for formatting instead of font
styles, the style information can be coded into the web pages using heading level markup
attributes. This helps the screen reader user to navigate easily through the headings and jump
randomly to any section.

So this page is good because it has got the headings and it has the list to
subcategorize all the links. Easy to know what information belongs where. So that
makes it more usable; because it is not frustrating. I can very quickly tell what is
on the page without going up and down. Otherwise, if it doesn’t have headings
and markups, I have to use the arrow key and scan up and down the page, which
takes a lot of time. (P19)

Three participants\(^{50}\) reported websites not providing headings as low in accessibility,
while nine participants\(^{51}\) reported websites providing good headings as highly accessible. Earlier
studies with screen reader users have found that headings help both screen reader users and
sighted users in navigation (Watanabe, 2007).

In the absence of heading information, the user will have to read through the entire
content serially from top to bottom. In the course of normal usage, screen reader users do not set
JAWS to articulate the size and other font attributes as well as spacing of text on the page, as it
gets too laborious to listen to.

2. Images/graphics

Images/graphics are used liberally on websites, and they are mostly useful in making
sense of web content. Logos of certifiers, security providers, authorities, etc., are used to enhance
a website’s credibility. When screen reader users encounter text descriptions for
images/graphics, they are in a better position to understand the content. Frustration experienced
by screen reader users on the Web often results from a lack of alternative text for nontext objects.

\(^{50}\) (P12, P17, and P22)

\(^{51}\) (P3, P12, P13, P14, P17, P22, P47, P51, and P55)
Eleven participants\textsuperscript{52} mentioned how difficult/frustrating websites proved to be when there was no or not enough description about images.

3. Flash content

Sixteen participants\textsuperscript{53} expressed their problems with using websites that used Flash-based content. In response to a survey question about when they would consider online information to be of good quality, participant P39 wrote, “If it doesn’t have to do with PDF and [F]lash.” Flash is known to cause accessibility problems if it is not implemented well.\textsuperscript{54} In response to the interview question, “Do you know when you come across Flash?” participant P23 said, “Yes, JAWS tells me ‘Flash … something’. I don’t even know what it is about. But, if I can still use the website, you see, I don’t care.” Participant P31 said, “I find it difficult to navigate if it is a Flash site that hasn’t been made accessible.”

4. Scanned PDF files

Six participants\textsuperscript{55} wrote about inaccessibility of content made available on websites in PDF (portable document format) files. When documents are scanned as images and converted into PDF files, these are not readable by the screen reader. Downloadable content provided in the form of scanned PDF files thus frustrates users. Sometimes PDF files load automatically from web pages without alerting the user. Some participants had strong reactions to PDF files, such as participant P41, who said, “No matter how accessible a PDF document can become, it is always necessary to post an alternative document along with it, preferably HTML. Many of us won’t touch a PDF with a ten-foot pole.”

\textsuperscript{52} (P8, P9, P11, P13, P17, P21, P23, P31, P32, P50, and P60)
\textsuperscript{53} (P3, P5, P8, P9, P13, P15, P16, P19, P20, P26, P31, P40, P41, P45, P50, and P57)
\textsuperscript{54} A survey of over 1,000 screen reader users conducted during December 2008–January 2009 by WebAIM, a nonprofit organization within the Center for Persons with Disabilities at Utah State University in U.S.A., found that 71.5% of screen reader users reported that accessing Flash-based content is difficult, while only 14.2% reported it as being easy.
\textsuperscript{55} (P1, P17, P31, P33, P50, and P60)
5. Automatic page refresh

Five participants\(^{56}\) wrote about their experiences with newer technologies on the Web that make the content refresh automatically in some locations on the screen. This made using the screen reader very difficult for them because they were not aware of the changes that were taking place, which a visual user could easily detect through peripheral vision. Participant P03 had the following to say about her frustrating experiences with the Forbes.com website, where automatic page refresh prevented her from reading her favorite stories.

One website that I would like to use but that is very difficult is Forbes.com. When you want to read the articles, some of them … let’s say an article is broken in ten little pieces, the stupid website keeps refreshing itself. It assumes how fast you’re going to read it. And it is so frustrating because their stories are interesting. (P03).

Two more scenarios are presented in the form of conversations with participants P05 and P34:

P05: If the data keeps changing then that can throw up [sic] your JAWS. There’s a couple of sites that do that to me.

*Interviewer:* CBC?

P05: No, generally CBC is nice to me. They do refresh once in a while but it is not so jarring. The only time you lose your place is when you leave it for a while and it refreshes. But if you are moving already when it refreshes, then you keep your spot.

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*Interviewer:* Sometimes when you are reading a web page, does it start reading all over again?

P34: Ya, because the page reloads, right, and that could be annoying.

*Interviewer:* Has that happened to you?

P34: Oh, so many times.

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\(^{56}\) (P5, P6, P15, P19, and P31)
Interviewer: Which kind of websites?

P34: It could be any website. Sometimes I would be on Facebook (laughs) and, like, I’m in the middle of this page or trying to find something out or whatever, and all of a sudden I would go back all the way to the top of the page.

6. Website search

The website search box, user sign–in, and all other data input points are not usable with the screen reader unless they are keyboard operable and all the fields have meaningful labels. At the same time, even if they are usable, the extent to which they are put to use might depend on the user’s knowledge about them. This is illustrated by the answers provided below in response to the interview question, “Do you look for the website search box when you get to a website?” While Holly and Mina both use this feature, their level of understanding about it differs. Laura, on the other hand, does not even know that such a feature exists.

Holly: But that’s only if you are trying to look for a particular information. If I am trying to look for a particular word that I know is on the website, then I will search for it. Not all sites have a website search box, though. A lot of times the search function searches the web and not the site.

Mina: Yes. I get to the website search box by e (for edit box) or it might be a link. Or I use the Ctrl+F again to find the search box. Especially on a store website, I get to the search box through find and then put in what I am searching for rather than going through all the layers, which could be time consuming.

Laura: I don’t know about website search. I use the search box on Google but haven’t used it on other websites

7. Web page search

A feature similar to website search is the web page search. This allows the user to search for terms within a web page. Laura does not know that such a feature exists. Mina, who is very fond of getting quickly to the required information, frequently uses the command Ctrl+F to search the page. This is a command at the level of the browser that can be used even by those who do not use a screen reader. Holly, in a more proficient manner, uses the JAWS command Insert+Ctrl+F to search the JAWS buffer. In her search, this includes not just what the page contains, but also the meta-information provided by the web page such as alt-texts.

In summary, orientation/navigation of websites and web pages, as well as location/interpretation of web content, are important for making sense of online information. The
ability to navigate effectively also impacts the context a user gets for interpretation. Users like Holly and Mina, who are adept at using navigation quick keys that allow them to skim over the contents of web pages, have a better idea of the context of the information they choose to use from that page than they would get by viewing it in isolation. This is helpful in evaluating the information. As Mina remarked, “When you look at other aspects of the website, it is easier to establish credibility because you can put it in the context of what they are trying to say or do” (P51). Users like Laura, who primarily use links to navigate, might have less sense of the context. Stepping through the content line by line, like Laura might also do, might sometimes indicate the context, but the time taken to go over all the content of a large page might make this method of navigation counterproductive. Online interaction proficiency could thus influence a user’s ability to evaluate online information and thereby influence credibility perception. The next section introduces and discusses the concept of technology opacity, which is a phenomenon inferred from the frequent mention of intervening technologies in the participants’ discourses.

5.6 Technology Opacity

Some of the data presented in the previous section indicate that screen reader users are aware of the technologies underlying their interactions. The names of several technologies such as Flash, PDF, and Javascript were commonly mentioned by the participants and formed a natural part of the discourse about their online interactions. Earlier research with sighted users reports that, while technology impacts credibility decisions, it is often invisible to the end-user (Ivory & Megraw, 2005). This suggests that intervening technologies are much more visible to screen reader users than they might be to sighted web users interacting directly with the browser (that is, without the mediation of a screen reader). In other words, screen reader users experience a higher degree of technology opacity, or are more conscious of the presence of intervening technologies in their online interactions.

Technology opacity could be viewed as a measure of users’ awareness of mediating technologies during a human-computer interaction. Fundamentally, technology opacity occurs because of the manner in which the screen reader articulates the names of underlying technologies while rending information from web pages, such as “Flash movie start,” “Flash movie end,” etc. Nevertheless, it makes every user aware of the intervening technologies, whether they understand how they work or not.
Technology opacity could have several effects. The more visible mediating technologies are, the more likely it is that users will recognize that the information they are accessing is mediated, rather than seamlessly integrated with the system. Users also become aware of the design and presentation aspects instead of experiencing the interaction holistically. When the intervening technologies interfere with the interaction experience, technology opacity provides users with explicit targets to vent their emotions on. Data show that the "visibility" through the screen reader of technologies underlying online interactions also distracts screen reader users from focusing on the information interaction. Some of their energy even goes into managing these technologies.

Furthermore, users’ assumptions about technologies influence how the credibility of the associated information is perceived. Friedman, Kahn and Borning (2006) proposed that the filters, assumptions, biases, and outright distortions that are built into the intervening tools factor into a user's credibility decision. Lankes (2008) opines that most of the studies on how users make credibility decisions have missed considering this point. In my work, screen reader mediation focuses the attention of the users on various technologies that sit between them and the information in a more acute manner than would have been noticeable in studies that focus solely on visual web access. On the one hand, awareness of these technologies might lead to better assessment of information credibility if the user understands their implications, as in participant P19’s opinion about how the comment.org website improved when he heard JAWS announce that it used ARIA.57 On the other hand, such awareness might create unwarranted beliefs that could skew credibility perceptions, as reflected in participant P39's words: “I would consider information to be of good quality if it doesn’t have to do with PDF and Flash.”

Participant P03 had to restart JAWS during the online activities session because JAWS stopped reading. She remarked, “Okay, I am having problems, so I will have to unload JAWS and then restart it. I don’t understand why it is doing that to me, but when I open certain websites which use Flash, JAWS stops reading the website.” Other participants were unaware of the

57 ARIA stands for Accessible Rich Internet Applications—a set of specifications published by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C) for making Rich Internet Applications accessible. Rich Internet Applications are typically web applications that have many of the characteristics of desktop applications.
underlying technologies causing the errors, although they did experience the consequences. When a similar incident happened during participant P51’s session, she said, “Now my JAWS isn’t talking, that happens too. Sometimes Facebook has such complex, complicated pages that it actually really throws the technology off.” Although participant P38 did not have to restart JAWS, she had moments of trouble managing it, when she said, “My JAWS is acting up. It does this sometimes.”

The manner in which several participants provided detailed technical requirements to describe what they looked for while assessing trustworthiness and quality online (as shown by the numerous remarks quoted below) shows the level of technology opacity experienced by them. Participant P21 said, “Regarding the quality, I need them [websites] with appropriate links, headings, input fields, etc. along with sufficient alt. texts.” The reason participant P39 thought Google.com is highly trustworthy is because he thought it is “not fragile; very hardy website; never freezes; flexible; extremely fast.” Participant P44 found most Asian websites poorly trustable for these reasons: “Too many ads, popups, not easily usable.” He further thought that online information is of good quality “when there are not too many links, and all info is on the same website; also less graphics.” Participant P25’s explanation for why she considered certain websites poorly accessible was that “they are full of links and buttons that are not labeled properly to reflect what they contain…. You get lost when entering a link, and they have forms that I am unable to fill out.”

During the interview, further expressions of technology opacity were encountered, possibly because the hands-on sessions put the participants in situations where they would experience them and, therefore, discuss them. Participant P31 was using the Internet Explorer. When he wanted to use ttc.ca, he said, “I am going to launch Firefox now because I know ttc.ca is going to crash my IE.” He added, “I also can’t watch youtube videos with IE.”

After hearing the first few seconds of the http://commcent.org website, participant P19 remarked, “Oh, this one uses ARIA. I should have used Firefox.” He then opened the website with Firefox to take advantage of the ARIA features. When he wanted to open another website but couldn’t, he wondered, “I don’t know what’s going on. I must have hit something.” He soon realized that he was not using the right key combinations. “Oh, see that’s the problem with using Mozilla. It is not Ctrl+O to open.”
When I asked participant P03 how she could make out that a website is using Flash, she said, “The only reason I know there is Flash is because JAWS is saying, ‘Flash movie start.’ And as soon as I hear that I’m like, ‘Okay…’” This remark shows that screen reader users feel some degree of helplessness when faced with a multitude of technologies during their information interaction. Participant P51’s take on Flash is the following:

I get to know that there is flash because JAWS tells me. After that I have to find out if it is accessible or not, like if I can operate it or not. JAWS doesn’t tell whether it is accessible or not. I don’t think JAWS knows that. (P51)

She also feels that “If you have too many colours and too many graphics, it throws JAWS off.”

More experienced users, like participant P05, who uses several types of screen readers with ease, have their own ways of managing technologies. Here are his remarks about Java:

Java can be a little problematic, especially if you are behind in your JAWS like I am right now. Actually I am finding that System Access works better with that kind of stuff than my JAWS version. So if I come across a page that uses Java and JAWS can’t access it, I might try it with System Access or NVDA to see if either of those can work better. Except, with NVDA I’ve fallen behind again. I have to catch up with it. (P05)

Participant P17 shared an interesting anecdote that showed how technology could come between the information and the user, not just for screen reader users but for sighted users as well. He explained how, when his visually impaired friend wanted to change from his PC to a Macintosh computer, the friend’s wife, who is sighted, resisted the change.

My friend wants to switch from a PC to a Mac. His wife won’t let him; because she doesn’t want anything to change. It is not that she cares, but right now when she goes on the Internet, she knows that the technology isn’t between her and her information. She’s been using web browsers on Windows for so long, she just clicks on the icon, starts the search, buys her plane ticket, reads about whatever, and there’s no technology between her and the information. She’s afraid that if they switch over to Mac, then there is going to be technology between her and what she wants to get. Realistically it won’t be all that hard to learn it, but at the beginning it is scary like, “Oh well, I don’t know where to click, I don’t know how to do this. Now, there is technology between the information and me and I have to figure out how to interact with the technology to get to the information.” And for a screen reader user or a keyboard-navigating user, that is the trick. Unless you have a very good website (and there are few examples of a very good website), unless you have a really easily accessible website, as a keyboard or
screen reader user you have to figure out how to interact. How do I open up this drop-down list? How do I do this and that? (P17)

Participant P34 explained how she kept up with changing technologies, even though it was troublesome, because she did not want to be left behind.

P34: I hate the new Microsoft Office. It is so different. I don’t like it but eventually I have to get used to it because that’s how it’s going to stay.

Interviewer: On Vista, are you forced to use Office 2007?

P34: No, you could use old 2003, but the thing is you’re not gonna be stuck on old 2003 for ever because things are changing quickly so you might as well get used to whatever is there right now. So, I’m kinda forcing myself to get used to this right now because I know the future ones that’ll come out are gonna be similar to this.

I would suggest that technology opacity is a general issue for all Internet users. For example, novice users and those with low-capacity Internet connections might also feel the effect of the medium to some extent, such as when encountering unmanageable pop-up messages or while experiencing slow-loading web pages. I would also argue that mediating technologies do play a role in the credibility perception process for all web users, possibly in a less obvious way.

Online experiences of screen reader users are intimately tied to the screen reader and other technologies involved in the interaction. Technology, when it operates smoothly, makes the interface disappear. Possibly because of this, the average web users remain relatively unaware of the computer, operating platform, browser, and various web technologies that mediate their online experience. Screen reader users, on the other hand, are frequently reminded of the underlying technologies and remain acutely aware of them. In their attempt to stay on top, they dialogue with other screen reader users, sharing technology problems and troubleshooting tips. This is shown by the discussions on several email lists dedicated to collaborative technology support, such as blindwebbers, blindcooltech, blindtech, JAWSusers, etc. Forty-two out of 60 participants reported using a total of 88 (nonunique) mailing lists.

5.7 Summary

The importance of understanding the nature of online interactions involving a screen reader for understanding the credibility perception process of its users cannot be
overemphasized. The purpose of devoting a full chapter to online interactions is to emphasize how technology is inextricably tied with the information experiences of screen reader users.

The presentation of information resources on the Web is predominantly geared towards visual interaction through a browser. The screen reader allows web users who are blind or visually impaired to interact with these online resources by converting information available in electronic text form into audio or tactile form. If the nontext elements such as images, graphics, animation, etc., are marked up in the web page code with text descriptions, the screen reader can convey that information to the user. Navigation of websites and interpretation of web content by screen reader users depend on the level to which such text descriptions are provided by websites. These descriptions are important because visual elements might provide navigational cues, assist in interpretation and provide credibility cues, and provide social action cues. Text descriptions might help screen reader users to perceive these cues. And yet, to enable whatever physical action is required for these cues to be acted upon, the same needs to be made possible through use of the keyboard (in place of the mouse).

Screen reader users’ ability to interactively evaluate online information depends on their online interaction proficiency, which is their proficiency in using the screen reader to interact with the Internet. This is bounded by two factors: the affordances\(^58\) (action capabilities) that the screen reader’s interface makes available to the users and the level of meta-information provided by the website for interpreting visual elements. These three dimensions determine the effectiveness of online information interactions of screen reader users and their ability to perceive the credibility of online information. Of these, the affordances presented by the screen reader’s interface and their role in facilitating credibility perception are discussed further in Chapter 8. The next chapter presents the results relating to participants’ online information practices and discusses the role played by the screen reader in these practices.

\(^{58}\) The concept of affordances in the context of screen reader online interactions is discussed in greater detail in Chapter 8.
Chapter 6 – Online Information Practices

“Information comes at you from everywhere.” — Participant P51

6.1 Introduction

This chapter builds on the details presented in the previous chapter about how online interactions happen via a screen reader to specifically look at how information seeking, evaluation, use, and sharing are carried out online by screen reader users. This provides a context for studying users' online information credibility perception. Since not enough is known about the information activities of screen reader users in different information domains to design the research around a specific domain, such as health care or scholarly information seeking, I chose to look at the online information context through the lens of everyday information seeking, where individuals seek information in complex ways from a variety of sources to manage their daily lives (Savolainen, 2007, 2008). Specifically, a related concept of everyday information practices was used as the framework for analyzing the everyday online information activities of screen reader users. As introduced in Chapter 1, everyday information practices are “… a set of socially and culturally expressed ways to identify, seek, use and share the information available in various sources such as TV, newspapers and the Internet” (Savolainen, 2008, p. 2). Further details about this concept are given in Chapter 2.

Data were collected about the everyday online information practices of adult residents of Ontario who are blind or visually impaired and using a screen reader. The questionnaire survey conducted as part of the research provided data about the various information sources used by the 60 participants, their online information-seeking strategies, their engagement in some common online information-use activities, and the extent of their use of online information-sharing technologies and tools. Data were also collected from 13 of the survey participants through hands-on online activities and interview sessions about how they sought, evaluated, used, and shared information on the Internet as part of their everyday life and about their experiences with using the screen reader in the process. This chapter presents details about the
information sources of the participants and their everyday online information practices. Examples drawn from the hands-on sessions are used to illustrate specific points.

6.2 Information Seeking

The view of information that my work is based on is that “information” is not a “resource” or something that resides in documents, web pages or other artifacts, but is the “outcome of people constructing meaning out of messages and cues” (Choo, 1999, p. 1). In the online context, individuals actively create the meaning of information in the process of online interactions. The social and behavioural processes through which information is enacted and engaged become important in this context, particularly when the processes are mediated by assistive technologies such as the screen reader.

The purpose of information seeking in everyday contexts could be for orienting oneself to one’s world or for managing specific problem situations. (Savolainen, 2008, p. 83). For seeking orienting information to monitor everyday events, the participants rely a lot on radio and television (TV) programs; they also access these programs online. On the Internet, participants went to websites they were familiar with through experience or to websites recommended by others. Using new websites was challenging for them due to unfamiliarity with the layout.

For seeking problem-specific information, they used “search” as their primary method. Fifty-four (90%) of the 60 participants used the Google search engine; most of them found it simple and easy to use, although the effectiveness of their use depended on their degree of online interaction proficiency. Details about their information sources, online information-seeking strategies, and specific examples of the role played by the screen reader in their information seeking are given in the following three subsections. The significance of these practices for credibility perception is also discussed.

6.2.1 Information Sources

Participants were asked, through an open-ended question, to indicate the information sources they use besides the Internet. Their responses fell into four categories: radio, television and multimedia, books and library publications, and people and organizations. The distribution of their frequencies is displayed in Table 6.1.
Table 6.1. Information Sources

<table>
<thead>
<tr>
<th>Information Sources used</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books &amp; Library Publications</td>
<td>42</td>
<td>70.0</td>
</tr>
<tr>
<td>People &amp; Organizations</td>
<td>41</td>
<td>68.3</td>
</tr>
<tr>
<td>Radio</td>
<td>29</td>
<td>48.3</td>
</tr>
<tr>
<td>Television &amp; multimedia</td>
<td>23</td>
<td>38.3</td>
</tr>
</tbody>
</table>

**Books and library publications**

Forty-two (70%) of the participants said that books and publications form part of their sources of information. Audio books, electronic books, online books, magazines, and CNIB library resources were some examples given.

**Radio, television and multimedia**

Twenty-nine people (48.3%) listen to the radio, and 23 (38.3%) get their daily information from TV. The audio nature of information provided by the radio seems to make it a preferred source for some. Participant P33 prefers the radio to the TV because “on the TV they show more whereas on the radio they describe everything; radio is more auditory.” Participant P21 said, “Being blind, more than anything else I go to radio, especially CBC radio because of their reliability.” Participant P38 felt radio and TV were easier sources: “I try to get as much information as I can from easier sources, which would be radio/TV but then again you have to believe what you hear.” It is interesting that several participants, like P33, mentioned listening to the radio through the Internet. “I have a regular radio but I mostly listen to radio on the Internet.”

**People and organizations**

Forty-one participants (68.3%) said they get their information from people and organizations. Many mentioned family and friends. Some mentioned "word of mouth." Email and phone were also mentioned, and this was taken to imply "people." Participant P19 prefers to get his news from people as a time-management strategy. “I don’t have much time. I get most of my news from people,” he said.
The results given above indicate a high reliance of the participant group on people (individually and as part of organizations) as information sources. In contrast to the three sources (books, radio, and TV) that are primarily one-way information channels, it is interesting that “people” provide a two-way information channel, where the interactive nature of the information transaction might sometimes blur the distinction between the roles of source and recipient, as well as the demarcation between the domains of information seeking and information sharing.

The role of community in the information practices of screen reader users offers an interesting area for future research, both from the angle of information practices and from the angle of credibility perception. Further, since people have traditionally been predominant in mediating the interaction of individuals who are blind or visually impaired with print information, it is interesting how they play a complementary role, even after the ostensible disintermediation brought about through the introduction of the screen reader. The involvement of people (or community) in information seeking/sharing has important implications for credibility perception by screen reader users, which are discussed in Chapter 7.

**Internet**

All of the 60 participants use online information. Some rely mostly on the Web for information. The independence, privacy, and convenience that the Web provides make online information appealing to them. Participant P05 said, “I can do online shopping … I can buy things and not go with people to stores. I can browse and search at my own pace.” Contrasting his current information experiences with the days before online access using a screen reader, participant P23 said, “But now, basically I can do everything myself. I email people. I keep track of my banking online. Only I know what grades I get in school, no one else knows it.” Participant P14 said that she “usually sticks to the Web” because it is a resource she can “use entirely independently,” of course within limits of web accessibility. Participant P44 does not use TV or radio; he “looks for information only online.” Participant P55 is of the opinion that “the availability of information on the Web for people who are blind is increasing because there are more and more [email] lists for the blind and every list specializes in certain topic, like blind-programming, blind-friends, blind-tech, etc.” Some participants, like P31, were strategic in mixing their source preferences, like “radio for local stuff and the Internet for, more like, the larger picture.”
The Internet is, thus, clearly a preferred source of everyday information for the participants. It was seen in Chapter 4 that participants held an overall positive attitude towards the Web and were highly motivated to use online information. There is a general skepticism, however, about being able to find trusted sources. For participant P51, about 50% of her information comes from the Web. She finds that to be most convenient; however, she feels concerned that she should be able to find trusted sources. Part of this concern stems from the uncertainty associated with whether the screen reader is indeed conveying all that is given on a web page. To optimally make use of the benefits provided by the Internet, screen reader users need to be able to evaluate the quality of online information. The next subsection examines further how the information-seeking process is carried out by screen reader users.

6.2.2 Online Information Seeking Strategies

One of the questions in the survey was, “How do you decide which website to go to for the information you want?” It was aimed at eliciting data about online information-seeking strategies used by the participants, which would be important in understanding how they chose online information for use. The questions allowed multiple selections from six given responses, with a seventh option to write in "some other" response. Table 6.2 gives the responses and the frequency of selection of each response.

<table>
<thead>
<tr>
<th>Strategy used</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use a search engine and select from the results.</td>
<td>54</td>
<td>90.0</td>
</tr>
<tr>
<td>I use websites that I can trust from my experience.</td>
<td>23</td>
<td>38.3</td>
</tr>
<tr>
<td>I go to websites recommended by those I trust.</td>
<td>21</td>
<td>35.0</td>
</tr>
<tr>
<td>I use websites recommended in other trusted websites.</td>
<td>13</td>
<td>21.7</td>
</tr>
<tr>
<td>I use only offline information sources as I feel I cannot trust anything on the Web.</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>Some other (see notes).</td>
<td>2</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Notes: 1. Sites referenced on radio or TV (P31).  
2. I’ll do a search, and based on the source, I’ll access it. I always get more than one source and look for agreement (P35).

In deciding which websites to use, participants go by their personal experience or by the recommendations of the people or websites they trust. An overwhelming majority of participants said that they used the popular search engine Google as their first step to select the website(s) to
Sixty-seven percent of the survey respondents mentioned Google as their favourite website. Fifteen participants (25%) mentioned, “Google is good.” Many reported that they “use Google every day.” It was an easy way for them to readily find the information they were looking for. Participant P13 found the Google site “easy to use and the results are easy to navigate.” Participant P51 summarized her information-seeking strategy as “I don’t have a specific website that I can say off the top of my head. I search for terms with Google. I look for a good source ... I try to corroborate with other websites. Consult people also.”

Four participants mentioned that the use of headings by Google to present the results made it easy for them to navigate the results. Several others too thought that the Google website is accessible and the results are easy to navigate. Participant P41 felt that “Google is pretty accessible and Google uses headings, so it is good.” Participant P20 found the Google search engine as well as the results “accessible.” Participant P23 had “rarely used search engines” until he “discovered Google,” which he found to be “the most accessible search engine of all.” Participant P55 felt Google was very well organized and said, “The result may be accessible and may be not but the google itself is very, very accessible specially using the results as a header and putting the comment under the result header.”

The information-seeking strategy for participant P16 is very simple: “I usually google my problem and find the website I feel is most credible.” Participant P56, again, doesn’t “visit a specific site”; he prefers to “make a Google query.” Participant P50 summed up his information seeking strategy as follows:

I do a search, read the information and make a decision if it is sensible. If I find the quality bad, I skip to the next site. Of course, this depends on the topic, and whether or not I feel reasonable trust. (P50)

Given such predominant use of the Google search engine for information seeking by screen reader users, the next subsection discusses some implications of using the screen reader in the process.

6.2.3 Screen Reader Mediation in Online Information Seeking

With specific reference to Google search, three aspects of screen reader mediation are discussed below, based on observations made during the online activity sessions:
1. Spelling of search terms
2. Selection from search results
3. Sponsored links

**Spelling of search terms**

Predominant use of the auditory channel for receiving print information appears to have an effect on the screen reader users’ spelling abilities with regard to differentiating between spellings of homophone syllables such as in the words *see* and *sea*. Spelling ability has an effect on search terms used and the results obtained when a mismatch occurs between what users intend and what they indicate through the spelling used.

While analyzing the survey data, I observed that homophone spelling errors were commonly occurring in participants’ responses. By this I mean that the word as spelled by them sounded the same as the word they meant to use, but was not the dictionary spelling of the word. Some examples are:

- *accecity* for *accessibility*
- *piers* for *peers*
- *knowlage* for *knowledge*
- *CAPTIA* for *CAPTCHA*
- *websight* for *website*
- *navegate* for *navigate*
- *straite* for *straight*
- *clattered* for *cluttered*

During the interview, I again observed that five of the thirteen participants spelled the search terms they used on the Google website wrongly, such as *flew* or *flue* for *flu* and *swain* for *swine*. I discussed my observation about the effect of screen reader use on spelling with them. Participant P30 mentioned that “Spelling is a problem for people who are blind and don’t see the actual letters.” And participant P19 said, “You’ll find with blind people using JAWS, because
they are listening to everything, that their spelling is very bad.” Participant P51 said, “I can’t spell to save my life!” After trying twice to spell the word prevention (both times wrongly), participant P34 said, “I keep spelling it wrong. Sometimes I know the word but when it comes to spelling, I am not sure.”

It can be argued that the spelling ability of screen reader users is affected by their learning words phonetically through hearing the sounds rather than by seeing the letters in the words. The speech engine used by JAWS reads using synthetic speech built up through phonemes. A phoneme is a unit of "uttered sound." It is the smallest segmental unit of sound employed to form meaningful contrasts between utterances. In the English language, there is a poor match between spelling and phonemes (basic units of uttered sound). Screen reader users might misspell words because they learn to spell mostly by listening to words as pronounced and not by seeing words as spelled. Screen readers do allow users to parse words character by character, but users usually don't resort to this unless they have a doubt or need. This leads to ambiguity in their spelling of phonemes that might have more than one set of letters corresponding to them. One example would be the words site, sight, and cite, all of which sound the same. To illustrate further, participant P38 hadn’t heard of a site map. When I explained it to her, she said, “Honestly, I thought it was something visual,” mistaking site for sight.

As a result of this difficulty, the search terms used by some participants were not exact, resulting in a suboptimal set of search results. Five out of the thirteen participants made spelling errors in their search terms. Two of them realized it and made a correction, while three did not. Two scenarios involving misspelling during the hands-on sessions are provided below:

Scenario 1:

P34: (types swine) I wasn’t sure how swine is spelled.  

_Interviewer: No problem, go ahead._

P34: (types flue) What else to type?  

_Interviewer: [Without pointing out the spelling error] However you would look for latest news. Whatever terms you would use for getting the current news._

P34: I would just add "latest news."

With the term _Swine flue latest news_, she ran the Google search engine.
Scenario 2:

Participant P21 typed Swain flu. When I drew him into a conversation about screen reader use and spelling, he said, “I look at the ‘Did you mean…’ option of Google, particularly when I am not sure of the spelling.” But, he did not check this one, possibly because perhaps he was sure of the spelling he used. The effect of screen reader use on spelling, thus, sometimes leads to suboptimal effectiveness in information search, because the results returned by Google depend on the search terms used.

Google offers a facility to correct spelling through its “Did you mean …” feature on the Internet Explorer and equivalent features on other browsers. “And now I see that I made a mistake in my spelling, so I just clicked on the correction that Google offers,” said participant P30. She had initially entered the search term as swine flew and Google suggested “Did you mean Swine flu?” In Google search results, the line “Did you mean …” precedes the search results. A sighted person might not miss that line on account of its distinct font styling and colour. But a screen reader user navigating the results page using the headings command might not encounter it because it occurs just preceding the main search results and is not marked up in any way.

Use of a special hardware device called the refreshable Braille display appears to help screen reader users in getting a better grasp of spellings. This device helps the users receive the screen reader output in Braille notation. Many use it in conjunction with the speech output. Five survey participants had reported that they use a refreshable Braille display. Two of them, participants P19 and P30, were included in the interview, and they used the device during the online activities. Both thought that using Braille helps screen reader users to spell better. Participant P19 said the following:

… which is why I like the Braille display. I can actually see the spelling on the Braille display. If you work with people that have never used Braille, and they work strictly with JAWS, you’ll find that their spelling is really bad. (P19)

Participant P30 added, “Spelling is a problem for people who are blind and don’t see the actual letters. So I find Braille helps a lot there.”
But refreshable Braille display devices are rather expensive, costing around $5,000, and not everyone can afford to have one. Participant P05 expressed his desire to possess and use one if only it were not so expensive:

If they would be kind enough to make a Braille display that is actually affordable I will cheerfully get one. Even if they had one for, say, under a thousand I could see myself saving up for a year and sort of cramping my life style a little and grabbing it. (P05)

In summary, spelling is important when using search engines during the information-seeking process because these are mechanical programs that return results based on the search terms provided. By using a spelling that conveys a search term other than what is intended, users might get results that don't really meet their information needs because their selection of websites during that search instance is restricted to the search results provided. How users actually select from the results is examined in the next subsection.

**Selection from search results**

Data from the online activities show that users at different levels of online interaction proficiency deal with the Google search results using different strategies. Using the personas introduced and discussed in the previous two chapters, a scenario is presented below to illustrate how different users deal with Google search.

Holly, who has high online interaction proficiency, uses a combination of skimming and stepping to look over the search results, getting quickly to details necessary for evaluating them.

On the search results page, I move by heading. Once I find a particular heading that sounds good then I go down by arrow because I know that the url, which is a good indication of where the information is coming from, is at the bottom of that section separated by headings. (P03)

Mina, whose proficiency level is neither high nor low, uses a different strategy. She reads quickly through the results and then goes to the first one that interests her, without checking the website url to “see what is there and just go back quickly” (P34). If she finds that interesting, then she checks which website it is. If not, she returns to the results and tries the next result. She thus operates a quick trial-and-error method for selecting websites.
Laura, who is more of a novice user of the screen reader and the Web, feels overwhelmed by Google. She relies mostly on websites recommended by people, knowing fully well that she would have a better choice through searching.

Most of the time I go to a particular website that a person would give me and I search there for information. I generally don’t go and search on Google. Most people do that, I know. But I just don’t. I have used Google but I just don’t bother with it. (P38)

Online information proficiency thus plays a significant role in the information-seeking process of screen reader users. Faced with a set of search results, participants generally scanned the Google results for websites that they could trust, where they felt they might find good-quality information relevant to their needs. One striking observation about their negotiation of sponsored Google links, which are displayed along with search results in the case of some terms, is examined in the next subsection.

**Sponsored links**

On some Google search results pages, especially when the search terms have commercial significance, related sponsored links are provided besides the main search results. Visually, the sponsored links are differentiated from the main search results. But the screen reader reads out sponsored links first. If the user is not experienced, they might miss noticing that they are encountering sponsored links.

Although sponsored links do not appear on all search result pages, where they actually do it is hard for screen reader users to distinguish them from the main results. The screen reader renders all the content on the page serially and thus reads out the sponsored links before the search results. Distinguishing a sponsored link from a main result, although technically possible to do using a screen reader, usually depends on the level of prior knowledge and familiarity of the user with using the Google search engine and its result layout. It also depends on the navigation style the user chooses to use, as described later in this section.
Figure 6.1. Screen shot of the Google results for a search on “swine flu prevention”

Seen in Figure 6.1 is a screen shot of the search results page returned for a search conducted with the term *swine flu prevention*. As can be seen, the Google search engine displays search results so that sighted users can distinguish the sponsored links from the main results (either well separated visually from the main results or set in a box with a different background colour). However, during the serial rendering of the results page by the screen reader, the sponsored links are read out before the main results. This is because Google has coded the search page in that order. The screen reader user accesses the virtual buffer created out of the information arranged in the order of the page coding. Figure 6.2 shows visually a simulation of the screen reader output as spoken by JAWS to the user.
From the screen reader output simulation in Figure 6.2, it can be seen that Google has used the heading markup effectively to separate the sponsored links and search results into two distinguishable groups. The title “Sponsored Links” in heading level 2 (marked by red rectangles) precedes every group of sponsored links, and each of the individual links is marked up with a heading level 3. This is followed by the title “Search results” in heading level 2 (marked by a green rectangle) followed by all search results, each of which is given a heading level 3.

It was observed during the online activities that online information proficiency plays a role in how screen reader users negotiate sponsored links, as seen from the scenario presented below:

Markup information as described above allows Holly, who is proficient in using the navigation quick keys and is also familiar with the page layout, to press the quick key 2 repeatedly to skip through the headings at level 2, listening to them until she gets to the search results, and then to press 3 repeatedly to go through the main results.

Users who are somewhat proficient or familiar, such as Mina, repeatedly press the "h" key to go from heading to heading. This enables them to hear every heading, but they easily lose
track of whether it is a sponsored link or main result because that information is announced only once at the start of each list.

Users like Laura, who go stepping from line to line, lose track more easily of what type of link they are encountering unless they are familiar with the page layout. Besides, it takes them too long to get to the search results, and they choose to go to, or inadvertently go to, a sponsored link instead.

Some highly proficient participants were aware of sponsored links and systematically avoided them, as seen in the conversation presented below:

P30: What I was doing there is getting past all the sponsored stuff because I am used to all the sponsored stuff coming up first.

Interviewer: How did you go past the sponsored stuff?

P30: Because I go to Google all the time I know there are usually at least five sponsored things at the top. So again, I’m using the Braille display. I keep checking if it says "sponsored" above the links and then I cursor down until I have crossed them all and gotten to the results.

Participant P05 stated that he does not check sponsored links because “I just tend to think they are sponsored so they are going to be advertisements or may not be directly tied in with what I want. So, I just skip over them and start looking at the results.” P38 expressed her general belief when she said, “If a company is sponsoring something, they would lead you to believe what they want you to believe.” But because she took a long time to do the first activity, it was not possible to actually see how she dealt with sponsored links in practice.

Some participants, even though they avoided sponsored links, did not think there was anything wrong with considering them.

I usually go straight to results because that is more specific to the search that I am making. Sometimes I do glance them [sponsored links] over just to see what is there. I mean they are sponsored so they’ve been put there for a reason. And they are probably not going to get me to the results I want as quickly. I have nothing against them. I might like something from them. (P33)

However, participants sometimes did not realize that they were looking at sponsored links, even when their intention was to avoid them. When participant P34 was looking through a Google search results page, she mentioned that she used the quick key Ctrl+down arrow to get to
the results. I asked if she knew that there are some sponsored links that occur before the search results, to which she replied, “I skipped them, that’s what I did.” I proceeded to explain to her that the links she was currently looking at were sponsored links and not search results. After checking, she replied with the following:

I see that. I see what you are talking about. Sponsored Links. It is a heading. I always use arrows to come down line by line. I like checking sponsored links too, just to see what’s there. I don’t hold anything against them! (P34).

A pair of scenarios from the online activity session of participant P23 reveals how complex it might be for screen reader users to negotiate sponsored links. The first one shows participant P23 thinking aloud about how he used the Google search results.

P23: So, what I did is, I quickly cursor down to the results and I looked at each link carefully to see if it is from a credible source.

Interviewer: Oh, so you skipped all the sponsored links and came to the results, is it?

P23: Yes. I usually … I don’t know but I skip the sponsored links.

Interviewer: How did you do that? Did you know that there are sponsored links at the top?

P23: Yes. I cursor down very fast till it says "Results."

The second scenario below shows how a little later during the next activity, participant P23 was looking at the sponsored links.

Interviewer: Last time you had skipped all sponsored links and gone to the results, right? But now, you started looking from the sponsored links.

P23: No, I didn’t.

Interviewer: But what you’ve been seeing now are all sponsored links.

P23: Oh, really?

Interviewer: So far, at least three of the six participants have selected hispanichealth.org from the sponsored links list. I wonder if generally people prefer to consider the sponsored links as well.
P23: Then honestly, maybe this goes back to how JAWS works. If I miss the heading, I do not know if a link is sponsored or not. Maybe the layout is different on the screen and JAWS reads differently. So, basically, I am not concerned whether it is a sponsored link or not. You know, I basically see what kind of website it is. If it sounds like a credible website I click on it. If it doesn’t I don’t. But then I am not aware whether it was a sponsored link or not. Maybe because JAWS doesn’t tell me whether a link is sponsored or not. Because you see, on the screen, right now I don’t really know how the links are laid out. Because on the screen you may see then in columns but what JAWS does is, it just decolumnizes and reads them link by link. So I really have no clue whether I am reading top to bottom or across.

P23 listens a bit.

P23: Okay now I understand what you said. I noticed that … I had never thought about it before … when I did the Ctrl+Home and then did the h, it took me to the sponsored links first and then it took me to the results. I never thought about it. As I said before, I only use my intuition, honestly, because I say, "Well if it a credible link, I don’t care if it is a result link or a sponsored link." And also, well, I really don’t know what’s on the screen. So what I do is, when I search for some phrase in Google, I read the entire page. I don’t click on the next page. I read every link. So I obviously read the sponsored and result links.

Interviewer: Okay, so you don’t go into the first link that you see or like.

P23: No. I read the whole screen.

Participant P23 had thus developed a strategy to deal with sponsored links. But this strategy of reading every result displayed on the screen (or page, to be precise) might not work for participant P03, who has set up her Google preferences so that 100 results come up per page. She said, “I hate next … next … that is more difficult for me.” She could, however, distinguish between the two categories of results.

In summary, spelling of search terms, selection of results from the search results presented, and negotiation of sponsored links are three ways in which screen reader mediation was found to have an impact on the information-seeking experience of the participants. This is as far as searching goes. Another method participants used during information seeking was browsing.

When participants search for specific information using some terms in the Google search engine, they get to the exact page(s) of websites where those search terms (and possibly the information) occur. Within this page, they browse through to locate the information they want.
On the other hand, when they try to get some information from a website recommended by someone, they might have to browse through the entire website to get the information unless they are familiar with website search techniques. Browsing websites to obtain orienting information also entails repeated orientation, navigation, and interpretation. Familiarity and ease of use play a big part in enabling screen reader users to browse websites effectively. Further discussion of these aspects of browsing is included in the next section.

6.3 Information Use

As seen from examples given in Chapter 5, participants expressed a great need for using online information because of the independence and privacy it provides to them in their information practices. However, the accessibility barriers they often experience make orientation/navigation on websites, location/interpretation of relevant web content, and evaluation of the quality and credibility of information difficult, leaving them uncertain and frustrated at times. This section begins with a description of the everyday online information activities of the participants, followed by a discussion of their experiences during online information interaction and use.

6.3.1 Online Information Activities

In the survey, participants were asked whether they engaged in the following online activities: reading news, shopping, performing banking, booking travel tickets, and searching for health-related information. These activities were chosen for querying since they are activities popularly performed by Canadian web users according to the Canadian Socio-economic Information Management System (CANSIM) table on Canadian Individual and Household Internet Use.59 Participants were asked to provide the names of some websites used for each activity they engaged in. If they did not engage in one or more of the activities, they were asked to explain why they did not.

As can be seen from Table 6.3, reading news online was the most popular activity among the participants, with 43 (71.7%) of them reporting it, followed by shopping, with 38 (63.3%) reporting it, and seeking health information, with 35 (58.3%) reporting it. Almost half (48.3%) of

59 [http://www40.statcan.gc.ca/l01/cst01/comm29a-eng.htm](http://www40.statcan.gc.ca/l01/cst01/comm29a-eng.htm) (last accessed March 26, 2010).
them used online banking as well. Booking travel tickets was relatively less popular, with only 16 (26.7%) saying that they booked travel tickets online, the reason given being that travel websites are generally complex and not very accessible. A couple of participants mentioned that they used the web mainly for their work. Participant P18 said, “I use the web primarily in support of my work to access peer-reviewed journal articles,” and participant P19 said, “Most of my web experience is for business use.” Their engagement in all these activities shows that these users would often need to judge online information credibility.

Table 6.3. Online Information Activities

<table>
<thead>
<tr>
<th>Online Information Activities</th>
<th>Yes N (%)</th>
<th>No N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading news</td>
<td>43 (71.7%)</td>
<td>17 (28.3%)</td>
</tr>
<tr>
<td>Shopping</td>
<td>38 (63.3%)</td>
<td>22 (36.7%)</td>
</tr>
<tr>
<td>Seeking health information</td>
<td>35 (58.3%)</td>
<td>25 (41.7%)</td>
</tr>
<tr>
<td>Performing banking</td>
<td>29 (48.3%)</td>
<td>31 (51.7%)</td>
</tr>
<tr>
<td>Booking travel tickets</td>
<td>16 (26.7%)</td>
<td>44 (73.3%)</td>
</tr>
<tr>
<td>Maintaining own websites*</td>
<td>11 (18.3%)</td>
<td>49 (81.7%)</td>
</tr>
</tbody>
</table>

*mostly related to their business

**Travel booking**

Sixteen participants (26.7%) reported having booked travel tickets online. Several others said they look up the information online but prefer to do the booking over the phone or through an agent. A few had family members doing the booking for them. Thirteen had not travelled much and so had no need to book tickets.

Seven participants reported difficulties in using the websites as the reason for not booking travel tickets online. Problems included too much information on these websites and difficult navigation that takes too long and results in frustration. As a reason for not booking travel tickets online, five participants said that they did not want to give their credit card information online as they thought it is not safe.
News reading

Forty-three participants (71.7%) read news online. The Toronto Star, CBC, and BBC News were among the favourites. Several of them mentioned CNIB’s news website Visunet, which provides the news from popular daily papers in an accessible form. Only the current day’s news is made available here. Eight participants said that they preferred to listen to the radio/TV for news.

Online banking

Twenty-nine participants (48.3%) said they used online banking services. They mentioned the names of some top banks in Canada. Nine participants said that the Internet does not provide the level of security they prefer when dealing with money. Several others felt no need to bank online because they preferred phone/ATM banking or had someone in the family to help them.

Online shopping

Thirty-eight (63.3%) participants said that they had shopped online. Amazon topped the list of shopping websites used, followed by eBay. Some (participants P42 and P44) prefer to buy over the phone after obtaining information from a website, as they feel unsure about making the correct choices or about the safety of online payment. Ten participants expressed their lack of trust for the security available on the Web to protect their credit card information.

Seeking health information

Thirty-five (58.3%) participants said they sought health information online. Only 10 of them mentioned the names of websites they went to, such as Health Canada, Diabetes.org, Medline, etc. Twelve (20%) of the participants said that they merely searched on Google. For participant P37, Wikipedia was a good starting point. Twenty participants (25%) said they did not have occasion to look online for health-related information because there was no need so far. Three mentioned that they did not trust health websites.

It can be seen from the above results that screen reader users engage in activities where evaluation of the credibility and quality of information being sought is critical. However, the challenges posed by the screen reader to the effective conduct of online information interactions
might have consequences for information evaluation and use by screen reader users. Some of the issues observed during the research are examined in the next subsection.

6.3.2 Screen Reader Mediation in Online Information Use

As seen from data presented and discussed in the previous chapter, the online information interaction experiences of screen reader users depend on the level of online information accessibility. Data collected during online activities are presented in this section to show how, due to the serial and textual nature of the screen reader interactions, screen reader users do not get sufficient contextual information and how that leads to the following effects. Lack of context leads to uncertainty about what is obtained compared to what is available on the web page. Uncertainty evokes emotions such as frustration, which in turn affect perception. Besides acting as filters, emotions modify the context and/or motivate further action, including abandoning the site and looking for another.

With reference to use of online information, three effects of screen reader mediation and a possible coping mechanism are discussed below, based on observations made during the online activity sessions:

• Insufficient context
• Uncertainty
• Emotions
• Moving to an alternative website

Insufficient context

Hearing content instead of seeing it means that screen reader users hear a single item at a time rather than seeing multiple items simultaneously. As a consequence, they often do not have access to supporting contextual information. The placement of content and controls on a web page conveys important information to the sighted user through its visual/spatial layout. Through styling, proximity, grouping, visual separators, etc., sighted users gain contextual information that helps in content interpretation.
Images present contextual information. When images are presented without alternative text, such contextual information is lost to the screen reader users. Participant P30 describes how she “manages” such situations:

There are some images that it doesn’t tell me what it is. And there are some image links that, because it just says "image," I don’t know what the link is. Again, with graphics on buttons, a lot of times I can usually tell what the graphics are. Sometimes even if it doesn’t have the correct tagging for it, you know it will say graphic number, number button and such, but often those buttons have numbers associated with them so I can say that number 1 is probably About, number 2 is probably Contact and so on. In that case I click on each of them and see what’s there. It takes longer because I have to click on each of them. (P30)

Insufficiency of context naturally leads to uncertainty, and this aspect is examined in the next subsection.

**Uncertainty during information interactions**

Participants faced situations during online information interactions where they were uncertain about whether what they obtained through the screen reader was indeed what was presented by the website. Participant P09 felt that his screen reader “seems to read some of what is on the page relative to the actual information contained.” He therefore “cannot feel comfortable” that he can “receive all the information nor certify that fact.” Participant P21 faced a similar situation. He said, “I cannot be certain whether I have the full information. I cannot feel confident about what I found. It takes a longer time also.”

Uncertainty also arose when participants did not find the results they anticipated for the actions they performed on the website. Four extracts from the online activity session experiences of P34 illustrate this point.

P34: “It went to Web Images. I don’t know where exactly that is.”

P34: “I hit Ctrl+down-arrow. It took me to Sign In. I don’t know if it is right after that but I am assuming not…”

P34: Oh, I kept hitting “n” because usually that should take you to the text, but it did not.

P34: See I already find a problem with this website because it gave me the heading so I was assuming there would be a text that would talk about it right away, right? So, there isn’t. I’m assuming right now. I don’t know if you could
see it but I’m assuming there’s only links there. So which will force me to go back and just see the different links.”

Another cause of uncertainty was occasional mispronunciation by JAWS due to misspelling of words on websites. JAWS reads using synthetic speech built up using phonemes. It assembles speech based on phonemes corresponding to groups of letters. When words are misspelled, it might cause JAWS to pronounce them incorrectly, causing confusion to users. This causes a problem for JAWS users in making sense of misspelled words. During the online activity session, it was observed that *swine flu*, if written as *swineflu* is read out by JAWS as *swine-ne-flu*. *Site map* if written as *sitemap*, is read out by JAWS as *sit-em-up*. Participant P19 stressed the difficulty this causes when he said the following:

Not only is JAWS pronunciation bad sometimes, as we saw just now with sitemap, I see that it also depends on people’s typing and people don’t type properly. Especially in messages, people type short forms. That makes it hard with JAWS. (P19)

Theofanos and Redish (2003, p. 7) had observed several similar mispronunciations by JAWS during their study with screen reader users. Notable among them was *home page*, which was rendered as *hommapodge* when written as *homepage*.

The above illustrations show that use of the screen reader has specific effects on the interpretation of web content by users. The aspect of uncertainty has several implications for information interpretation, evaluation, and credibility perception. Particularly when users are aware of a mismatch between their experience and what is actually possible, they sometimes experience emotional reactions.

**Emotions**

One important effect of screen reader mediation during online information interactions is the emotional experience arising from uncertainty caused by insufficient understanding of the context of information interactions. Information behaviour research regards emotions as cultural artifacts that need to be analyzed within the social and cultural context in which they are experienced (Nahl & Bilal, 2007). According to Nussbaum (2001, p. 4) emotions are value judgments indicating the significance a person attaches to things outside their control that affects their goals. Owing to the screen reader’s limitations in interpreting visual/spatial features of web
content, interactions involving websites that do not provide adequate meta-information have a potential to generate negative emotional responses in the users. Several illustrations substantiating this point are provided later in this section.

On occasion, positive emotions are generated while encountering websites that provide all necessary meta-information. When participant P19 encountered web pages that used headings, he felt favourably inclined towards them. “So this page is good because it has got the headings and it has the list to subcategorize all the links. Easy to know what information belongs where. So that makes it more usable; because it is not frustrating.” And participant P23 “feels friendliness” in websites that use labels for links and are organized. “Yes. If the links are labeled and organized, I can feel friendliness in the website. In other words, if the website is friendly I get a good first impression.”

Nussbaum’s theory of emotions states that acting under uncertainty makes people emotional. While emotional responses exhibited by the participants could be a result of cultural differences in uncertainty avoidance (Marcus & Gould, 2000), I would argue that responses might also depend on their level of proficiency in using their screen reader for online information interactions. Participants with lower online interaction proficiency reacted more to inaccessible features on websites. Emotions appear to be related to both the situation and the user because users with higher interaction proficiency were seen to persist more when dealing with inaccessible features on websites than those with lower interaction proficiency.60

Holly understands what a problem might be due to and tries to get around it.

Holly: Ha, see … it said just “Edit” [and not “Enter Search Term”]. So to make sure I was in the search box I had to move forward to check that button out before I could use it because they didn’t label that edit field. But I can easily bear with minor annoyances like that. (P05)

Not knowing what a problem might be due to, Mina gets frustrated more easily, but she does not hesitate to accept help from people around her.

60 Lazar, Feng, and Allen (2006), in their study about the impact of computer frustration on the mood of web users who are blind, have also reported that a longer time using the Internet lessened the impact of the frustration on the participants’ mood.
Mina: It’s frustrating when the screen reader is unable to tell me what is there, but there isn’t much I can do! Or if I really need that information at that time, if somebody is around me I would ask them like what is on the page and what is it saying there, and just try to troubleshoot that way. But there isn’t somebody always around you. (P34)

Laura feels overwhelmed much more easily.

Laura: When JAWS doesn’t respond well it gets me very frustrated. I wish they would create something a bit more user-friendly. It is already quite frustrating not being able to see it and then when you have something like that happening, you get doubly frustrated. (P38)

Literature in the field of psychology has dealt with frustration extensively, broadly defining it as a reaction to the thwarting of some goal attainment. Freud (1921) first postulated the idea of a specific emotion arising when faced with an obstacle to satisfaction. Some researchers have conducted studies about frustration among screen reader users during online interactions.61

One frustrating situation to some participants in this research is the automatic refreshing of web pages, which takes the screen reader to the top of the page and makes it start reading all over from the beginning. Participant P03 describes the frustration:

One website that I would like to use but that is very difficult is Forbes.com. When you want to read the articles, some of them … let’s say an article is broken in ten little pieces, the stupid website keeps refreshing itself. It assumes how fast you’re going to read it. And it is so frustrating because their stories are interesting. (P03)

According to Berkowitz (1978), frustration occurs more on account of anticipation of the attainment of a goal not being met than merely the thwarting of the goal. Again, the level of frustration might depend on the degree of interference with goal attainment, which in turn might depend on the suddenness or severity of the interference. As participant P51 said, “For me, things that impede me from getting what I need to get done are frustrations and irritants.”

61 Lazar, Feng, Allen, Kleinman, and Malarkey (2007) conducted a study about what frustrates screen reader users on the Web. They found (a) page layout causing confusing screen reader feedback; (b) conflict between screen reader and application; (c) poorly designed/unlabelled forms; (d) no alt text for pictures; and a (e) three-way tie between misleading links, inaccessible PDFs, and a screen reader crash to be the most frustrating happenings.
According to Baron (1977), the feeling of frustration is somewhat socially constructed, in the sense that the level of frustration could be lowered by how much the user believes that the interruption to goal attainment was socially acceptable. Participant P34 felt comfortable asking for help from people nearby if necessary.

When the screen reader is unable to read some information it is frustrating, but there isn’t much I can do! Or if I really need that information at that time, if somebody is around me I would ask them like what is on the page and what is it saying there, and just try to troubleshoot that way. But there isn’t somebody always around you. (P34)

Data from my research shows that emotions arise during an information activity not necessarily only as a response to failure of goal attainment, but even as a part of the interaction with technology. Responses that participants provided to a question during the interview about what caused them frustration on websites were replete with names of various technologies that underlie web content. All participants were familiar with the names of these technologies, while the extent to which they understood what they were and how they worked varied with their technology proficiency, as can be seen from how Holly, Mina, and Laura describe what frustrates them.

Holly: So, websites that use a lot of Flash, hotspots and mouse rollovers are real problem sites. (P19)

Mina: (thinks) … adobe … pictures … buttons not titled. Can’t think of anything else. (P33)

Laura: Flash, PDF, javascript, I’ve heard of these terms but if you asked me what they are I couldn’t tell you. (P38)

Finally, emotional reactions induced in screen reader users might also affect their credibility perception, as expressed by participant P51 in the context of her reaction to websites that change their layout often:

My whole premise in terms of using the Web is based on knowing at some level, what information can be found where. And when you change the layout of a page, then the information that shows up on the page changes and I may have to work harder to locate the same information. Then it becomes a bit of a problem. And that strains credibility because credibility is not just a cognitive process; it is also an emotional process, right? You get frustrated. (P51)
An understanding of the nature of the information practices in the context of which credibility perception happens in terms of user experience is thus essential. The above considerations of insufficient context, uncertainty, and emotions prompt users to sometimes abandon a website and find alternative websites as shown in the next subsection.

**Moving to an alternative website**

Participants sometimes cope with frustrations by simply abandoning the website and moving to a new one, as this conversation with participant P34 shows.

P34: In a website like this (duramproducts.com)… I though it was good … but to me it is not accessible and I would’ve just gone back and found another website.

*Interviewer: Do you feel upset?*

P34: Well, I can do nothing, like probably if I could’ve got the information, it would’ve been good. But I won’t be upset. It is frustrating. But I can do nothing. I just go find information on another website.

Participant P33 expressed a similar sentiment in the following statements:

It is kind of unfortunate (if JAWS cannot interpret stuff on a webpage) but you know that’s the way it is so I just kind of skip them. It is unfortunate, but that’s life. If it [website] is not accessible, you know, I won’t even give it a dime a day [sic]. I’ll find one that is. There are so many out there, so one’s bound to click.

The persistence people showed in situations of inaccessibility, resisting the temptation to move to an alternative site, also appeared to increase with higher levels of online interaction proficiency, as the following three quotes suggest:

Laura: Sometimes I feel annoyed and I leave after I find a couple of drop down menus. (P59)

Mina: If JAWS said "image, image, image" on a website I might not spend too much time on it. (P30)

Holly: If this whole page had been inaccessible then I would probably dump out of it. (P31)

Sometimes, what determines the persistence is how essential the information is, as participant P34’s remarks show:
If it is a website that has some thing that I just need, I have to access it some how. Otherwise I can just leave it and move on. I’m not gonna waste my time on a website that’s not accessible. I’ll just move on to the next. (P34)

In summary, during information use, insufficient context arising from screen reader mediation sometimes results in uncertainty, which evokes emotions such as frustration and prompts users to seek alternative sites. This has implications for credibility perception because users often perceive the sites they are forced to move away from as being not credible enough. Evidence for this is presented in Chapter 7. Information sharing, the third leg of information practices, is examined next.

### 6.4 Information Sharing

Information sharing refers to the communicative aspects of everyday information practices. My work does not examine information sharing from the angles of social capital or social networks (these areas have great promise for future research, given the inadequate research involving this population). The focus of my research is to obtain a general view of the technological and social practices around information sharing in the context of online information credibility perception.

Technology forms an integral part of the information experience of screen reader users. As part of their technology management strategy, participants were seen to share information about using and troubleshooting technology. Further, they also shared recommendations about which websites were easy to use, trustworthy, had good quality information, etc. The next subsection examines the usage of online information-sharing technologies and tools by the research participants.

#### 6.4.1 Use of Online Collaboration Technologies and Tools

This subsection outlines the extent of use of online collaboration tools and technologies by the participants for information sharing and community participation. Participants were asked about their use of a few popular online collaboration technologies, viz., mailing lists, social networking sites, and social media. As can be seen from Table 6.4, which summarizes the responses, participants primarily use emails and mailing lists for online sharing, with 42 (70%) of them being members of 88 mailing lists. Their use of online social media is relatively low: 22
(36.7%) use social networking sites; 10 (16.7%) contribute to blogs; 2 (3.3%) contribute to wikis; 10 (16.7%) use RSS feeds and 3 (5%) use tags.

Table 6.4. Online Collaboration

<table>
<thead>
<tr>
<th>Participation in</th>
<th>Yes N (%)</th>
<th>No N (%)</th>
<th>Not heard N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing lists</td>
<td>42 (70.0%)</td>
<td>16 (26.7%)</td>
<td>2 (3.3%)</td>
</tr>
<tr>
<td>Online chat</td>
<td>28 (46.7%)</td>
<td>32 (41.7%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Internet telephony</td>
<td>23 (38.3%)</td>
<td>36 (60.0%)</td>
<td>1 (1.7%)</td>
</tr>
<tr>
<td>Social networking sites</td>
<td>22 (36.7%)</td>
<td>35 (58.3%)</td>
<td>3 (5.0%)</td>
</tr>
<tr>
<td>Online communities</td>
<td>12 (20.0%)</td>
<td>43 (71.7%)</td>
<td>5 (8.3%)</td>
</tr>
<tr>
<td>Blogs (write/comment)</td>
<td>10 (16.7%)</td>
<td>45 (75.0%)</td>
<td>5 (8.3%)</td>
</tr>
<tr>
<td>Wikis (contribute to)</td>
<td>2 (3.3%)</td>
<td>46 (76.7%)</td>
<td>12 (20.0%)</td>
</tr>
<tr>
<td>RSS feeds</td>
<td>10 (16.7%)</td>
<td>39 (65.0%)</td>
<td>11 (18.3%)</td>
</tr>
<tr>
<td>Tag clouds</td>
<td>0 (0.0%)</td>
<td>23 (38.3%)</td>
<td>37 (61.7%)</td>
</tr>
<tr>
<td>Tags</td>
<td>3 (5.0%)</td>
<td>39 (65.0%)</td>
<td>18 (30.0%)</td>
</tr>
</tbody>
</table>

Mailing lists

Mailing lists were the most popular collaboration technology used by the participants, with 70% of them being members of around 88 (nonunique) mailing lists. Some of the popular mailing lists mentioned were AEBC (3), Eyeliner (6), NEADS (4), Blindwebbers (3), Torshout (3), and CNIB (3). Participant P55 mentioned that “There are more and more [mailing] lists for the blind and every list specializes in certain topic, like blind-programming, blind-friends, blind-tech, etc.” Perhaps due to their textual nature, mailing lists were the most-used information-sharing technology among the participants.

But some of the younger and less experienced participants, like P51, felt overwhelmed by them. “I was on many lists during my time as a radio jockey, but got off,” she said. “I don’t want my inbox flooded. I can’t skim over them like a sighted person; have to read each one to find out if it is important. That is time consuming.” Several other participants also mentioned that although they used mailing lists, it was difficult for them to quickly review email messages as well as filter/sort different types of information to manage them easily.
Participant P17, who is under 30 and uses mailing lists heavily, said he saw many benefits to using Twitter, a popular social microblogging application, that were absent in a mailing list.

And though mailing lists are incredibly important, they are more time consuming. I can get more information from Twitter in the same amount of time that it takes me to get information from mailing lists, and the reason is, even though on a mailing list you have a topic area, which can sometimes be narrow and sometimes broader, I have to look at everything everybody has to say. At least I have to read the subject line from every single message sent to the list. On Twitter, I only listen or follow the people who I know are going to be saying things that are going to be informative to me. (P17)

**Online chat and Internet telephony**

Twenty-eight participants reported using online chat, with some preferred tools being MSN Messenger (21), Windows Live Messenger (9), Skype’s chat function (6), AOL instant messenger (2), Google chat (2), and Yahoo messenger (3). Skype (internet telephony) was used by over a third of the participants.

**Blogs**

Figure 6.3 shows the usage of blogs by participants. Thirty-three participants said they read blogs. However, the reported contribution on blogs appears low; only 10 write their own blog or comment on others’ blogs.
There was a general expression of distrust of information available on blogs because anyone can write one. For participant P31, “Blogs, unless the author can be established as an expert, are always read with a grain of salt.” Participant P35 does not trust any “personal websites” because “the information is created and entered by individuals without any vetting.” And in the opinion of P23, “Websites that belong to individuals who are not well established are poorly trustable.”

Participant P30, on the other hand, likes reading blogs and would have participated in the conversations by adding her comments. But she is not able to do so because visual CAPTCHA, used by most blogs to ensure that malicious programs do not misuse the commenting feature, cannot be accessed using a screen reader.

P30: I read blogs but not frequently. When I am looking up info on some thing, sometimes blogs help. I read through some posts and the comments.

Interviewer: Do you comment?

P30: No. And that’s where a lot of CAPTCHAs are there. A lot of times I want to but can’t because of the CAPTCHA.

Wikis

Figure 6.4 shows the usage of wikis by participants. Forty-five participants said they read wikis (39 used Wikipedia); only 2 reported that they contributed to wiki websites in their workplaces.

![Figure 6.4. Wiki use](image_url)
In everyday contexts, Wikipedia was the only wiki that the participants were familiar with. There was a general expression of distrust of information available on Wikipedia because anyone could edit it. Participant P6 said, “When I found out that anyone can post information on wicapedia [sic], I figured that even a website such as that, if it can be mucked with, it probably has been.” Participant P47 did not find Wlkipedia to be trustable “because anyone can change the information on the site.” And participant P51, who said she looked for “source reliability,” felt that “Websites edited by anyone, like Wikipedia are not reliable.”

However, 57% of the participants said they used Wikipedia. A few felt that Wikipedia is trustworthy because “other people trust it” (P26); “[it is] well known, mainstream as in a lot of people use it” (P33); and “[it is] well known and trusted through experience.” (P37)

**Tags and tag clouds**

One of the significant developments in the area of online knowledge management and collaboration is the use of tags and tag clouds. Users "tag" or label online content, such as songs, blog posts, pictures, or documents, using their own personal labelling system or "folksonomy." These tags are then combined into "tag clouds" that graphically display the relative frequency or importance of tags in an easily interpretable manner and can be used to facilitate navigation of the website. These concepts of tagging and tag clouds were unfamiliar to most of the participants. One-third of the participants had not heard of tags and almost two-thirds of them had not heard of tag clouds. Three participants said they had used tags; none of them reported having accessed tag clouds, although participant P51 appeared to have encountered them. She remarked that she had “seen a bunch of links on websites and clicked on the titles to get to documents, but did not know they look anything like a cloud.”

**Social networking sites**

Figure 6.5 shows the use of social networking sites by participants. Online social networking tools are powerful in engaging users because they provide social incentives to enter, update, and manage personal information (Eysenbach, 2008). Although online social networking has caught on in a big way among web users, most of the participants (except some in the 18–30 age category) do not appear to be active in this realm.
Figure 6.5. Participation in social networking sites

Twenty-two participants (36%) reported being members of social networking sites (mostly Facebook), but most of them said they were not very active because they did not find these sites to be very accessible. Participant P8 did not like the interface. Participant P9 felt Facebook “is not very accessible and can only do very limited operations.” Participant P2 also said that Facebook is not very accessible and added that she did not have much time to be active there.

Of the 35 that did not use social networking sites, 15 said that they were not interested, 12 said that they did not have the time, and 8 said the sites are not accessible. Some were also concerned about the level of privacy on social networking sites. Participant P22 said, “Social networking sites are not trustworthy; it’s too easy for other people to see your info, and the owner of the site could be selling your info secretly.” Similarly, participant P36 felt he was not sure who was looking at his personal information.

Overall, the use of newer online collaboration technologies by the participants was very low. As a result, their awareness of the potential of these technologies was also low. Further, enculturation into online communities was also seen by the participants to be an issue.

6.4.2 Participation in Online Communities

Online (or virtual) communities are platforms for exchange of information between people who engage in an ongoing discursive activity, acting both as writers and readers. Burnett (2000), while discussing a typology for information exchange in such virtual communities,
claimed that they function as social spaces supporting "conversations" through which participants can find both socio-emotional support and an active sharing of information. Burnett’s discussion was about textual exchanges, while today, the discussion includes information in multiple media. But the basic notion still holds that online communities serve as a platform for social practices around information sharing.


Fifty (83%) are members of either mailing lists or social networking sites or both. However, only 12 (20%) said they participated in online communities. Many remarked that although they are members of Facebook, LinkedIn, Twitter, etc., they are not active because of poor accessibility of the interactive features. Participants P04, P18, and P34 were unable to join some online communities due to the entry barrier posed by visual CAPTCHAs. Participant P30 was unable to contribute her comments on blogs due to visual CAPTCHAs.

Accessibility is one thing and adoption is another. Adoption requires a mindset that people need to change over from, say, accessing information to participating online, to thinking about it, visualizing it, and becoming members of social networking sites. But participant P17 feels that popularizing the use of the newer technologies is also the responsibility of the screen reader users who are already using them.

It’s basically like the telefriend thing, right? I think one of the things is, people like myself or one of the million people on the Internet with a disability who are in there should say, like, "Hey, you should try this out, it works really well." And the other guy goes, "Oh well, I don’t think. I’ve tried things like that in the past and I really wasn’t able to use them with my screen reader." And then I go, "You know, trust me, this one works." So I think a lot of it is going to be being referred by other people that you already have the relationship with, like where you can trust their opinion and go, "Oh wow gee, if he thinks this is going to work for me, then I can give it a try even though I’ve never found a social networking site that did work." (P17)

The use of Twitter among screen reader users is increasing fast, possibly again because it uses only text, is extremely simple, and users find it very accessible.
And Twitter is very easy. The user interface on the web page could use some improvement, but as far as accessibility goes, it is pretty good. I don’t think anybody feels incredibly frustrated in the same way that they feel about Facebook; and they don’t feel like they are not part of the community. The ones that are on there are very active members. (P17)

The application called Accessible Twitter\(^62\) enables users with disabilities and limited technology to use Twitter. Accessible Twitter ensures that all links are keyboard accessible, provides simple, consistent layout and navigation, and structures each page with helpful headings. Additional audio cues indicate when Twitter’s 140-character limit is almost reached when writing a tweet. People with and without disabilities use Accessible Twitter.

**6.4.3 Screen Reader Mediation in Online Information Sharing**

Whenever there are advancements in mainstream technologies, screen reader technologies have to be modified to suit them. In view of this reactive paradigm, there is a perpetual lag between introduction of new technologies and release of newer versions of the screen reader that can work well with them. Participant P03 expresses this as follows:

And my understanding is that if you are relying on extra technology, the mainstream technology evolves and then the adaptive technology has to evolve depending on the other technology. If you rely on a screen reader you are likely not going to be able to use the most up-to-date technologies. (P03)

While this might account for much of the inaccessibility of recent social web applications like Facebook, there is also the issue of enculturation into communities that is more of a social problem than a technical one.

Participant P17 remarked that although a lot of blind people use Facebook, very few of them are satisfied because “it is syntactically accessible, but not meaningfully accessible since the users don’t become enculturated\(^63\) into the community due to the barriers that are there.”

\(^62\) http://www.accessibletwitter.com (last accessed May 7, 2010).

\(^63\) Enculturation: A process through which individuals learn their group's culture through experience, observation, and instruction (Porzecanski, 2009).
Hence they don’t “feel like full participants” and are “unable to get the most information they can, or contribute in ways that they would like to be able to.”

6.5 Summary

This chapter looked in detail at the information seeking, using, and sharing practices of screen reader users. For each of these, some specific examples showed how using the screen reader impacts that process. The types of information activities engaged in reveal that they would warrant concern about credibility. The data presented so far shows that community support scaffolds screen reader users towards more effective technology management, information practices, and information evaluation. It is also seen that poor accessibility of online participatory technologies makes participation in, and enculturation into, online social communities difficult for them. An important theme that emerges from the discussions in this chapter is that there is a need for promoting inclusion in the online participatory culture for supporting and promoting, among other things, the online information practices of web users who are blind or visually impaired. Further discussion of this theme is presented in Chapter 8.
“I think, overall, that I believe in the web, the same way as the general populous believes in the web. Proceed with caution and verify the information with other sites and measures. Better accessibility would greatly improve the general navigation experience. Availability for training with the use of screen readers has been challenging. So my performance from that perspective would maybe help, or exacerbate, the experience.”

— Participant P09

7.1 Introduction

The Internet is an important source of everyday information for screen reader users. It provides them independence and privacy in their information practices. At the same time, it also places on them the onus of making choices about which information to use among several available alternatives. The Web, with its predominantly visual characteristics, makes information evaluation difficult for screen reader users due to problems posed by inaccessible websites for orientation/navigation within and across websites and location/interpretation of relevant content. In such a context, how do screen reader users perceive the credibility of information they find online and what role does the screen reader play in the process? This chapter presents answers to these questions based on the results of a qualitative content analysis of data collected. Section 7.2 analyzes findings relating to the first research question. Section 7.3 presents an answer to the second research question, synthesizing findings from the previous two chapters as relevant to credibility perception. Section 7.4 presents and explains a model for the online information credibility perception process and Section 7.5 summarizes the chapter.

Credibility is a user perception. Therefore, the focus of the data collection and analysis for this work was user-centric. Participants in the survey were asked to name some highly trustworthy as well as some poorly trustworthy websites based on their online experience together with reasons for their judgments. The term “trustable” was used in the survey
questionnaire instead of “trustworthy” because it appeared to be more personal and less judgmental, which might make the participants feel more at ease.

Fifty participants (83.3%) named highly trustable websites and 45 (75.0%) of them also wrote explanations for their choices. Responses received to the questions about poorly trustable websites were fewer in number at 48 (80.0%), of whom 34 (56.7%) provided the names of websites as well as the reasons for considering them to be poorly trustable. Fourteen participants reported that they were unable to name any, giving various reasons. The reasons are listed, followed in each case by the number of participants who gave that reason: “had not come across any such websites” (2); “do not know” (3); “did not remember any names” (3); “none came to mind” (3); “cannot think of any” (3).

Participants were also asked an open-ended question about what they thought of as good quality online information. Fifty-eight participants (97%) responded to this question, providing rich data about their views on information quality and how they linked it to source trustworthiness and information credibility. The final question in the survey asked the participants to share their general views about, and/or particular experiences with, their assessment of the trustworthiness of websites and the quality of online information. Fifty participants (83%) provided a variety of responses to this question.

During the interview, participants were observed while they performed online information seeking activities based on two scenarios that were provided to them. Think-aloud protocols were recorded to capture their explanations/clarifications about points of interest during the activity. Following the online session, they were asked some questions aimed at understanding their information evaluation processes (see Interview Guide at Appendix V).

Qualitative content analysis of descriptive data collected as above generated the following themes having a bearing on credibility perception:

- User assumptions/heuristics
- Predictive information evaluation
- Interactive information evaluation
- Information corroboration
- Context of interaction
Community involvement

The next section analyzes findings from this research relating to the first research question, situating online credibility perception as a dynamic process and discussing each of the above categories with illustrative excerpts from the data.

7.2 Online Credibility Perception as a Dynamic Process

Information credibility perception in an online context is a dynamic process where users’ perception might keep changing based on evaluations in context, some of which might not even be occurring at a conscious level. In contrast to some traditional media such as print, radio and TV, where user interaction with the information is predominantly linear, the Web as a medium presents a hyperlinked information environment that is highly interactive and navigable, providing some freedom to users in the ways they choose to derive their information. This property of the Web makes online information activities a process of interaction and interpretation rather than mere access and retrieval. Consequently, there is a need for continuous evaluation during this process. In the online environment, where evaluation happens continuously throughout the information interaction, information credibility perception is best viewed as a process.

During online information interaction, a series of quick evaluations happen at very short time intervals. The options/alternatives to choose from are far too many and there is not much time at the Web user’s disposal to perform detailed critical evaluations at each step. Users’ perception of the credibility of the information they are seeking builds up dynamically through evaluation of source, medium and content based on their knowledge base. Such evaluations happen in micro steps, each relating to source, medium or content, and these steps are entangled and intertwined. A scenario from one of the online activity sessions illustrates this:

Participant P17 is looking up news on swine flu. He starts interacting with the www.wtvm.com website, which he recognizes as a popular radio station (source judgment). He types “f” in the hope of reaching the website search box. JAWS says “Edit; enter search term.” He feels favorably inclined towards the website because he thinks the search box has been labeled properly (medium judgment). He searches for the news item on the website by entering the term “swine flu” into the box. When he reviews the first result and the date shows it to be just
one day old, he feels good about its currency (content judgment) and decides to read it. As he sets JAWS to read continuously through the piece and starts listening, a page refresh happens. Participant P17 loses his spot on the web page and JAWS starts reading from the top of the page. This frustrates him and undermines his opinion about the usability of the website (medium judgment) and prompts him to move to another website.

Participant P51 narrated a negative experience that reflects the dynamicity of the online credibility perception process, besides bringing out the emotional undercurrents of credibility perception.

When I was first on the website I was saying, “Ya, this is what I am looking for.” Then a few minutes later, just because I am having so much hassle trying to even find information ABOUT it, if I have to spend five minutes of my life trying to figure out what the place is, then it also undermines the credibility. (P51)

The same participant also mentioned a positive experience (see the conversation below) that, again, emphasizes the dynamicity of the online credibility perception process.

P51: Finding the help link for bookmarklet right near it (because I don’t know what it is) makes life easy for me because I don’t have to go to the Help page. It makes me feel nice that somebody is looking out and recognizing that not everybody might be equally familiar with it. This also helps credibility-wise because I think, “Okay I can trust the information here because they care.”

Interviewer: So, does your credibility rating keep shifting as you interact?

P51: It does. It is not totally a fixed thing. For example, I will not trust Yahoo Answers versus another source that is more credible, yet whether they are more or less credible keeps shifting.

Credibility perception for screen reader users in an interactive, digitally mediated online information context is thus seen to be a dynamic process. The following subsections will elaborate upon the themes identified through data analysis about the process.

7.2.1 User Assumptions/Heuristics

Credibility perception has a history. Past experiences of the participants with websites in relation to their trustworthiness and accessibility guided their present interactions with the website. Personal knowledge/beliefs about websites and online information are seen to contribute to their evaluations of websites and web content. Such knowledge/beliefs are implicitly socially
constructed or explicitly acquired through social inputs they receive in the course of their online information practices. These inputs take the form of recommendations/cautions received from offline media, trusted websites and trusted people. All of the above resulted in the participants making assumptions during information interactions that shape their decisions/choices made in the course of their information practices.

When users repeatedly find that some assumption leads them to successful perception of credibility, they might formulate a general rule of thumb. Thus, some assumptions might evolve into heuristics over time and usage. Heuristics are, thus, evolved generalizations. In a technical sense, they are “strategies for problem solving using readily accessible, though loosely applicable, information” (Pearl, 1983). Heuristics are applied by people in everyday life contexts both consciously and unconsciously, and often get refined with experience. Assumptions and heuristics are subjective as they are based on personal experience. Whether the statement “websites that are editable by anyone cannot be trusted” is an assumption or heuristic depends on the user. It could be an assumption for one user and a heuristic for another depending on how successful they have been with it. More research is required to examine this.

The participants used assumptions/heuristics for evaluating websites and web content as part of their credibility perception process. Some illustrations of participant comments relating to their evaluation criteria revealing their assumptions / heuristics are given below:

<table>
<thead>
<tr>
<th>Participant remarks</th>
<th>Underlying assumptions/heuristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Websites that have typos throw me out. I think their credibility is lost right away. (P51)</td>
<td>Sources that cannot assure structural quality cannot be trusted for semantic quality.</td>
</tr>
<tr>
<td>I’ve always received valuable information from those sites. (P13)</td>
<td>Sites that provided valuable information in the past will continue to do so.</td>
</tr>
<tr>
<td>If an organization is credible, its website should be credible. (P32)</td>
<td>Credibility transfers from the physical world to the online world.</td>
</tr>
<tr>
<td>I trust websites with addresses. (P43)</td>
<td>Sources that are contactable must be credible.</td>
</tr>
</tbody>
</table>

Some comments from participants illustrating the source of their assumptions/heuristics are given below:
I think it [perception of information credibility] is a **skill that we develop with experience**. (P30)

I guess by now I **have built up enough information or knowledge base** to know which website I should go to. It very much depends on the information I have learned in the past. (P23)

I might even visit this one simply because it is **more in line with what I feel**. P51

Often we come in with preconceived notions about people. So too we come with **preconceived notions** about websites. Like even before I visited the CDC website or the Yahoo website I had my preconceived notions about them. (P51)

I have some **pre-conceived ideas** about which websites are highly trustable and which are poorly trustable and based on that I believe websites. (P31)

The main thing is **word of mouth**. If many people tell you a site is good, then it usually is. (P13)

During the hands-on sessions conducted at the time of the interview, participants were asked to perform two online information activities. One was to find the latest news about the spreading of swine flu and the other was to find swine flu prevention measures for a friend. Twelve out of the thirteen interview participants went to the Google search website and searched for the information using terms that they thought as relevant. As indicated in previous chapters, participants found the Google website simple and easy to use. Their preferred practice for seeking information when they did not have a specific requirement to go to a particular website was to conduct a search on the Google search website. They then browsed over the search results and tried to decide which website(s) they would use to get the required information. They found the search results display easily navigable using the screen reader. Based on their past experience with Google results, some participants believed that the websites suggested at the top of the list were usually reputable and their information was reliable.

### 7.2.2 Predictive Information Evaluation (Website selection)

Website selection decisions were guided by assumptions and heuristics as discussed in detail in the previous section. Predictive evaluation of the information a website might provide was seen to guide the selection of websites during information seeking. During this process, participants were seen to be guided primarily by the characteristics of the website in its role as the proxy of the source of that information and to some extent by the anticipated experience with
the website in its role as the medium of interaction. Participants drew their assumptions/heuristics primarily from:

1. Past experiences with websites
2. Personal knowledge/beliefs
   a. transfer of reputation from the physical world
   b. reputable/trusted online sources
   c. beliefs about the social Web
3. Referrals received from
   a. Trusted websites
   b. Media
   c. Trusted people

1. Past Experience with websites

One assumption that seemed to prevail among some participants is that if a source had proved to be trustworthy in their past experience, they could trust it for their present information needs. P51 trusted certain websites because they had not previously let her down and her past experiences with them had been good. P59 relied on “tried and true experiences” to tell her which are the best web sites. According to P37, “It takes time and experience to discover what to trust and what not to trust.” And P30 thought, “It is a skill that we develop with experience.” For P29, generally, trusted web sites came from personal experience or referrals from others whose judgments he trusted. P33 said he used criteria that have worked for him in the past.

For similar reasons, other participants found various websites highly trustworthy. P13 said, “I’ve always received valuable information from those sites,” and P15 remarked, “I never had problems with these sites and the contents.” For P51, “… if earlier experience of navigation was easy,” then she is more inclined to use the information. P28’s criteria are, “… if I have used a website before and found their information to be accurate in the past.” P23, P50, P41, and P05 mention past experience as a determining factor for trusting a website.
2a. Personal knowledge/belief - transfer of reputation from the physical world

Participants tended to transfer the reputation of organizations, as they knew them in the physical world, on to the websites of those organizations. P31 said, “The BBC has established itself outside the Web as a trustworthy source of news, so I extend this to their web content.” P21 had reservations about certain types of companies, “I trust the website based on the name and nature of the business provided. If they are an unknown company or do not have at least a known branch in Canada, I won’t go there.”

Participants possibly felt safe in the belief that organizations they trust in the physical world would not betray them online. P42 said, “I largely judge the quality and trustworthiness of the information on the Web by that of the organization behind it.” P32 believed that “if an organization is credible, its web site should be credible,” while P23 felt that, “the quality of information on the Internet is as good as the owners of websites.” P40 would “go to websites that are run by reputable organizations.”

This sentiment was seen in several other responses about why certain websites were considered highly trustworthy:

The entities that they represent are trustworthy. (P32)

I know the organizations. (P01)

It is a big organization. (P44)

[I trust them] because they're legitimate news sources. (P26)

[I would trust them] if I know who they are; if they are well known, trusted. (P41)

If they [websites] belong to reputable institutions, then they are trustworthy. (P23)

They are hosted by organizations that I have found worth trusting. (P05)

I tend to go to the root of the source, or a major news site such as CBC, CNN, etc. (P22)

Participants’ beliefs about information quality were also governed by similar sentiments. Participant P51 remarked, “If a big institution is backing the website, I think the information must be trustworthy.” Participant P08 said, “… if it is on a web page from a reputable organization,” and Participant P23 said “… if the website belongs to a reputable institution.”
An equally strong sentiment was observed about trusting websites that belonged to the Government, educational institutions, charities, public broadcasters, etc. Participant P14 felt that a site would be credible “if it is associated with a public institution such as a university, government office, or hospital.” She also said, “I always assume the websites of charities or similar organizations to be credible.”

Some other examples of websites considered to be trustworthy were:

… if they end in .gov, .edu or .org. (P16)

… all universities and gov. Websites, Public Broadcasters. (P23)

… govt. websites, provincial tourism. (P50)

Participants P35 would trust a source if it is “government, university, hospital, known institutions (such as CNIB), or a known resource such as Encyclopedia Britannica.” Some others trusted the quality of the information, “… if it is from a government organization that I trust (P14),” “… when it comes from the site of a trusted organization or government (P17),” or “… if the information is from government sites, educational sites, published web pages, and I need to know who published it (P34).”

2b. Personal knowledge/belief – reputable/trusted online sources

Several participants held the belief that websites that were well known and reputable would be trustworthy. Participant P11 remarked, “I find that if a website is accessible, reputable, gives multiple results, it is trustworthy,” while P19 said, “I use web sites that are well known or have contact information and resources available.” P22 conjectured, “When I eventually get around to online shopping, I’ll probably only use eBay since it has such a good reputation.”

Participants also believed that information would be of good quality when it came from sources that were reputable, reliable and trustworthy. P51 said, “I look for reliable sources. I am more inclined to use the information if it is from a reliable source known beforehand.” Several others said that information would be of good quality “… when it comes from reputable sources (P24),” “… when the source has been proven reliable (P9),” “… when it’s from a reputable source (P27),” “… if it comes from a trustworthy source (P36),” “… if they [sources] are well known, trusted (P41),” “… when provided by a trusted source (P54),” “… when it is information for school gathered at scholarly sites, and information that is accessible to me (P59),” “if it
come[s] from places that have had a good track record for providing good information that can be verified (P52),” and “if the information is from a legitimate trusted source, and accessibility has at least in some degree been taken in to consideration (P60).”

2c. Personal knowledge/belief – beliefs about the social Web

There was a general belief that Web 2.0 websites were not trustworthy. P16 felt that websites with an option to “edit this page” aren’t usually of very high quality. Some felt that websites that could be edited by anybody and those belonging to individuals do not possess enough authority to be trusted. Participant P06 remarked, “When I found out that anyone can post information on wicapedia [sic], I figured that even a website such as that, if it can be mucked with, it probably has been. So, it [Wikipedia] can’t be trusted one hundred percent. Wikipedia [is not trustable] because anyone can change the information on the site (P47).”

Some others made statements as given below:

I look for source reliability. Websites edited by anyone, like Wikipedia are not reliable. P51

I cannot trust Facebook for health information, political opinion, etc. Wikipedia, in my view, is not reliable source of information as the information can be changed by anyone. P51

Any websites that belong to individuals who are not well established [are poorly trustable]. P23

Generally, [I don’t trust] any personal websites. The information is created and entered by individuals without any vetting. P35

Finally, blogs, unless the author can be established as an expert, are always read with a grain of salt. P31

On the other hand, a few felt that Wikipedia is trustworthy because, “other people trust it (P26),” “[it is] well known: mainstream as in a lot of people use it (P33),” and “[it is] well known and trusted through experience (P37).” These statements show the social nature of trust and beliefs acquired as exemplified further in the next section.

Social Inputs

In conjunction with being directed by personal assumptions as discussed in the previous three subsections, participants’ decisions about the website they would go to depended primarily
on three factors: inputs received from people they trusted, what they found on websites they trusted and inputs derived from the offline media. Participant P59 summed this up quite humorously as, “I rely on commercials, on doctor’s and church clergy’s recommendations, Google and tried and true experiences to tell me about which are the best web sites.”

Of the three avenues for social inputs mentioned above, inputs derived from other websites and from media are discussed below. The third avenue, viz., inputs received from trusted people, is presented in Section 7.2.5 under the heading Community involvement, which also includes other types of social interaction relating to credibility perception besides website recommendations.

3a. Referrals received from trusted websites

Participants rely upon websites referenced on other trusted websites. They “follow links (P03)” from trusted websites. They choose to go to a website “… when they hear about it from trusted websites, or if the information is linked to by other web sites (P13),” “when the site/information … appears on recognized/reputable/trusted websites (P33),” “is linked from trusted websites or referred by others, such as university websites, government, or consumer groups (P40).”

Google is also a source that many participants depended upon to get pointed to relevant websites that they could trust. Some rely totally on the websites suggested by Google. Participant P15 said, “I never had problems with www.google.com and the contents,” while P11 said, “Usually what results come from google [I consider highly trustworthy].” On the other hand, some examine them further before using them. Participant P12 said, “I also use sites that I find through google, but I only trust them, if I find other sites that link to them.”

3b. Referrals received from media

It is becoming increasingly popular for the radio, TV and press to mention the URLs of websites of entities or events referred to in their shows/articles and direct their viewers/readers to those places online for further information. Websites recommended in this manner gain credibility on account of the trust the viewers/readers place on offline media. Participant P31 mentioned that he would use sites “referenced on radio and TV” as well as sites “cited in surveys and in the press.” Participant P46 said, in a lighter vein, “If I was watching Macys [sic]
Participant P09 thought that information found on websites whose “URL has been supplied through media” would be of good quality.

In summary, this section presented some assumptions/heuristics used by the participants for predictive credibility perception during their selection of websites and web content.

7.2.3 Interactive Information Evaluation (Website Use)

Once on a website, participants begin navigating the website and interpreting its content for obtaining the information they are interested in. Interactive evaluation of the website and the web content is done at this stage. During website use, assumptions relating to websites in their role as a proxy for the source that come into play during an information interaction are broadly about (1) the apparent motives of the source as publisher of the information and (2) the displayed evidence regarding connection of the website with the real world presence of the source.

Assumptions relating to websites in their role as the medium of information interaction relate to (3) the security features implemented by the website and (4) the accessibility of the website and web pages for interaction using a screen reader. Assumptions relating to the web content as the message published by the source pertain to (5) critical information evaluation factors such as authority, accuracy, objectivity, clarity, currency, errors and verifiability of information. These five categories are illustrated with examples below:

1. Apparent motives

Participants were wary of the motives behind websites, and generally felt that sites that had too many advertisements, freebies and spam had ulterior motives and were not trustworthy. By way of website assessment, participant P05 always tried to think about possible motives of people who provide information on any site he visited. Participant P10 felt he found quality information whenever there was no soliciting. Participant P26 tried to make sure that any site that he relied on was not trying to sell him a product that relied on his believing the information being provided. Participant P30 endorsed this view, saying, “If the company or organization is benefiting by selling you something, you really need to carefully check any information from their site.”

Advertisements and spam were looked upon with disfavour. If a site contains a lot of advertising along with the information they provide, participant P14 generally assumed it to be
not credible. Participant P37’s view about sponsored links from Google is that they are often not the best, as they usually want to sell something rather than provide information. Participant P20 would generally stick to the sites he knew and trusted. If a site has a lot of ads in general, he questioned its trustworthiness. Further, he claimed that he could just tell if a site is un-trustable. If it “included a lot of spam,” he would not trust it. As for participant P32, if a website attempted to introduce itself to him without his active consent, i.e., as a pop-up or in spam, he would not go near it. And participant P56 did not trust websites that offer free give-aways because they seemed shady to him. P32 felt that all web sites that rely on spam for outreach are not to be trusted.

Besides causing indirect harm, advertisements also affect the online experience of screen reader users and add to their troubles of keeping on top of technology. Ads come in the way of navigation. They confuse and frustrate users. Pop up ads can disorient users and could potentially cause harm to the system leading to trouble-shooting needs. There might be valid reasons for why participants did not look favorably upon sites with too many ads, freebies and spam. Participant P10 felt that Indian music websites [have] too many ads coming in the way. Participant P44 considered most Asian websites poorly trustable due to too many ads and popups. Participant P42 held a valid concern that free things might be accompanied by a lot of advertising that would confuse and frustrate him while navigating the software.” Participant P48 remarked, “[I consider] websites with jokes, international news websites [to be poorly trustable because] after being on their websites pop ups ads come on or sometimes the computer freezes.” Finally, participant P42 said, “I have considered free software downloads from Winamp & Shareware but am afraid to try mostly because firstly, they will surely ask a question during the download that I cannot answer and secondly, I will not be confident to uninstall it later.”

2. Connection with the real world

When participants encountered websites they did not know, they tended to look for additional information about them in the “About Us” section of websites. They also looked for address and contact information that could connect the website with some presence in the physical world. As P03 said, “In the case of websites I don’t know, I read the ‘about us’ section for additional information or their mission.” And, P43 was not being too skeptical when he said, “When it seems too good to be true, I don’t believe it. I need the address.” P44 said he looked for
contact details such as address and phone number on a website and trusted them when they replied his queries well. P19 endorsed this behaviour saying, “I use web sites that are well known or have contact information and resources available.” So did P05 in his remark about why he trusted some websites: “They all have “about” links on them where I can find out more as well as contact information.”

Websites that do not provide self-information and contact details seem to diminish their own trustworthiness in the eyes of visitors as evidenced by the following remarks participants made about websites they would consider poorly trustworthy: “… sites that don’t have a contact us or about us section (P11),” “No contact information for organization (P17),” “… websites not giving address and phone number (P44).” “There is no address on the website. I trust websites with address (P43).” Participant P14, a student, sums it all up well as follows:

If I can’t find contact information to determine the specific origins of the website, or hear no response back when I inquire about these things, I generally assume that the cite [sic] isn’t credible and don’t use it in my research assignments. (P14)

3. Security features

For websites that have financial implications, “… security on websites (P48)” appeared to play a part in their judgments about trustworthiness. Participant P08 said he would “try not to give out credit card info and only try to deal with web sites that accept PayPal.” Participants trusted banking websites for the security features implemented, as seen from the following remarks about such sites.

Websites that are trustworthy have security with log in, passwords, such as banking on line. (P48)

Beside their mere reputation, they force one to re-login if the user was idle for about five minutes. They have a very rigid password procedure. (P21)

I believe they include security features. (P20)

The security levels are very high and they’ve never been in the news for security breeches [sic] on their web sites. (P08)

Even on sites with no financial implications, participants felt that the information would be of good quality if the site was technically secure, as P24 puts it, “Generally I consider … whether or not it [information] comes from a secure site.” Others endorse this security-based
view about information quality as “… if it is logical and if the site is electronically certified (P45),” “… if it's on a secure site (P53),” “… uses secured urls like https P58.”

4. Website Accessibility

As seen in the previous two chapters, the effort screen reader users might put into a systematic evaluation of the information depends on their experiences with the accessibility of the website for screen reader interaction and the emotions these experiences generated in them. Some indicators of how accessibility affected the participants’ evaluation of information credibility are presented here.

For participant P36, easy navigability was a criterion for trusting websites. He said, “[I find] Gmail [highly trustworthy because it is] easy to navigate. [I find] myspace [poorly trustworthy because it is] hard to navigate.” Participants did not prefer to use websites that did not work well with JAWS. When participant P33 came across websites that “won’t go with JAWS,” he would just “kick them off.” If they are inaccessible, he is “not going anywhere near them.” And P34 said, “If it is not accessible there is not much I can do like I can’t process the information given there. Therefore, more than likely I’ll go for another website (P34).”

In their responses to questions about trustworthiness of websites and quality of content, participants mentioned accessibility on several occasions. How accessible they found the website and the content appeared to influence their perceptions about credibility. Participant P53 remarked, “Overall, I find that the quality and trustworthiness of information on the Web is good and satisfactory. However, I’m at the point where I won’t use a site if it isn’t accessible.” And P33 said, “I base much of my decision about the trustworthiness/quality of information found on web sites on the extent to which they are accessible with JAWS.” Reduced accessibility also reduced their ability to assess the website and content. Participant P51 felt that “the most crucial point is that the information should be accessible.” And participant P11 said, “More often than not, they [websites] are not accessible so I can’t even assess how much I trust them.” Some other participants expressed similar sentiments.

I never completely trust a website. That is one of the reasons that I have not taken any online courses. My screen reader seems to read some of what is on the page relative to the actual information contained. I cannot feel comfortable that I can receive all the information and couldn’t certify that fact. (P09)
Due to the inaccessibility or the lack of userability [sic] of most websites, I usually hire a sighted person to help me with research, so most websites I consider trustworthy are not at all accessible, so I really don’t know much about them. (P16)

Some participants were found to express their opinions about accessibility mildly, such as, “Well, if I can read it that’s a step in the right direction (P16),” “Accessibility doesn’t hurt (P50),” “… contains information I need, and preferably is accessible (P19).”

In contrast, some other participants regarded accessibility as a necessary prerequisite for trust. They felt that websites that are not accessible are not trustworthy. Participant P43 said, “Ebay, Amazon [are not trustable because] they are not accessible,” and P43 felt strongly that, “They (websites) have to be accessible.” Participant P11 would find a website that is accessible, reputable, and gives multiple results as trustworthy,” and P59 would consider information that is accessible to her to be of good quality. Participant P60 would consider some information as of good quality if it comes from a legitimate, trusted source, and accessibility has at least in some degree been taken in to consideration.”

The responses of participants P25, P52, and P53 to the questions about highly and poorly trustable websites were interesting, in that they merely wrote: “Same as [earlier question numbers relating to accessibility].” This unequivocal identification of trustworthiness with accessibility revealed the possible importance of accessibility to the online credibility perception of screen reader users.

On the other hand, participant P31 does not subscribe to the view that if a website is not accessible it is not trustable (as seen from the interview excerpt given below.)

*Interviewer: Some people like to take suggestions only from JAWS users, as they want accessible sites.*

P31: I don’t take accessibility as my first filter. I want to know if it is a good website first. And then if it is not accessible I will try to make it accessible to me.

*Interviewer: How do you do that?*

P31: Well just by little tricks, like trying to figure out. So I might explore the site inspecting all the links. If they are not properly labeled and if it is a really trustworthy site, or a site that everyone is recommending, then I’m going to figure it out … because I don’t want to be left behind.
Interviewer: Some people say, “If it is not accessible, I don’t believe it.”

P31: I don’t subscribe to that view.

Participant P51 presented a more balanced view: “Information is reliable because source is known. Makes me more willing to deal with accessibility problems even if they are there. When website is accessible I believe the information more. Works both ways.” She also made some interesting remarks that pointed to credibility perception being an emotional process. It can be inferred that the emotional factors relating to online information interactions using a screen reader, as seen in Chapter 6, might all play into the credibility perception process directly or indirectly.

My whole premise in terms of using the Web is based on knowing at some level, what information can be found where. And when you change the layout of a page, then the information that shows up on the page changes. … I may have to work harder to locate the same information. Then it becomes a bit of a problem. And that strains credibility because credibility is not just a cognitive process; it is also an emotional process, right? You get frustrated. (P51)

Now here’s where it gets annoying. When I got to their (cdc.com’s) “About” page, I did a quick run through and I couldn’t actually find any information, although I found some information under awards and recognition. Their “About” page is not very well structured. But although this is putting me off a little bit, it doesn’t undermine the credibility. Although it does make a HUGE difference if something is well structured, if the source seems credible, you would be willing to excuse, you know. (P51)

Finding the help link for bookmarklets right there (because I don’t know what they are) makes life easy for me because I don’t have to go to the help. It makes me feel nice that somebody is looking out and recognizing that not everybody might be equally familiar with it. This also helps credibility-wise because I think “Okay I can trust the information here because they care.” (P51)

5. Critical information evaluation

Participants tested the web content against their prior knowledge and past experiences along a variety of criteria such as authority, accuracy, objectivity, clarity, currency, errors, verifiability and alignment with personal beliefs. The assumptions/heuristics that they expressed in relation to web content are given below:

a. Authority
Establishing the authority of online information mattered a lot to several participants. Participant P14 said, “If I can see the name of a specific author, I know a site is credible,” while P16 said, “I consider a source to be trustworthy … if I am able to find who wrote the website and read their credentials. Websites with an option to ‘edit this page’ aren’t usually very high quality.” For P17, “Anonymous author” made a website poorly trustable. He normally determined trustworthiness through named authors, trusted organizations and/or multiple similar sources. Participant P23 “cannot trust any websites if the authority of their owners is in doubt.” He does not trust “websites that don’t have information about their authors.” In his opinion, “Any websites that belong to individuals who are not well established are poorly trustable.” Likewise, participant P23’s opinion about a website also depended on its owners.

The quality of information on the Internet is as good as the owners of websites. If I read something on www.utoronto.ca or www.macleans.ca I trust the information. If I read the information on www.doctorbob.com I take the information with a grain of sault [sic]. (P23)

Participant P35 generally did not trust any personal web sites because the information is created and entered by individuals without any vetting. For P50, “Authority is important.” For P31, “[B]logs, unless the author can be established as an expert, are always read with a grain of salt.” For P30, “Assessing the trustworthiness of a website is similar to assessing that of an author of a book. It is important to understand their perspective and interest in the topic and also to compare information from other sources.” Participant P31 considered information to be of good quality when its authorship could be established and he perceived the author to be credible.

b. Accuracy

To decide about information quality, participant P24 generally considered the “completeness and accuracy of the information” and whether or not it came “from a secure site.” P37 trusted a website “when it provides accurate and verifiable information.” P28 said, “I would consider the information to be of good quality if I have used a website before and found the information to be accurate; or when someone I trust recommends a certain website.” He trusted some websites because he “found their information to be accurate in the past.”

c. Objectivity
Objectivity was one of the important criteria used by participants in assessing source trustworthiness and information quality. When assessing the trustworthiness of websites, one of the aspects participant P03 checked was whether the information they provided was balanced and accurate. She thought some news websites such as Fox News could not be trusted because “there is a clear tendency to favor only one position and the facts are many times misrepresented.” She considered information to be of good quality “when it is neutral or balanced” among other things. P14 considered any website with a self-proclaimed or assumed slant on an issue to be poorly trustworthy. She said,

I don’t trust anyone especially not websites that look at only one side of an issue and believe that their opinion is the only one with any importance or credibility. They are interesting to get some perspective but should not be used as relayers of facts. They have taken information and only reported the parts that will strengthen their argument. (P14)

To the question about which websites he did not trust very much, participant P01 responded, “[Websites] run by Politicians; news outlets (use them but not trust them) [because] [t]hey put their own spin.” P07 considered “websites that are intent on propaganda only, not truth” as poorly trustworthy.” P16 mentioned a website he referred for his school work that he thought was “slightly untrustworthy simply because the writing is very opinionated and not very objective.” For P45, trusting a website “depends on the amount of logic and how the information is handled.” P26 tried to make sure that any site he relied on was “thorough in its discussion of a topic.” P07 trusted news sources that gave “both sides of a story, if in doubt.”

How logical the information seemed also mattered to P22 and P45 as seen from their remarks: “[I would consider information to be of good quality] when it is well footnoted, when it seems very, very logical, and is backed up by other sources or websites (P22),” “[I would consider information to be of good quality] if it is logical P45.”

d. Clarity

Participant P03 considered information to be of good quality “when it is presented clearly” among other things. She considered clarity of content presentation as one of the criteria for assessing the trustworthiness of websites. Participant P24 felt that “how clear and how explicit the information being given is, helps determine whether you can really trust it.” Some of the criteria used by others to assess information quality were: “… when it is clear and sounds
authentic (P12),” “… when it is well footnoted, when it seems very, very logical (P22),” “… when it responds clearly to my query (P25).”

e. Currency

Participant P23 said he wouldn’t trust websites that don’t have information about the date they were updated. “I think websites are just like books,” he added. P55 thought that websites “making update to the webpage regularly or every week” was a mark of information quality. For P50, “timeliness” of information was important and a website would be a good information source “[w]hen it is well updated, with the updating date marked on the content.” P34 said that the only information she trusted on the web were from “published web pages, government sites and sites that have copyrights and are up to date.”

f. Errors

Surface characteristics such as spelling errors and sloppy language influenced how some participants felt about trusting the information. Participant P32 remarked, “If a site contains sloppy use of language, such as improper spelling, errors of grammar or style, blatantly false information, I don’t trust it.” P51 said, “Websites that have typos throw me out. I think their credibility is lost right away. The spelling must be good; else I get put off.” Participant P41 said, “[I would consider information to be of good quality] If there are no spelling mistakes and the English is good.”

g. Verifiability

In his research that dates to before the advent of the Web, Rosenthal (1971) found that verifiability of message content is crucial for its credibility and that information that could not be validated would be perceived as less credible. This seems to be reflected in the behaviour of the participant group with respect to information on the Web as well. The extent to which websites provided additional sources by way of links and references influenced how good participants thought the source and information were. Participant P03 said, “I generally look for additional sources either listed or referred to in the websites.” She would consider information to be of good quality “when it has references.” She trusted websites that “provide other useful
Participants used verifiability as a criterion even while assessing information quality, as evidenced by the following excerpts: “… if the web page … contains references and resources (P43),” “… when it is presented with resources and references (P25),” “… if it has references and incorporates information from recognized sources (P40).”

In summary, participants expressed several criteria—authority, accuracy, objectivity, clarity, currency, errors, verifiability, and alignment with personal beliefs—that they would use during evaluation of a website/web content in the process of locating and using online information. Although participants mentioned all these critical evaluation criteria that they use to evaluate information, in practice, the extent to which they are able to interact with the desired information is determined by the ease of navigation and interpretation that the website and its content allow. During the hands-on online activity sessions, it was observed that participants spent more time managing the navigation and interpretation aspects in the face of inaccessible features presented by websites and spent relatively less time in performing evaluations. Given all the constraints such as information inaccessibility, uncertainties and emotions described thus far in this document, it is not surprising that participants required additional efforts to be convinced about the reliability of the information at hand, for which they resorted to information corroboration as detailed in the next section.

### 7.2.4 Information Corroboration

Online information corroboration is an important aspect of information literacy and plays a significant role in the empowerment of Web users. In the case of screen reader users, corroboration might also be a coping mechanism for dealing with the uncertainty associated with hearing the web content in the awareness that they are possibly not getting all of the information. The findings about information corroboration suggest that participants were not sure of what they received through their screen reader and felt the need for verifying the information through other sources before allowing themselves to be persuaded by it.

Most participants expressed the need to verify the information they obtained online with other sources. Participant P50 said, “I check if the information connects with everything else or
not. I go to several websites and see if they compare.” Whenever participants felt uncertain about the credibility of the information they found on one website, they tried to corroborate their findings with other online and/or offline sources. Sometimes, the concern was that the authority of the source could not be ascertained, as P51 remarked, “Corroboration with other sources is necessary when the source is not known.” Sometimes, it was about opinion bias. “Because there is a clear tendency to favor only one position and the facts are many times misrepresented, I search for more than one point of view, to obtain a balanced account of events or balanced analyses,” said participant P03.

In general, information corroboration appeared to be their way of ensuring the reliability of the information when they were not certain about their assessment of its quality. For corroboration, they used (a) other online sources, (b) offline sources from other media, and (c) people.

a. Corroboration through other online sources

Participants did not feel satisfied with obtaining information from only one website; they verified it with other websites. They liked to compare and cross-reference through multiple online sources. Their general attitude was one of caution. “Proceed with caution and verify the information with other sites and measures,” said participant P09. P50’s thumb rules for identifying good quality information were (a) evaluating the information source and determining if the source is trustworthy, and (b) identifying a number of information sources on the web that present the same facts and draw similar conclusions. P22 tried to “find another site which backs it up, or contradicts it.” P03 would “Google more information to read others’ opinions about them [websites].” P18 would “cross-reference information between multiple websites.” In general, P19 would “verify web information with other web resources or other information resources.” P26 would "make sure that the site is thorough in its discussion of a topic, which can be corroborated by information provided on other websites.” Participant P35 said, “If they [websites] look legitimate, but I don't know for sure, I look for other web sites which verify the information.”

In the context of assessing information quality, corroboration played a huge role. Some criteria the participants went by were: “… when it can be validated through multiple online sources (P17),” “… when I can verify it across multiple websites (P18),” “… when it is backed
Participants did not stop with verifying information only across other websites. They also went to offline sources, as detailed in the next section.

b. Corroboration through offline sources

Besides checking other websites, participants also used offline sources to verify information they accessed online. P17 said that he normally determined trustworthiness through named authors, trusted organizations and/or multiple similar sources. He considered a website whose information could not be “verified through multiple sources” as poorly trustable. P33 said, “I base much of my decision about the trustworthiness/quality of information found on web sites on the degree to which the information found on a site matches that which I have gathered through other offline sources that I trust.” In the view of P46, some websites are trustable because “what they report you hear on TV and radio.”

Participants considered information to be of good quality when they were able to verify it with offline and/or online sources: “… when I cross reference that information with another online source or radio, news paper info (P07),” “… when I am able to verify it through other sources (P02),” “… if I’ve found a source trustworthy in the past or can confirm it on at least a couple of independent sources (P05),” “… when I can verify it across multiple websites and/or written documentation (P18),” “… when it is well footnoted, when it seems very, very logical, and is backed up by other sources or websites (P22),” “Typically, when the information can be validated through at least one other source (P31),” “… when it contains information that I am able to corroborate using other sources (P32),” “If I can find agreement among information about the same thing in different sources, then I consider that information good (P35),” “When I can cross reference with some other source (P41),” “If it can be verified by 2 independent sources or come from places that have had a good track record for providing good information that can be verified (P52).”

Information corroboration also occurs during current interactions with similar information already accessed. This shows that corroboration could also happen backwards in time, as exemplified by the following two conversations:
P03: For swine flu we have been bombarded with all kinds of information so it is easier to judge.

Interviewer: When you say easier to judge, do you mean you know something and you read something which is kind of similar to that then you think that it should be correct?

P03: Ya.

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P51: I have no trouble accepting the information from the CDC [website] because there is corroboration. I remember I had seen pretty much the same information on the U of T Crisis web page.

Interviewer: So you are corroborating with something you know already?

P51: Yes. What I saw on the CDC website is not inconsistent with what I already know.

This point illustrates the dynamic, continuous and connected nature of credibility perception as a process. The third aspect of corroboration with people is dealt with in the next section, which considers the explicit involvement of community in the credibility perception process.

7.2.5 Community Involvement

The association between credibility and community is becoming increasingly obvious in both theoretical and empirical references in the literature over the past few years, especially in discussions around online credibility (Eysenbach, 2008; Hilligoss & Rieh, 2007; Lankes, 2008). Data from this research provide ample evidence to support the claim that community support is essential for credibility perception, establishing it as a social process. Community support for the research sample came both in the form of consultations about trustworthy websites and good quality information to help in predictive evaluations and in the form of discussions for corroboration of information found online. Help was thus available in the pre and post stages of information seeking. Data in support of the above claims is presented below. A deeper discussion of the social nature of credibility perception is provided in the next chapter.

Support from their community serves to scaffold the participants during evaluation by contributing to their assumptions/heuristics. In P31’s view, “If people are talking about it, like if
I see on the news or hear on the radio, you know, people are saying, ‘Ya, go here for information’.

Support from their community serves to scaffold the participants during corroboration by providing avenues to verify/corroborate information.

a. Community for Consultations

Participants said that they relied upon recommendations received about websites from people they trusted. “The main thing,” participant P13 said, “is word of mouth. If many people tell you a site is good, then it usually is.” And P37 remarked, “A good personal reference from someone you trust is always recommended.” Participant P21 said he receives a lot of links via email while P12 said he used sites that others told him about.

Participants also followed the recommendations of people they trusted when it came to deciding whether the quality of some online information is good enough for their use. P51 said she would go with some information “if others recommend,” which P13 would when he would “hear about it from other people.” For P29 and P28, trusted web sites generally came from referrals from others whose judgments he trusted. P16 would consider a source to be trustworthy when someone he trusted to know the difference told him it is. P33 usually thought of websites that “aren’t known and/or used by his friends” as less trustable.

It is interesting to note here, that community consultations happened irrespective of the level of online interaction proficiency. For example, Holly said, “If someone I regard says that a website is of interest to them, then there must be something there (P31).” Mina used “friends’ recommendations (P51)” as one of the criteria when it came to deciding which websites to go to. And Laura said she would using some information when it comes from a website that had been recommended by someone she trusted, such as “a family member or good friend or a trustworthy company (P39).”

Besides personal recommendations from close ones as detailed above, participants also derived much of their sense of which websites to trust based on how popular they were and how much other people endorsed or vouched them. They felt the need for such vouching due to the apparently contradictory nature of information as found on different websites. “Information on the Internet is often contradictory. Other people’s vouching is important to know what is good. A
name or face makes it more believable,” said P51. P33 based much of his decision about the trustworthiness/quality of information found on web sites on the “extent to which they are used by others, known / popular.” The fact that some others trusted them and used them automatically made some websites more trustworthy than others for some participants.

[I trust] CBC, Toronto Star, wikipedia [b]ecause they're legitimate news sources because other people trust them. (P26)

[I trust] Canada.com, google.ca, charityvillage.com, wikipedia.com because they are well known: mainstream as in a lot of people use them. (P33)

[I trust] ibm.com, wikipedia.com, sourceforge.net, large banks, universities, large newspapers and government of Canada gc.ca. [These are] [w]ell known and trusted through experience by many customers. (P37)

[I consider] www.microsoft.com & www.freedomscientific.com [to be highly trustable because] these are great companies; melions [sic] of people access them every day. (P55)

Some participants went by advice provided by a community of users such as members of online communities and consumer groups. Participant P40 said, “I go to websites that have been referred by others, such as university websites, government, or consumer groups.” P31 described his experience of actually participating in a community rating process of travel information.

Although it [www.tripadvisor.com] depends highly on users providing content, we as the users get to rate the quality of the information, and it is usually pretty clear if/when someone provides incorrect information, based on other user responses. (P31)

b. Community for Corroboration

In conjunction with making use of recommendations about good websites and good online information from their close ones and the larger community, participants also consulted people they trusted to discuss about information they obtained online in an effort to corroborate and confirm their selection as credible enough for use. Discussing online information with other people was common among some participants as part of the information corroboration process. Participant P22 would often discuss information from websites with others to see what they think, or if they have heard the same thing. P28 would discuss with someone that he trusted what he read from a particular website. P11 would consider some information to be of good quality if
she had heard of it before, or somebody she knew had heard of it. Sometimes participants found much value in such discussion, as can be seen from the anecdote shared by P16:

I also used the below website, and thought it was slightly untrustworthy simply because the writing is very opinionated and not very objective, but it wasn’t until my friend looked at it and said, ‘Oh, you shouldn’t use this site, it’s not a reliable source at all’ that I thought of it as untrustworthy enough not to use in my paper: http://www.dominionpaper.ca/articles/1070. (P16)

P33 felt it necessary to be able to consult with others about websites to determine the quality of information found therein. He usually thought of those that aren’t known and/or used by his friends as less trustable. “Because they are not well known, not used by my friends so I can’t really ask anyone about their take on the quality of the information,” he said.

7.2.6 Context of Information Interaction

The context of the information interaction determined how much effort participants would invest into evaluation as well as corroboration. Participant P51 said that feeling concerned about trustworthiness of online information “depends on what it is for—weather not a problem; researching a paper is different. Health needs greater concern than latest hairspray.” This view is endorsed by P7 who said, “What you use the information for makes a big difference (in how it should be evaluated).” Participant P37 remarked that the strategy he used for getting health information depends upon what exactly he was searching for, but he considered Wikipedia as a good starting point.

Context and type of information also bestowed different levels of trustworthiness on different sources, as expressed by P23.

Interviewer: Among all the sources that you get information from—radio, TV, Internet, people—which one do you believe most?

P23: It depends. If I am looking for a pub downtown, I believe my friend. But if I am looking for swine flu I believe the CDC website. And if I am doing a research about the American Foreign Policy I trust websites and books and a variety of sources. I guess basically it depends on the type of information. If it is a fact, of course I can check the fact.

Participant P03 had a general idea of what she did for evaluating information, which she tailored to suit the kind of information she was looking for.
This is to say that, although in general I look for "qualified" information and do check the source when I google something, and I analyze the info when I go to websites, I guess that what I do ultimately depends on the kind of information I am looking for because if I am looking for news on Afghanistan, I am not going to go to governmental websites and then I need a lot of different sources because everybody has agendas. (P03)

For P34 and P37, blogs and wikipedia were credible but only in some situations.

I read blogs but not frequently. When I am looking up info on some thing, sometimes blogs help. I read through some posts and the comments. But when I’m doing research usually I don’t base it on blogs and stuff like that because I don’t know how accurate they are. So those are things that I really don’t trust much. That’s just people’s opinions and stuff. Sometimes it is good to read it. But I wouldn’t use that in research because I don’t think it is really credible. (P34)

P51 clarified that looking at multiple sources need not necessarily be for seeking concurrence or corroboration, but that it depended upon the context of the information seeking.

What I saw on the CDC website is not inconsistent with what I already know. But again, sometimes you want things to be inconsistent and in other cases you don’t want them to be. If you are writing a paper and you are researching online, you want disparate points of view so that you can compare and contrast. (P51)

Participant P51 also felt that contextualizing online information in the light of other aspects of the website is also important for credibility perception. “You know, when you look at other aspects of the website, it is easier to establish credibility because you can put it in the context of what they are trying to say or do,” she said.

For participant P50, when she would keep searching a website and when she would move on to an alternative one depends on the situation in context. “If I find the quality bad, I skip to the next site. Of course, this depends on the topic, and whether or not I feel reasonable trust,” she remarked.

In summary, Sections 7.2.1 through 7.2.6 presented the findings derived from the data about how screen reader users who are blind or vision impaired perceive the credibility of online information in everyday information seeking contexts. Users make assumptions about websites and their content based on their past experiences and personal knowledge/beliefs, which are implicitly socially constructed, or based on social inputs explicitly acquired. Assumptions that are repeatedly successful when applied likely evolve into personal heuristics or general “rules of
thumb” for the user for evaluating websites and web content for determining the credibility of the information they contain. During online interactions, users’ perception about the credibility of the information they are seeking builds up dynamically through interactive evaluations of the website and the web content. These evaluations are based on users’ assumptions/heuristics. To what degree they evaluate a website and the information they find there depends on their experiences in using the website with the screen reader and their resulting emotional state. If users feel uncertain about the credibility of the information they find on one website, they try to corroborate their findings with other online and/or offline sources till they reach a desired confidence level. The context of the information interaction determines how much effort they would invest into evaluation as well as corroboration. Support from their community serves to scaffold them—during evaluation by contributing to their knowledge base, and during corroboration by providing avenues to verify/corroborate information. The next section examines how the screen reader mediates the credibility perception process.

7.3 Screen Reader Mediation of Online Information Credibility Perception

As expressed by several participants, the screen reader plays a positive role in making online information available to its print-disabled users. There are some limitations experienced during screen reader use, which are primarily due to the interaction paradigm adopted in the screen reader design and the current lack of technologies to automatically convey visual features through alternative modalities. This section synthesizes findings discussed in previous chapters from the angle of how the use of the screen reader possibly shapes the online information credibility perception of its users.

For a large part, earlier online experiences while using the screen reader (mostly relating to accessibility) form a part of users’ assumptions about websites and web content and these assumptions guide their credibility perception process. Some users directly identify accessibility with credibility while some are more discerning in their judgments. Yet, there is ample evidence from this research pointing to the direct and indirect influence accessibility has on users’ credibility perception, as detailed in the following paragraphs.

When it comes to website selection through a search, using a screen reader might have an effect on the search results obtained because the spelling ability of screen reader users is generally affected by learning words through hearing rather than seeing, especially where there is
a mismatch in the English language between pronunciation and spelling of words. To the extent
to which this leads to misspelling of intended search terms, it might have an impact on the search
results generated and therefore on the website selection process itself. A second aspect of
website selection is about sponsored links. Visually, the sponsored links are differentiated from
the main search results. But the screen reader reads out all links serially, with the sponsored
links being read out first. If the user is not experienced, they might miss noticing that they are
encountering sponsored links, and even think of them as being more credible because they occur
at the top of the search results list.

Users’ ability to interactively evaluate online information depends on their proficiency in
using the screen reader to navigate websites and interpret web content. For credibility perception,
navigation within and across websites and web pages is essential for access, interpretation and
evaluation of content. Where web pages do not provide text labels for image-based navigation
elements such as image maps and hotspots, the screen reader user’s ability to navigate past them
is restricted. This could result in the user not accessing all the information provided on the web
page/website. Another restriction to navigation happens when navigation elements such as
menus are not designed to be keyboard operable. In such a case, users will not be able to operate
those controls, or even realize their existence. Users’ ability to navigate is also restricted where
access points that are guarded by visual access controls (such as CAPTCHAs) are not provided
with alternative methods. This also results in users not being able to access the resources that are
so guarded.

Users’ ability to interpret web content is equally important for credibility perception.
Visual cues, such as a logo of Verisign, often aid credibility judgments because they signal the
website’s level of security. The screen reader can convey information about such images,
graphics and animations only if alternative text descriptions have been provided for them. Users
loses the advantage of those that are not described. Similarly, interface cues that are signaled
through physical layout of content on the page are accessible to a screen reader user only by
providing relevant meta-information or by maintaining the order of coding the content to reflect
the visual layout.

The screen reader announces technologies underlying web pages such as “Flash”, “PDF”,
etc. as a signal to its users about interaction possibilities. Users’ accessibility experiences with
these technologies leads to assumptions being made by them about these technologies, which underly online interactions. Such assumptions are seen to influence how the credibility of the associated information is perceived. The “visibility” through the screen reader of these technologies is also seen to distract the user from evaluating online information.

Screen reader users get frustrated when faced with difficult situations on the Web during online interactions. Such frustrations arising from the screen reader’s apparent inability to interpret inaccessible web content is seen to diminish the credibility of information that they obtain from the content. It also prompts them to move to other websites. But again, the type of emotions the screen reader evokes in users depends on their online experience. Finally, uncertainty resulting from incomplete access to information prompts users to move to other websites.

The following section integrates findings from Sections 7.2 and 7.3, and presents a model representing the process of online information credibility perception.

7.4 A Process Model for Online Information Credibility Perception

The previous two sections analyzed the findings with respect to the two questions that drove this research. This section synthesizes the findings from this research into a model of the online information credibility perception process relating to screen reader users who are blind or visually impaired (see Figure 7.1). This model brings together the three areas of information practices, credibility perception, and web accessibility that constitute the conceptual framework adopted for the research (see Figure 2.1 in Chapter 2), and shows how these are interconnected. In doing so, it focuses on how the two research questions probed a space that falls at the confluence of these three areas. A discussion of the model follows.
Evidence from this research shows online information activity to be a dynamic process of interaction and interpretation rather than mere access and retrieval. This underscores a need for continuous evaluation. Online information credibility perception is, therefore, best viewed as a dynamic process where a series of quick evaluations happen within very short time intervals.

The model in Figure 7.1 is based on the general pattern of information interactions observed with the participants in the online context that involves the following steps: identifying websites for use; locating, interpreting and evaluating informational content; and corroborating information across different sources. Online information credibility perception is the conscious/unconscious application of personal assumptions/heuristics (derived from past online interaction experiences and cultural-historical knowledge) during online interactions for ‘quick-and-dirty’ or systematic evaluation of information (depending upon the context). It is a dynamic process of micro judgments of the website and the web content, where the website is viewed
both as a first level source of the information and as the structural platform or medium that holds the information.

The online information credibility perception process depicted in the model is derived from the context of everyday information practices, which involves information seeking, use and sharing (Savolainen, 2008). As part of their everyday information practices, screen reader users engage in conscious/unconscious information evaluation resulting in a perceived notion of the credibility of the information. Users tend to make assumptions about websites and web content in the context of their online information practices. These assumptions are governed by their personal knowledge/beliefs, and influenced by community involvement as well as by their interactions with technology. Evaluative heuristics evolve out of these assumptions in the course of successful usage. Information evaluations made during online interactions are based on these assumptions/heuristics. The context of the information interaction determines how much effort the user might consider investing into the evaluation.

This research indicates that there are three phases in the information credibility perception process: predictive perception, evaluative perception and information corroboration. These processes are seen to map respectively with the information seeking, using and sharing stages of everyday information practices. During online interaction, Web users start with a predictive perception about the credibility of the information they are seeking, primarily formed on the basis of heuristic evaluation of the website where they hope to find that information. These evaluations guide their selection of a website to look for the information they want.

While they interact with the website and web content in the process of locating/using the desired information, they perform further evaluations of both to build upon their predictive view of the credibility of the information they are seeking. Their interactive evaluations are guided by their assumptions/heuristics and their technology interaction experiences during orientation/navigation within and across websites as well as location/interpretation of information. These evaluations might be done along several possible dimensions as indicated in the model, such as contact info, technical security, etc. for the website and clarity, currency, etc. for the web content. During this phase, users’ perception about the credibility of the information builds up dynamically through interactive evaluation of the website and the web content.
Websites with low accessibility make evaluation difficult for screen reader users. If users feel uncertain about using the information they derived through their interaction with the website and web content, they try to confirm it through a process of corroboration by interacting with other online and/or offline sources, including people. This involves interacting with other websites (using a process similar to that described above) or interacting with offline sources like radio, TV and printed material or interacting with people using online or offline communication methods. User’ information corroboration efforts define the support they seek/get from online as well as offline sources to ascertain the dependability of the source and the reliability of the information.

While the above three stages of information evaluation essentially mark the process of the online information credibility perception process in the context of the information interaction, community is also seen to an play important role. Community support serves to scaffold users, both during evaluation (by contributing to their heuristics base) and during corroboration (by providing additional avenues to verify/corroborate information). The scope of the process of credibility perception extends beyond the individual user’s cognition and includes social cognition, or what users and their community mutually know about one another’s assumptions regarding the credibility of online information. This observation is supported by the Social Cognitive Theory (Bandura, 1986), which posits that portions of an individual's knowledge acquisition can be directly related to observing others within the context of social interactions, experiences, and outside media influences. An individual’s credibility perception is shaped by, and in turn shapes the perception processes of others in the community. It enhances the experience of the individual and contributes to their information assessment expertise.

Data from this research provide ample evidence to show that community support is an integral part of credibility perception, thus establishing it as a social process. Such community involvement, spurred by uncertainty in evaluation, need not necessarily be a phenomenon restricted to screen reader users. On the social Web, where information evaluation is more difficult for Web users in general, the role of community involvement could be expected to be high for all users and not merely for screen reader users. For this reason, online participation is essential for effective online credibility perception.
As can be seen from the bottom portion of the model, technology plays an important role in the online credibility perception process of screen reader users, and it spans the entire range of online information activities. The dynamics of online interaction mediated by a screen reader is different from the unmediated one. For screen reader users, the activities of orientation and navigation within websites as well as location and interpretation of web content are more tedious, and especially so when the website does not provide adequate meta information. It was observed during the online activity sessions that participants spent more time managing navigation and interpretation in the face of inaccessible features and spent relatively less time in performing evaluations. In such cases, they had to make additional efforts to convince themselves about the credibility of the information.

The screen reader mediates the online information interactions of its users. Three factors that come into play on account of screen reader mediation are online information accessibility, technology opacity, and users’ emotional responses to accessibility problems they face. Online information accessibility is the extent to which users are able to seek/evaluate/use/share information in the course of an online information interaction. Online interaction proficiency is the term used in this work to represent how effectively users are able to interact with online information. Traditionally, ensuring online accessibility is considered the responsibility of websites. But this research examined the issue much deeper and found that accessibility depends on three factors: affordances provided by the screen reader, meta-information provided by the website and online interaction proficiency of the user. This is a very important finding from the human-computer interaction angle. Suggestions are discussed in Chapter 8 for improving screen reader affordances through better design and enhancing online interaction proficiency through online participation.

The Web, as a medium, is a bundle of technologies. The qualitative measure of users’ awareness of mediating technologies during a human-computer interaction has been conceptualized in this research as technology opacity. The screen reader often announces technologies underlying web pages as a signal to users about interaction possibilities. For example, when the screen reader encounters a Flash movie, it announces “Flash movie start” before it starts and “Flash movie end” after completion. The more visible mediating technologies are, they more likely it is that the user will recognize that the information they are accessing is mediated rather than having a seamless interaction experience. Users might be aware of the
technologies and yet not understand their working. This might lead to faulty assumptions being made by users about some technologies (such as Flash, PDF, etc.), which influence how the credibility of the associated information is perceived. If users have bad experiences with some Flash objects, they begin to rate websites with Flash badly. Users also become aware of the design and presentation aspects instead of experiencing the interaction holistically. When the intervening technologies interfere with the interaction experience, technology opacity provides users with explicit targets to vent their emotions on.

Technology opacity is a general issue for all Internet users. For example, novice users and those with low capacity Internet connections might also feel the effect of the medium to some extent such as when encountering unmanageable popup messages or while experiencing slow loading of web pages. Thus, mediating technologies do play a role in the credibility perception process for all Web users, possibly in a less obvious way.

There is often a loss of context when screen reader conveys information sequentially. Insufficient context leads to uncertainty, which results in various emotions. Screen reader users often get frustrated when faced with difficult situations on the Web during online interactions, such as CAPTCHAs or automatically refreshing web pages. If users get frustrated with inaccessible web content, that could diminish the credibility of information that they obtain from the content. Finally, uncertainty resulting from incomplete access to information often prompts users to move to other websites. Users often consider the sites they move away from as not being credible enough.

An attempt is made in Table 7.2 to compare the themes of online credibility perception identified in Section 7.2 with the literature.

Table 7.2. Comparison of online credibility perception themes with literature

<table>
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<tr>
<th>Main themes</th>
<th>Sub themes</th>
<th>Mentioned in the literature by</th>
</tr>
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<tbody>
<tr>
<td>Website selection</td>
<td>Past Experiences</td>
<td>Fogg et al. (2003c)</td>
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<tr>
<td></td>
<td></td>
<td>Hilligoss &amp; Rich (2007)</td>
</tr>
<tr>
<td></td>
<td>Personal knowledge/beliefs -</td>
<td>Eysenbach &amp; Kohler (2002)</td>
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<tr>
<td></td>
<td>Transferring reputation from the</td>
<td>Fogg et al. (2003c)</td>
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<tr>
<td></td>
<td>physical world</td>
<td>Liu (2004)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hilligoss &amp; Rich (2007)</td>
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<tr>
<td></td>
<td></td>
<td>Flanagin &amp; Metzger (2007)</td>
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<tr>
<td></td>
<td>Personal knowledge/beliefs -</td>
<td>Fogg et al. (2003c)</td>
</tr>
<tr>
<td></td>
<td>reputable/trusted online sources</td>
<td>Hilligoss &amp; Rich (2007)</td>
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</table>
As can be seen from the table, most, although not all, of the credibility perception themes from this research are similar to those reported in earlier studies conducted with sighted users. Accessibility and information corroboration are two aspects that indicate variance. Although Olaisen (1990) used the term accessibility, it was not in the sense of online information accessibility resulting from technology intervention. Secondly, although information corroboration is reported in some earlier studies, the same has not been emphasized to the degree to which it appears important to this participant group. Thus, two aspects that are found to be in variance are the effect mediating technologies have on the credibility perception of screen reader users, which underscores the importance of information accessibility and the extent of social

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<tr>
<td>Referrals from Media</td>
<td>Hilligoss &amp; Rieh (2007)</td>
<td></td>
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<tr>
<td>Referrals from Trusted people</td>
<td>Hilligoss &amp; Rieh (2007)</td>
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<tr>
<td>Website Evaluation</td>
<td></td>
<td></td>
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<tr>
<td>Security features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility*</td>
<td>Olaisen (1990)</td>
<td></td>
</tr>
</tbody>
</table>

**Content Evaluation**

| Authority                                      | Liu (2004)                  |
| Accuracy                                       | Fogg et al. (2003c)         |
| Objectivity                                    | Fogg et al. (2003c)         |
|                                                | Liu (2004)                  |
|                                                | Hilligoss & Rieh (2007)     |
| Clarity                                        | Fogg et al. (2003c)         |
|                                                | Liu (2004)                  |
| Currency                                       | Eysenbach & Kohler (2002)   |
|                                                | Liu (2004)                  |
| Errors                                         | Liu (2004)                  |
|                                                | Hilligoss & Rieh (2007)     |
| Verifiability                                  | Liu (2004)                  |
|                                                | Freeman & Spyridakis (2004) |
| Information Corroboration**                    | Other websites              |
|                                                | Hilligoss & Rieh (2007)     |
|                                                | Rieh, Hilligoss & Yang (2007) |
| Information Corroboration**                    | Media                      |
|                                                | Hilligoss & Rieh (2007)     |
|                                                | Rieh, Hilligoss & Yang (2007) |
|                                                | Mattus (2007)               |

* Olaisen’s reference to accessibility was in the sense of an individual’s access to people in terms of relative social location. His study did not involve online information.

** Mentioned, but emphasized less.
influence on their online credibility perception process, which stresses the importance of community for context.

In summary, the model in Figure 7.1 brings out a three-phase process of credibility perception happening with screen reader users that spans different media and resources where users rely on their assumptions and heuristics in performing information evaluations. It further emphasizes the roles played by technology and community on credibility perception. In their study about how people make credibility judgments in a wide variety of everyday life information seeking contexts, Hilligoss and Rieh (2007) have reported their observation of three stages in the credibility judgment process as prediction, evaluation and follow-up judgments involving verification/reevaluation/clarification/refusal. Thus, comparing the findings with the literature shows that the credibility perception themes and the three-stages in the credibility perception process are similar to earlier findings from studies with sighted participants while the community involvement and technology effects are significantly different. This research provides evidence for difficulties experienced by screen reader users in information evaluation due to technological factors, resulting in a greater need for community support in credibility perception in their case than might be required for sighted users. Where information evaluation becomes more difficult for Web users in general, such as with novice users or on the social Web, the role of community involvement could be expected to be higher for all users. This model, therefore, represents an inclusive and general model that might be applicable to all Web users.

7.5 Summary

This chapter discussed answers to the two questions raised and explored in this research. It analyzed the credibility perception process in the context of everyday online information practices as experienced by screen reader users. It also analyzed the mediating role played by the screen reader in online interactions, emphasizing the ways in which it shapes users’ credibility perceptions. A model for the online information credibility perception process was presented, synthesizing the answers to the two research questions. Credibility perception process of screen reader users was found to be fundamentally similar to that reported in research with sighted users, differing in two ways marked by technology mediation and community involvement. One of the important themes that emerged from the discussions in this chapter is that community is an
important component of the credibility perception process. Further discussion on this theme is presented in Chapter 8.
Chapter 8 – Discussion

“My whole premise in terms of using the Web is based on knowing at some level, what information can be found where. And when you change the layout of a page, then the information that shows up on the page changes. … I may have to work harder to locate the same information. Then it becomes a bit of a problem. And that strains credibility because credibility is not just a cognitive process; it is also an emotional process, right? You get frustrated.”

— Participant P51

8.1 Introduction

The previous three chapters systematically examined how online information interactions are accomplished by screen reader users who are blind or visually impaired, how they use the Internet in the course of their everyday information practices, and how they perceive the credibility of information online. At the close of each of these chapters, one theme that emerged from the discussions in that chapter was identified for deeper examination. The three themes, as listed below, are discussed in the following three sections of this chapter, followed by a summary of the chapter in Section 8.5.

1. Screen reader interface affordances as facilitators of credibility perception
2. Community as a component of the credibility perception process
3. Online participation as a means for information inclusion

8.2 Screen Reader Interface Affordances as Facilitators of Credibility Perception

This section introduces the concept of affordances, looks deeper at interface affordances in the context of human-computer interaction (HCI), and examines how the screen reader interface could be designed better to enhance the action capabilities of the user.

The goal of screen reader design has always been to “allow a blind user to interact with online interfaces in an efficient and intuitive manner.” (Edwards, Mynatt, & Stockton, 1995, p. 56). During the mid-1990s, when the sighted community was quickly adopting graphical user
interfaces (GUI) as a more intuitive interface, there was a growing concern about the blind community being left behind. However, with the development of screen readers for GUIs, it became possible for them to use graphical systems. Participant P23 recounts his transition from text-based computer systems to Windows:

I remember in 1994 when there was talk about a new system called Windows. Blind people were very worried because they thought that they would be shut out because Windows was visual. In fact until 1998 I, like many blind people, refused to switch to Windows because I thought it wasn’t accessible. And once I switched to Windows because JAWS came along, oh, then I knew what I was missing because using DOS was like living in the Stone Age. (P23)

Some researchers attempted to translate the screen reader interface in terms of the affordances of the onscreen objects (Mynatt, 1997). They emphasized conveying the types of objects in the interface, as well as the attributes and affordances of those objects. An affordance could be viewed as a perceivable cue for a performable action. The term cue signifies a hint, suggestion, reminder, or prompting. The term affordance was originally introduced by ecological psychologist James J. Gibson (1977) in his article “The Theory of Affordances” and explored more fully in his book The Ecological Approach to Visual Perception (Gibson, 1979). Gibson theorized that individuals could perceive the functional significance of objects from their properties and use that knowledge to negotiate the objective external environment using subjective internal representations. He termed this functional significance the affordance associated with the object as perceived by the individual (Gibson, 1979).

Although affordances are tied to technological conditions, they also require perception of the cues for action by the individual as well as the ability of the individual to act upon those cues. In other words, an affordance exists not merely when the user can perceive the cue, but only if the user can perform the cued action. All affordances provide cues, but all cues might not offer an affordance.

### 8.2.1 Interaction Affordances

The affordances of a human-machine interface tie the perception of an action possibility to action. Norman (1988) appropriated the term affordances to the context of HCI to refer to just those action possibilities that are readily perceivable by the user. He envisioned the deliberate building of affordances into interface design elements in ways that cue the type of interaction
those elements afford. In his seminal article, Gaver (1991) defines technology affordances as action possibilities in a technology environment given the technical capabilities of the system and the action capabilities of the user.

One mark of an easily usable human-machine system is the perceptibility of its affordances. Affordances built into an interaction interface that are limited to visual cueing are not available to screen reader users. For example, if an interaction button on a web page is represented as a raised cylindrical image, it serves to cue users visually to press it. But this cue (and hence the affordance) is lost on nonvisual users who interact with the interface using a screen reader. Besides being unable to take advantage of the visually cued interaction affordances of the interface, nonvisual users are further limited unless alternative cues are deliberately built into the screen reader design to enable them to perceive such affordances.

The JAWS screen reader does not present web pages directly to the user. Upon opening a web page using the browser, JAWS typically takes a snapshot of the page (actually a copy of the DOM—Document Object Model—of the HTML document), and places the contents in a virtual buffer for user interaction. The user interacts with a serialized, textual virtual buffer of the page contents rather than with the page itself. The cue JAWS provides for a button is the announcement of the word Button following the text label the designer has chosen to assign to the button, such as OK—Button or Search—Button. The announcement JAWS makes, "Button" is associated by the user with a possible action, as indicated by its label, which will be initiated by invoking the button.

Interaction affordances in Web interfaces are primarily visual, so they require the sensory ability of sight to be perceived. An example would be the use of a different colour for indicating that a phrase of text is a link. In order for users who are blind to perceive the links as such, the screen reader builds in an alternative cue. It announces the word Link along with the words that constitute the link. On hearing this word, the user associates it with the possible action of pressing the Enter key and branching off into the web page that link leads to. With practice,

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64 Whereas screen readers working on the Microsoft Windows platform such as JAWS use a virtual buffer for navigation, some other screen readers working on Linux (Orca) and Apple Macintosh (VoiceOver) platforms use an object interaction model where, instead of going up and down in a serialized buffer, the users can actually navigate the page.
hearing the word "Link" might act as a sort of a cue for that action. Such alternative cues are required to be deliberately built into the screen reader’s design to enable its users to perceive the interface affordances. Users who have never visually perceived a computer interface, or the world, might not know the visual form of interface elements to help them form mental maps easily. Participant P03 expresses this:

I know what radio buttons are but I don’t know how the layout on the screen looks. I don’t know where the task bar is or the system tray is or the floating things or the icons ... I have no idea, and I wish I knew. It is interesting because people tell “ah, the link at the top of the page” and I have no idea where the links are, right? Like I don’t know if they are at the top of the page or on the right or on the left or whatever, I have NO idea. (P03)

Gaver (1991) mentions that users might not be able to think of a given action when there is no affordance for it or any perceptual information suggesting it. If there is no information available for an existing affordance, it is hidden and must be inferred from other evidence. As seen earlier, the announcement “Button” denotes an action possibility for screen reader users. This announcement helps them use the button only if it is designed to be keyboard-operable because screen reader users would typically not use a mouse. The text label associated with the button cues what action is possible. In instances where an appropriate text label is not provided in the web page code for a button, JAWS simply announces, “Button,” and the user does not know what action might possibly be initiated upon invoking it. Such situations are difficult for screen reader users to manage without annoyance unless they are experienced, like participant P17:

Well, for example, I was on the phone with a company and I went to their website. There is a search field. It is not labeled in any way and underneath it is a button. Now if you were to look at it, the button says, “Search” in big, pretty letters, possibly an image. But, as a blind user, I have no idea what the box is for. Now I am experienced so I go, “Gee, if on their home page there is only one box and one button that probably is for search.” But I have to think about it whereas you just go, “Oh, that’s where I’m supposed to search.” (P17)

When affordances are perceptible, they offer a direct link between perception and action, whereas hidden and false affordances lead to mistakes (Gaver, 1991, p. 79). For instance, in the case of screen reader users, merely being able to perceive and act on the button might not provide the complete affordance. For example, text labels that provide inappropriate information
do not afford the intended action, and the user has to face uncertainty and spend more energy in performing the action, as experienced by participant P33:

> On a lot of websites I can usually tell what the graphics are. Sometimes even if it doesn’t have the correct tagging for it, you know, often those buttons have numbers associated with them and JAWS will say, “graphic, number, number, button” and such, so I can say that number 1 is probably About, number 2 is probably Contact and so. In that case I click on each of them and see what’s there. It takes longer because I have to click on each of them. (P33)

The two examples above show that screen reader affordances are complete only when appropriate meta-information is provided by websites.

Users who have not seen what a user interface button looks like still associate some action affordance with the auditory announcement, “Button,” as in the case of JAWS users who participated in this research. However, there is a distinctly better sense of affordance when deliberate auditory cues are presented to prompt interaction. Gaver (1991) also claims that affordances may be perceived using other senses as well, such as tactile and auditory. The application of the concept of affordance in HCI is also not restricted to the visual modality. For example, the “ting” that signifies the arrival of a new mail and cues reading action is a redundant auditory cue. It might thus be possible to design effective auditory affordances for the screen reader interface to improve the user’s interaction experience, so long as users are made aware of the association between the cue and the action that it signifies. Use of auditory cues over a period of time could build into their mental representation of the interface. Participant P34 explains how an auditory cue introduced in version 10.0 of JAWS affords a more intuitive interaction with online forms compared to earlier versions.

> When you landed in a forms field, if you were using JAWS 8 or 9 you had to hit Enter to get to the forms mode before you could type in. The cursor would still land in the box, but you couldn’t type without hitting Enter and getting into forms mode. In JAWS 10 it makes a noise so you know you are in an edit field. I’ll do it now, watch. You will hear a “tuk” sound. Then you know exactly you are on an edit field. [After typing] Watch, when I hit enter it makes that “tuk” sound again to tell it is out of edit mode now. (P34)

This example shows how building affordances thoughtfully into the screen reader design would improve its effectiveness in mediating online interaction when screen reader users have to relate attributes of a virtual text buffer to the relevant action.
I would argue that improving the affordances the screen reader interface presents to its users would enhance the experience and effectiveness of their information interaction. However, there are challenges in the design of effective interface affordances for users who are blind or visually impaired. As one of the participants pointed out,

The major challenge is that people who don’t see have no idea what they are missing. So, I can’t say, “If I could see this and that on the page it would help me,” because most people would have never experienced seeing those things on the page. (P17)

8.2.2 Semantic Affordances

Hartson (2003) provides a taxonomy of affordances, classifying them as physical, sensory, functional, and cognitive. Of these, physical and cognitive affordances are relevant to this discussion. A physical affordance is a design feature that helps, aids, supports, facilitates, or enables physically doing something. A cognitive affordance is a design feature that helps, aids, supports, facilitates, or enables thinking and/or knowing about something. The conventional use of the concept of affordances in HCI could well be termed interaction affordances akin to Hartson's physical affordance notion. Paralleling his concept of cognitive affordance is another class of interface affordances, viz., semantic affordances, which help users to interpret web content.

Web designers generally convey navigational and semantic information through the spatial layout of a web page, the use of various fonts, images, and other visual cues. While these cues are useful to sighted users, they are not accessible to screen reader users. Further, these cues are not conveyed effectively through the screen reader. As a result, screen reader users are often unable to understand the intended use of the navigational aids, resulting in reduced efficiency in information seeking (Kouroupetroglou, Salampasis, & Manitsaris, 2007). Conceptualization of the site map by participants as discussed in Chapter 5 is a case in point. Affordances could be built into the screen reader interface to help users get more of the semantic cues presented on web pages.

Just as interaction affordances cue interface action, I would argue that semantic affordances built into web interfaces cue evaluation that affords interpretation of web content. The concept of affordances could thus be further extended to address interpretation of web content.
content. Examples of semantic affordances could be layout of the web content on the page, organization of text through styling, visualization of information, use of pictures, etc. Alternative text description provided for visual content is a semantic markup. Labels used for links and form fields are semantic markups. In other words, semantic cues that users perceive on web pages trigger relevant heuristics that assist users in making sense of web content. Semantic affordances are possibly taken for granted in the case of sighted users, but making them available to screen reader users is critical for their effective interpretation of web content. These affordances will help them in the orientation/navigation within and across web pages and in the location and interpretation of relevant content. All of this is critical for effective online information interaction.

Semantic cueing by the screen reader is presently achieved through the use of structural markups in the HTML code of the web pages. A list of sample structural markups (with the associated tags in brackets) is given below:

- Heading tags (h1, h2, ... h6)
- Quotation tag (blockquote)
- Emphasis (em)
- Strong (strong)
- Lists (ul/ol/dl)

To illustrate how semantic affordances might help users, some details about the use of heading tags is presented: JAWS reads aloud the number of heading elements that exist in the web page when loading the page. It provides navigation functions to move along headings. Users can also skip to the next (or previous) heading element of the specified level, h1 to h6, by pressing the corresponding number key (or Shift + the number key). A user can get a summary of the page contents by listening to all the headings on the page, assuming, of course, that the designer had marked up the headings in a meaningful way. These functions help users get a better sense of the web content. Participant P19’s experiences with headings are given below:

If a page is marked up nicely with headings and sub headings, I can tell where I am pretty easily by using the h key. It gives me an overview of the content, and how the content is laid out. I check the layout of the page by using Insert+F1. JAWS says how many links, landmarks, headings, and forms are present on the
In the earlier discussion about interaction affordances, the importance of meta-information from the website in the form of labels for interaction buttons was noted. Likewise, meta-information in the form of structural markups is to be provided by the websites in their web page code to enhance the semantic affordances offered by the screen reader interface. Using appropriate HTML markup rather than font styling allows the screen reader to treat different groups of text differently and add “meaning,” or semantic value to the virtual buffer presented to the user. There is plenty of room for innovation and improvement in designing additional markups for visual/spatial web page elements not presently covered. Audio cueing of elements crucial to interpretation of web content also needs to be considered in screen reader design.

In this manner, interaction affordances and semantic affordances together broadly enable navigation and interpretation of websites/web content, which are two fundamental, intertwined actions necessary for effective information interaction.

### 8.2.3 Social Affordances

Besides interaction and semantic affordances, a third class of affordances called social affordances was popularized by Bradner (2001), Suthers (2006), and Wellman et al. (2003). Social affordances are properties of an object or environment that permit social actions. Social affordances are action possibilities for social behavior (Bradner, 2001; Suthers, 2006). In the online information interaction context, these affordances could cue the user about the possibilities of connecting with another person or an entity represented by a person. Websites contain several elements that afford social action, such as a form for contacting the people managing the website, a link for online chat with a live person, links to Facebook, Twitter, and similar social networks, etc. These afford easy ways for users to connect with people or organizations to get contextual help. Further, there are websites that are more oriented towards community and networking whose primary purpose is to offer opportunities for social connection. My research indicates that participants often contacted people in the context of technology management, information practices, and credibility perception. Effective presentation of the onscreen social cues through the screen reader interface can help them in these contexts.
Affordances could even directly facilitate credibility perception. Sundar (2008) theorizes about the affordances that are inherent in different types of technologies. He illustrates four affordances of digital technologies as Modality, Agency, Interactivity, and Navigability, and identifies cues they hold for potentially triggering heuristics pertaining to credibility assessments. According to Sundar (2008), users hold a theoretical connection in their head between the presence of a cue and the relevant credibility judgment.

My research shows that the assumptions/heuristics of screen reader users relating to evaluation of websites and web content are mostly similar to those used by sighted users. Differences exist primarily in the ability to apply them during interaction. This is determined primarily by online information accessibility. Interface affordances help in improving online information accessibility. The availability of interface affordances to the user is governed by:

- the design of the screen reader interface;
- the extent of meta-information provided by the website for interpreting visual/spatial elements; and
- the user’s online interaction proficiency.

In summary, online interfaces abound in cues designed to guide and help users. Cues help focus the user’s attention in the online environment, which is full of distractions. A cue becomes an affordance to users when it can be perceived and acted upon by them. The notion of affordances offers a way of examining the interface action possibilities that the screen reader provides to its users. Online interaction for screen reader users is governed by the interface affordances of the screen reader, which aid them in recognizing interface cues for interaction, semantic action, and social action. Interaction affordances facilitate interaction and information accessibility. Semantic affordances facilitate evaluation and information usability. Social affordances facilitate social action and information sharing. All three contribute to online information credibility perception.

For effective credibility perception by screen reader users, the screen reader must provide as many cues as possible to its users. Effectiveness of the cues depends on the meta-information provided in the web page code and the user’s level of proficiency in recognizing and using those cues. Screen reader users mostly use similar criteria for online information credibility perception as reported in studies with sighted users, but their interactive information evaluation is limited by
the interaction affordances, semantic affordances, and social affordances provided by the screen reader on the interface it presents to its user. Therefore, for effective use of online information by screen reader users, three things are necessary:

- Screen reader designers need to find ways to provide alternative cues for all the interaction cues, semantic cues, and social cues present on the web interface.
- Web designers need to provide adequate meta-information in the page code.
- Screen reader users need to familiarize themselves with use of these cues to benefit from the interface affordances.

8.3 Community as a Component of the Credibility Perception Process

This section expands on the social nature of the online information credibility perception process of screen reader users as identified through my research and discusses the possible emergence of reliability as an important characteristic of information credibility on the social Web for all Web users. In doing so, it emphasizes the communicative aspects of everyday information practices and shows how community involvement in information corroboration helps screen reader users in discerning the reliability of online information. Further, this section discusses the results of my research in the light of the Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986b).

Studying how credibility is portrayed as well as perceived on the Web has engaged researchers in several fields. Through an exploratory study of how screen reader users who are blind or visually impaired perceive the credibility of online information, my work expands the existing research on credibility. One significant finding of my research is the social nature of screen reader users' online information credibility perception process. There is evidence of explicit social support in the form of website referrals and information corroboration consultations. As well, there is implicit socialization of beliefs as part of the cultural-historical process of knowing, where portions of an individual's knowledge acquisition are directly related to observing others within the context of social interactions, experiences, and outside media influences (Bandura, 1986). Savolainen (2008, p. 4) states, “All human practices are social, and they originate from interactions between the members of a community.” In emphasizing the social nature of knowledge as given below, Wilson (1983) also emphasizes the need for a trusted community:
All I know of the world beyond the narrow range of my own personal experience is what others have told me. It is all hearsay. But I do not count all hearsay as equally reliable. Some people know what they are talking about and others do not. Those who do are my cognitive authorities. (p. 13)

The manner in which explicit community involvement supports the credibility perception process of screen reader users is illustrated by participant P51’s views about the credibility perception process:

I don’t know based on just this one article if it is true or not. And I haven’t actually heard about this. This whole credibility question is a social thing. It is about how much you can get things to concur with each other. It is not something that is hard-wired in your brain that you look at something and you say, “Ah, this is credible” just because it looks a certain way. It’s about being able to show that there is evidence here, that it can be corroborated with other sources. (P51)

The same participant, when queried about why she chose to use the website cdc.gov over prevention-is-better-than-cure.ca for information about swine flu prevention, explained how her present thinking about health care was influenced by how she was brought up to think about it.

… because CDC is reputed [sic]. It is not that people on blogs don’t know what they are talking about. But we’re sort of set up in a way where we would like to think that somebody who has done a lot of research in the area would know what they are talking about. It is the difference between this is what scientific research says versus this is a housewife’s take, for instance. So, that’s how you judge credibility. It is very, very social. In certain respects, it is kind of how people are brought up, that if you are sick you should go to the doctor, and in the same way, if information is coming from a mainstream healthcare professional then you are more comfortable accepting that just because of the way you have been socialized, the way you have been brought up. Even with the thing about herbs, now I am trying to be more conscientious about different approaches to medicine. But that is really hard to do having grown up being told if you are sick go to the doctor versus taking some herb or the other, right? (P51)

Community support occurs during the credibility perception process in the form of consultations about trustworthy websites and good quality information, which help in the predictive phase of information credibility perception process, and in the form of discussions for corroboration of information evaluations, which help in the corroborative phase of the process. Evidence for these is available in statements made by participants, two of which are presented here. Participant P31 said, “If someone I regard says that a website is of interest to them, then there must be something there.” Participant P22 said, “Often I’ll discuss it [information from websites] with others to see what they think, or if they have heard the same thing.” Credibility
perception for screen reader users in an interactive online information context is thus a social process that requires a trusted community and social tools to support it.

Traditionally, source credibility and information quality have been regarded as markers of information credibility. With the phenomenal increase in individual contributions on the Web following the advent of Web 2.0 technologies and the emergence of the social Web, source credibility is not always easy to discern. Systematic information evaluation requires greater attention and time than Web users are typically willing or able to devote to it. Moreover, the Internet forces users to integrate information from multiple sources and quickly and critically examine each source before moving on to the next available alternative source. Context is very important for online credibility assessment; the more meta-information we have about something, the better we are able to assess its credibility. The increasingly participatory nature of the Web has initiated a rethinking of the online credibility assessment as a social process (Eysenbach, 2008; Lankes, 2008).

Eysenbach (2008) shows how social support in various spheres is increasingly visible on the social Web. He identifies a phenomenon of online social support for credibility perception called apomediation. Apomediaries, such as friends, can help users navigate through the onslaught of information afforded by networked digital media, providing additional credibility cues and supplying further meta information. People and tools who apomediate stand by and help when required instead of actively intermediating or totally ignoring.

Lankes (2008) points to the emergence of reliability as a measure of credibility determination on the social Web. In his paper titled “Credibility on the Internet—shifting from authority to reliability,” he examines at a conceptual level how users determine credibility in the Internet environment. He concludes that there is a perceptible shift from the traditional view of authority as a measure of credibility determination, where trusted sources are used to vouch for the credibility of a given piece of information, to a move towards reliability, which involves seeking commonalities and coherence among multiple information sources.

Reliability commonly denotes dependability and consistency of quality. The user determines credibility by synthesizing multiple sources of credibility judgments. In using the reliability approach, users are constantly seeking out information and other people to come to a credibility judgment. Participant P19’s words support this view:
Networking has become more important today than it has ever been because there is just so much information out there and you need to be very discriminating as to what information you are taking in because you can get overloaded. I usually tend to go with information that people give because, you know, you expect it to be reliable. (P19)

Reliability as a measure of quality is not a new concept. Rieh and Belkin (1998) found reliability to be a criterion for information quality in three out of five studies on dimensions of quality (Marchand (1990), Taylor (1986), and Olaisen (1990), although none had been confirmed empirically). In Olaisen’s (1990) work investigating how business managers (in Norwegian financial institutions) perceived information quality in their information behaviour, he refers to credibility as reliability when he notes that “Our social location in time and space will greatly influence quality factors like credibility (ie., reliability), relevance, and perceived value of information” (p. 92).

Reliability of information is typically ensured through corroboration. As reported in a study at the Yale Law School, when people are unable to ascertain the quality of some information, they prefer to go by the opinion of those they trust:

Because most individuals lack the time and expertise necessary to make sense of scientific information on risk and other policy issues, they naturally rely on those whom they trust to determine what information to believe. The people they are inclined to believe are those who share their cultural outlooks. (Kahan et al., 2006, p. 4)

Corroboration, which emerges as an important part of the credibility perception process, has been reported in studies conducted with sighted users as well, as seen in the previous chapter. However, Flanagin and Metzger (2007) quote skepticism as a possible reason for users’ tendency to verify information, whereas in the case of screen reader users, verification appears to be more of a coping mechanism for dealing with uncertainty over whether they were indeed able to access all the web content relevant to the information they were seeking. I must add that this might not be the only reason for their resorting to information corroboration, as can be seen from the following remarks. Participant P09 prefers to “proceed with caution and verify the information with other sites and measures.” Participant P51 feels, “Information on the Internet is often contradictory. Other people’s vouching is important to know what is good.”
Meola (2004), in his paper “Chucking the checklist,” criticizes the checklist model approach (authority, accuracy, objectivity, currency, and coverage) to teaching undergraduates how to evaluate Web sites. He suggests comparison and corroboration as part of a contextual approach that uses information to evaluate information. To corroborate information is to verify it against one or more different sources. Corroboration with varied and reviewed sources increases the probability of accuracy.

Social involvement is reported in several credibility studies, albeit on a small scale. Reputed credibility, conceptualized by Fogg (2003a) as one of the four types of credibility, is based on third-party endorsements, reports, or referrals. Mattus (2007), who conducted a study on how students access the credibility of scientific information in web-based environments, reports “teachers’ recommendations” as the second most important element for students. She does not, however, highlight it as a social support mechanism. Rieh, Hilligoss & Yang (2007), in their paper proposing an integrated framework of information and communication behavior, identify social support as an important factor influencing information seeking behavior. They found the study participants occasionally wanting to verify information found in one source by comparing it with information from another source and feeling more comfortable to use that information if they were similar. The participants also verifying online information with people they trusted. The paper reports that, “… human resources were often involved in the information seeking process either as an initial point at which to start the process or as a secondary or tertiary point to verify the information found.” (p. 10) This directly ties in with the results from my research, which show that community involvement happens by way of sharing of recommendations and referrals about websites as well as in the form of corroboration of information evaluation. I do believe that the reliance showed by screen reader users in my study on community support could be greater than that showed by non-screen reader users because the need of screen reader users for community support also spans their technology support requirements. Further research is necessary to verify this.

The importance of community involvement in credibility perception has increased with the increasing popularity of the social Web that allows anyone to contribute content, and the consequent uncertainty about the trustworthiness and expertise of the source. An information seeker cannot be sure of the information source, and so cannot apply traditional evaluation criteria such as source trustworthiness. The alternative is to ensure through multiple sources that
the information is reliable. The results of my research indicate a high degree of information corroboration and community involvement among the participants. I would suspect, though, that this situation is applicable to all Web users in today’s online context and not just to screen reader users.

I would argue further that community involvement offers a *lateral route to persuasion*. ELM is a theory of persuasion that suggests central and peripheral routes to persuasion depending on the level of motivation and ability of the information user (Petty & Cacioppo, 1986b). My research suggests a supplementary third route—a lateral route to persuasion through social influences. I use the term *lateral* because, while it aids the assessment of the content in question, it does not directly involve processing of the content. Further, it could coexist with content processing at any level of the elaboration continuum between extreme central and extreme peripheral processing.

Data from my research offers some evidence for the above claim since users who are in high, intermediate, and low online interaction proficiency levels all reported taking corroborative measures. As noted in the previous chapter, community consultations happened irrespective of the level of online interaction proficiency of the participants. For example, Holly said, “If someone I regard says that a website is of interest to them, then there must be something there” (P31). Mina used “friends’ recommendations” (P51) as one of the criteria for deciding which websites to go to. And Laura said she would use some information when it comes from a website that had been recommended by someone she trusted, such as “a family member or good friend or a trustworthy company.” Further examination of this lateral route to persuasion, and how it might be incorporated into the ELM, offers an interesting area for future research.

Application of ELM to screen reader users in this research can be examined further. Heuristic evaluation is a process of evaluation based on heuristics that offers a “quick and dirty” way of arriving at a decision. As clarified by Sundar (2008), this is notably different from an evaluation using heuristics, which could also be performed in a more systematic manner. In other words, heuristics could be used either for snap judgments or for a systematic processing of the web content. Predictive evaluations performed by participants that led to predictive perceptions about information credibility were clearly heuristic evaluations. While screen reader users might predominantly adopt a heuristic approach to information evaluation rather than a systematic
approach, the data from this research does not offer conclusive evidence for whether the evaluations performed during information interactions were heuristic or systematic (Chaiken, 1980). The participants in the survey reported all criteria relevant to systematic evaluation of information. However, ample evidence from the hands-on sessions shows that actually engaging in such systematic evaluation might be difficult for users due to the poor accessibility and usability of online information through their screen reader and keyboard interactions. Further research in this area is required to understand the extent to which screen reader users adopt a central or peripheral route to persuasion depending on the context (Petty & Cacioppo, 1986a).

Lankes (2008) claims that the tendency of Web users to synthesize multiple sources of credibility judgments as part of their credibility perception process has led to “an increased pressure for participation and openness at all levels of the Internet” (p. 1). He views participation (engagement in a conversation with people and sources) as the essence of today’s digital world, due to the overwhelming amount of information and people available to the user for engaging with in arriving at a credibility judgment. The results of my study empirically support this argument advanced theoretically by Lankes (2008). The need for constant conversation around credibility is an essential aspect of today’s online environment. Facilitating participation will facilitate online credibility perception.

In summary, this section highlighted the social nature of the online information credibility perception process of screen reader users as identified through my research. Reliability was discussed as an important characteristic of information credibility on the social Web for all Web users. Community involvement in information corroboration was an essential part of discerning the reliability of online information. The possible existence of a lateral (social) route to persuasion was indicated by the data from this research, besides the central and peripheral routes proposed in the literature. The need for online participation to meet the information sharing needs brought about by online information practices is identified at the end of this section. This segues into the next section that discusses this further and suggests how it could be accomplished.

8.4 Online Participation as a Means for Information Inclusion

Online participation is key to information inclusion, which means promoting and supporting diversity in information use as well as contribution. While using a computer is
usually an individual experience, using the Web is an intensely social computing experience where technologies mediate conversations rather than being an end in themselves. There is often a trusted person (or more) just an email, chat, or call away. Hargittai and Hinnant (2006) report social support to be an important factor influencing information seeking on the Internet. Wilson (2000) conceptualizes human information behavior to be a totality of human behavior, including communication with others. Rieh, Hilligoss, and Yang (2007) have proposed an integrated framework of information and communication behavior. Their findings reveal how information behavior and communication behavior are interwoven in the process of information seeking. They also report that people are seen as a preferred source of information because they are quick to access as well as dependable. Savolainen’s (2008) concept of everyday information practices gives prominence to information sharing as a social communication activity.

Online participation is important for information sharing. Participants in my research shared information in at least three areas: accessible and trustworthy websites, quality and credibility of online information, and technology use and troubleshooting. Participants shared recommendations and referrals about accessible and trustworthy websites because interacting with inaccessible or unfamiliar websites makes screen reader users feel uncertain, and this leads to frustration. They also frequently share opinions about the quality and credibility of information found online with trusted others, to verify or corroborate their judgments before using that information.

There are several reasons for sharing technology use and troubleshooting information. Minimal training is available in Canada to individuals with disabilities in the use of assistive and other technologies effectively, especially on the Internet. As well, frequent updates to mainstream and assistive technologies require screen reader users to keep learning continuously. Furthermore, screen reader users need to manage multiple technologies such as Flash, Javascript, etc. used in Web pages because these come in the way of their online interactions. Participant P17 shares his experience of being bombarded daily by questions from screen reader users seeking solutions to technology problems.

When you are on all JAWS mailing lists, every day somebody asks this question, “How do I do this on this site?” “Can I do this on this site?” “What JAWS key do I press to open this box on this site so that I can listen to my baseball game?”
Whatever it is, there is always, “How do I use my screen reader to effectively interact with this website?” And that’s a problem. (P17)

Screen reader users’ online interaction proficiency depends much on their efficient use of the navigation quick keys. It is not enough to know about the various keys; users must also know how different key combinations enable efficient information processing, and this comes with more practice. Participation in platforms that enable large-scale spread of small bits of knowledge will enable effective information sharing among screen reader users to enhance their online interaction proficiency and online information credibility perception skills.

When assisting others with technology trouble-shooting, particularly when it relates to screen reader use, most of the participants said that they habitually help and share what they know, like P30, who hoped that “…whoever (they) pass the information hopefully will pass it on to some one else (because) the more informed screen readers are of the various functionalities the better it is.” As Savolainen (2008) mentions, altruism is still a significant driver of information sharing (p. 9).

For sharing information, participants predominantly used emails, mailing lists, and online chats. One of the characteristics of Web 2.0 is improved communication and collaboration between people via social networking technologies. Yet, compared to the use of mailing lists, the use of online social media was found to be relatively low among the participants. While several new social technologies such as social networks, blogs, wikis, etc. and techniques such as RSS feeds, tags, etc. are available for online collaboration, these technologies are not used much by participants. Two-thirds of them used mailing lists, while only one-third used social networking sites such as Facebook. And surprisingly, only one-fifth felt like they were members of online communities. Very few participated in conversations on blogs and wikis or used tags. One reason could be the perpetual lag between introduction of new technologies and release of newer versions of the screen reader that are compatible with those.

This situation is not peculiar to the participants of my research. The online survey (referred to in Chapter 4) conducted by WebAIM of over 1,000 screen reader users reported that 54% of them said they “Did not know” how accessible Web 2.0 applications were for them; 2% said “Not at all accessible”; 16% said “Not very accessible”; 24% said “Somewhat accessible”; and 4% said “Very accessible.” These results show that screen reader users are mostly unfamiliar
with Web 2.0 technologies and, among those who have used them, the opinion about how accessible these technologies are is divided. Thus, the WebAIM survey results are in alignment with my research finding that screen reader users have not adopted Web 2.0 technologies optimally.

In addition to enabling sharing of information, social technologies on the Web might actually be useful in assisting screen reader users in using the Web better. Access to participatory technologies could be expected to lead to participation (through a process of enculturation). In turn, social participation leads to knowledge transfer about better ways of managing and using technologies and more efficient ways to seek, evaluate, use, and share information. Information access is not just the ability to reach a mound of information; it is the ability to filter, sort, prioritize, process, understand, evaluate, etc. These activities are difficult to handle using a screen reader. Participation could allow users to learn more about assistive technologies and ways to use them, enable the establishment of norms and standards of evaluation, and provide access to not just information but useful information. Such knowledge, when practiced, could lead to better access. Better access in turn could lead to better participation. This process is best called the Access-Participation loop.65

The Access-Participation loop is thus an entangled relationship between access to resources and participation in communities whereby access depends on participation and participation depends on access. The loop could work as a vicious spiral or as a virtuous spiral. In a vicious spiral, low access to resources leads to low participation, which reduces learning about potential access to newer resources, and this reduces access to those newer resources. This situation translates into an expanding digital divide. For example, a novice Facebook user is unable to participate in Facebook groups. Thereby, he is unable to learn from a Facebook group on LinkedIn accessibility. This results in his not being able to access LinkedIn optimally, leading to lower access to both LinkedIn and Facebook.

As an abstract example of the loop acting as a virtuous spiral, a typical user poses a problem to the community. More savvy members offer solutions. The user implements a solution

65 I acknowledge this term to Professor Stephen Hockema, who encouraged me to think along these lines during our discussions.
and gets to participate better. Through participation, the user gets increasingly savvy. The user then helps others solve their problems. Thus, in a virtuous spiral, through effective participation, users learn better ways to access resources, which in turn helps them to participate much more. Here is a more concrete example. A typical user is unable to comment on blogs due to visual CAPTCHA authentication that is generally used on blogs to protect spamming. The user writes a blog post about this problem. Another member of the community adds a comment on this blog about how the WebVisum browser add-on feature helps in solving CAPTCHAs. The user then learns how to use WebVisum to solve CAPTCHAs and is able to comment on others' blogs. Thereby, the user is able to participate in the conversations on several blogs and learn more access tips. The user shares all that is learned by writing more blog posts. In this way, access and participation could be linked in a virtuous spiral.

Promoting an online participatory culture would help in promoting online participation. Online participatory culture is a concept put forth by Jenkins (2009). He shifts the focus of the digital divide from technological access to opportunities to participate. Although Jenkins focuses on youth and their creation and sharing of media artifacts, the concept applies in the context of knowledge sharing for other purposes as well. Overall, the concept of participatory culture emphasizes the need for people to feel that their contributions matter and to experience some degree of social connection with one another. My research shows that information practices and credibility assessment are social processes that require a trusted community and social tools to support them. Hence, for effective use of online resources, full access is important not only to online information but also to the online participatory culture.

Online participatory culture facilitates informal mentorship whereby the more experienced pass along what they know to novices. It shifts the focus of online information interactions from being an individual act to a social act. In a participatory online environment, the process of social “scaffolding” (Vygotsky, 1978) can be expected to unfold, enabling Web users to continuously improve and also support others less expert than themselves. Community support scaffolds screen reader users towards more effective technology management, information practices, and credibility perception.

In this context, an important development towards a social approach to online credibility assessment is Eysenbach’s (2008) concept of apomediation. Whereas the social process of
“disintermediation” through digital technologies is the cause of many of the problems in online credibility assessment, Eysenbach conceptualized apomediaries to mitigate these problems. While the traditional intermediary is the “expert,” apomediaries consist of a broader community including experts, parents, teachers, and peers who are networked in a digital environment. Apomediaries are agents (people or tools) that “stand by” (in Latin, *apo*- means separate, detached, or away from) to guide a user to high-quality information and services without being a prerequisite to obtain that information or service in the first place, and with limited individual power to alter or select the information that is being brokered. This approach aligns well with the need for social support in credibility assessment as shown by the results of my research.

Online communities consist of multiple individuals interested in a specific topic, sharing resources and communicating using group computer-mediated communication tools (Preece, 2000). Several participants who, on the one hand, reported active participation in email lists and moderate participation in social networking sites also reported, on the other hand, that they do not belong to online communities. The problem is not just with accessibility, but also with enculturation. As participant P17 put it, “If persons with a disability are not able to become enculturated into those online communities, be they social, marketing, or whatever, then they are not going to feel like full participants and they are not going to be able to get the most information they can, or contribute in the way that they would like to be able to.” Online participation is all about conversation and connection. Enculturation into the community involves joining the conversation and building those connections. Every new user expands the possibilities for everyone else who’s already there. For this reason, promoting participation is important.

It is essential for a multitude of voices and participants, including individuals with disabilities, to be present in this participatory culture that marks the emerging social Web (Treviranus & Hockema, 2009). Only then can collaborative problem solving and knowledge creation happen in innovative ways. Making information accessible is important, but making social technologies accessible to facilitate peer support in information practices is as important, if not more so (Chandrashekar & Hockema, 2009).

Thus, screen reader users who are blind or visually impaired derive support from their community in their information practices, which includes information evaluation for credibility, as well as in keeping up with technology skills. While the recent online collaboration technologies might be helpful to them in this regard, their use is suboptimal due to poor accessibility/usability. Screen reader users are also unable to contribute to the Web to their potential, due to technological and enculturation barriers. Greater online participation will expand the opportunities for this group to contribute their unique perspectives to knowledge construction online. As can be seen from the access-participation loop, participation facilitates access as well. Therefore, promoting inclusion in the expanding online participatory culture is essential for promoting information inclusion.

8.5 Summary

This chapter provided in-depth discussions around three themes relating to screen reader interaction, credibility perception, and online participation that emerged in the three preceding chapters. Together they emphasize the need for technology, community, and the coming together of the two in an online participatory culture for promoting the online information practices of screen reader users. The next chapter summarizes this research, enumerates the contributions it makes, and indicates the implications for future research.
Chapter 9 – Conclusion

“In 1994, when Windows came, we were so gloomy that we would not have access to computers any more. But, in fact, with Windows, maybe, we have ten times or even a hundred times more access. Now, I am more optimistic. I say we should never become pessimistic because we don’t know what will come about in the future.”

— Participant P23

9.1 Research Summary

My research examined how screen reader users who are blind or visually impaired perceive the credibility of online information during their everyday information practices and how the screen reader mediates their online information credibility perception. The results summarized here are based on the online experiences of 60 screen reader users residing in Ontario, Canada.

Participants in my research, in the course of their everyday online information activities, evaluate a website where they plan to look for some information to assess its credibility as a source of that information. In the process, they also form a predictive perception of the credibility of the information they would potentially obtain from that website. During their interaction with the website, they evaluate the accessibility and quality of the web content on that website leading to an evaluative perception of the credibility of the information. Their evaluation is guided by the heuristics they formulate based on the assumptions they make about the website and the web content. These assumptions are based on their past online experiences and personal knowledge/beliefs, as well as on inputs from their community. They verify their evaluations through a process of corroboration with other online and offline sources including people. The extent to which they engage in evaluation and corroboration depends on the context of the information interaction. They also interact with their community in this process to share their views and experiences.

Credibility perception as described above is an integral part of everyday online information practices. It thrives on the socio-cultural-historical nature of information practices.
The information seeking process, which includes identifying, selecting, and accessing the appropriate websites, maps on to the predictive phase of information credibility perception. The information use process, which includes evaluating the information content, maps on to the evaluative phase of information credibility perception. The information sharing process, undertaken for corroborating the evaluations, maps on to the corroborative phase of information credibility perception. Information sharing also happens by way of referrals and recommendations that assist in further information seeking and predictive credibility perception, thus completing what could be termed the information cycle. Seeking, using, and sharing, or prediction, evaluation, and corroboration cannot really be viewed as discrete stages; rather, they are views that help us simplify and understand the complexity that constitutes our everyday information practices.

The screen reader as a mediating technology has an inherent limitation: it can only process and convey to its users information available in textual form on web pages. Therefore, unless a web page provides meta-information in text about visual objects, attributes, and layouts used in its design, the screen reader cannot convey that information to its users. The online experiences of screen reader users are governed by online information accessibility, which is a multidimensional concept that depends on the screen reader’s capabilities, the meta-information provided by web pages, and the user’s online interaction proficiency. Better interaction proficiency helps in getting better contextual information, reducing uncertainty and frustration during online information interactions.

In the case of online information interactions, the Web as a medium is more than a “black box.” The online medium is a bundle of technologies that work together to provide an information experience. My research shows that these technologies are apparent to screen reader users possibly more than they are to sighted Web users. In other words, there is a high degree of technology opacity in screen reader-mediated online interactions. The higher the opacity, the more apparent the technologies are to the users, and the more likely it is that users will recognize that the information they are accessing is mediated. Online interaction proficiency helps users understand the layers of technology between them and the information, thereby helping them manage those technologies better. This also helps in minimizing biased personal beliefs about the technologies, which could potentially affect credibility perception.
Mediating technologies thus shape the interaction experience of the user and, through that, their credibility perception. Technology opacity is a general issue for all Internet users. For example, novice users and those with low-capacity Internet connections might also feel the effect of the medium to some extent, such as when encountering unmanageable pop-up messages or while experiencing slow-loading web pages. I would also argue that mediating technologies do play a role in the credibility perception process for all Web users, possibly in a less obvious way. Thus I suggest that technological opacity in conjunction with proficiency be incorporated into extant theoretical models of credibility perception.

Information sharing is an important aspect of everyday information practices. Screen reader users share information about technology use and troubleshooting because there is practically no training available to the average user. Through processes of implicit and explicit socialization, they also share assumptions and evaluations relevant to credibility perception, which help them in their credibility perception process during online information interactions. Given the barriers to online information accessibility experienced by screen reader users, scaffolding by their community helps them in their information interactions, information evaluation, and information practices.

The results from my work are synthesized into a model for online information credibility perception (see Figure 7.1 in Chapter 7). My model highlights the technology and community aspects of online credibility perception over and above all other aspects that are found to be mentioned in earlier research studies with sighted users. These two aspects also, in my opinion, are also common to all users, but underemphasized in previous research due to the absence of nonvisual Web users in the sample. I believe that the proposed model of credibility perception is not solely for screen reader users but could well serve as a general model applicable to all Web users. Further research is needed to confirm this assumption.

Technology has made it possible for people with disabilities to participate in the information society and contribute to the knowledge economy in unprecedented ways. Research on improving the online experience of people with disabilities has traditionally focused on facilitating information access, and recently, on enabling online participation. I argue based on the results of my research that these are not distinct. Participation in the form of social interactivity can support and transform information access by, inter alia, supporting a social
process of credibility assessment necessary to effectively process, evaluate, and use that information. Hence, the need for participation goes beyond collaboration to satisfy specific knowledge needs. It also helps users in accessing online resources better through what I call the access-participation loop, whereby access depends on participation and participation depends on access.

My research shows that poor accessibility of online participatory technologies makes participation and information sharing in online social communities difficult for screen reader users, reducing their avenues for such online collaboration. It identifies that, in conjunction with access, enculturation is also essential for effective participation. It brings out the need for promoting inclusion in the online participatory culture for supporting, among other things, the online information practices of individuals who are blind or visually impaired.

9.2 Contributions

My research takes a holistic view of the credibility perception process from the users’ perspective, drawing from and contributing to the interdisciplinary areas of credibility research, information studies, human-computer interaction, and disability studies. Besides academic contributions, it also makes some technical, cultural, and social contributions. The results and insights drawn from my work are presented as a part of the ongoing academic discourse about credibility perception, rather than as an attempt to seek consensus. My research approach doesn't claim that this is the only way screen reader users perceive credibility. I believe there could be no single way in the complexity that is reality.

My work examines credibility perception in the context of nonvisual online interactions, a modality not hitherto studied. It also shows that mediation by a screen reader has greater implications deriving from accessibility considerations than simply the nonvisual nature of the interaction. It situates credibility perception of online information as a dynamic, social process, and empirically establishes the influence of technological and social forces on credibility perception besides the individual’s own efforts. In this way, it adds techno-social dimensions to credibility perception, which has generally been considered as a cognitive phenomenon.

My research advances a process model for online information credibility perception. It shows technology and community to be two additional factors that come into play in the
credibility perception process over and above individual factors that have been reported in earlier works. My work also redefines the meaning of *medium* in an online context to be a “bundle of technologies” and introduces *technology opacity* as a phenomenon that makes intervening technologies visible. While these findings have been made possible due to the nature of online interactions as mediated by a screen reader, I believe that, on the social Web, the present model might be applicable for credibility studies pertaining to all Web users.

The role played by web accessibility in the credibility perception process had not been examined earlier. Furthermore, I examined accessibility from the standpoint of the screen reader and the user, an approach different from the traditional practice of viewing it only from the website design perspective. Through this, I could qualitatively establish the role played by the users’ online interaction proficiency in their online information accessibility experiences and consequently on their credibility perception. Through the innovative use of personas for organizing and communicating the research results in this context, the effect of online interaction proficiency could be effectively illustrated and analyzed.

The user-centric findings from this research relating to online interaction paradigms of screen reader (JAWS) users could inform the design of both screen readers and websites for improving online information accessibility and usability. One finding from the research is that screen reader users find it easier to interact with the mobile version of complex websites such as Facebook on their computer than the Web version. This shows that making the mobile version of websites compliant with Web accessibility guidelines could help screen reader users use complex websites through their computer even more easily.

I introduced the concept of credibility affordances that could help users in their credibility perception. Credibility affordances comprise interaction affordances, social affordances, and semantic affordances. While the first two have been reported earlier (Bradner, 2001; Norman, 1988), insights drawn from my work allowed me to conceptualize semantic affordances that could assist the user in interpreting online content. Pointing out that a screen reader’s interface is different from the web page interface, I examined how the affordances available on the web page interface could be built into the screen reader interface to assist its users with online credibility perception.
Examining credibility perception in the context of Savolainen’s (2008) concept of everyday information practices, my work shows that the process of credibility perception permeates the information seeking, information use, and information sharing phases of everyday online information practices. With respect to online information practices of screen reader users, my work is the first to collect data about the everyday online information practices of a sample of 60 screen reader users living in Ontario, most of them from the Greater Toronto Area (GTA). The data could be used as a comparative base in future research about the online information practices of individuals who are blind or visually impaired.

Besides the academic component, the spirit of my work has been to create an awareness among screen reader users about their role in contributing to research. It is gratifying to note that, following involvement in my study, several participants have taken part in and contributed to other research studies involving screen reader users. This dissertation document, made available as an accessible PDF file, would provide a reflexive opportunity for screen reader users to examine how their information practices are portrayed and to possibly engage in an online discussion about it. As a step towards digital literacy, I collated various shortcut methods that different participants used for screen reader Web interaction during the online activity sessions into a document titled “JAWS Web tips” (see Appendix VI) and shared it online with the participants. The motivation for doing this came from my observation that not all participants were aware of all the screen reader interaction methods. At the same time, they were all eager to learn and use new methods. The gesture was well received by them.

Results from this study point to the need for information inclusion not only from the angle of information consumption, but also from the angle of participation and contribution. My work provides a snapshot about the current scenario of online information accessibility for Ontario residents who are blind or visually impaired and about their level of online social participation. The findings from this research hold political and social significance in light of the provincial initiatives for promoting accessibility under the Accessibility for Ontarians with Disabilities Act, 2005. It is also significant from a federal perspective, in light of the

67 [http://atrc.utoronto.ca/sambhavi#JAWS web tips](http://atrc.utoronto.ca/sambhavi#JAWS web tips) (last accessed May 10, 2010).

ratification of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) \(^{69}\) by Canada on March 11, 2010, which makes access to information a fundamental right of all Canadians. The results of this research could inform social policy measures aimed at enhancing information inclusion, an important focus for Canada since its ratification of the UNCRPD.

Article 9 of the UNCRPD stresses “promoting access for persons with disabilities to new information and communications technologies and systems, including the Internet.” Article 21 stresses “urging private entities that provide services to the general public, including through the Internet, to provide information and services in accessible and usable formats for persons with disabilities” and “encouraging the mass media, including providers of information through the Internet, to make their services accessible to persons with disabilities.” After signing the UN Convention, Canadian Foreign Affairs Minister Lawrence Cannon said in his speech at the United Nations on March 11, 2010, “Canada is committed to promoting and protecting the rights of persons with disabilities and enabling their full participation in society. Ratification of this convention underscores the government of Canada’s strong commitment to this goal.”\(^{70}\)

Considering the tight coupling between Web accessibility and credibility perception observed through this research, measures such as those mentioned above would enhance the ability of screen reader users in better perceiving online information credibility, thereby better utilizing online information.

### 9.3 Limitations and Implications for Future Research

There were some limitations to this research. I studied web access only through a computer and did not examine the mobile device as a platform for online interaction and credibility perception. Web users who are blind or visually impaired, as much as sighted Web users, also access the Web using mobile devices equipped with screen readers. Studying online interactions, interface affordances, and credibility perception on the mobile platform could be a possible future research avenue. Another limitation is that I examined only the JAWS screen

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reader, the reason for this being that most of the participants used JAWS. It is necessary to examine online interaction and credibility perception while using other screen readers such as VoiceOver, which have a different interaction paradigm (direct screen manipulation rather than through a virtual buffer). User studies involving individuals who use such screen readers could broaden the understanding of online information interactions and credibility perception by screen reader users.

There is no single category of users called the blind. For instance, those who are born blind (congenital), and those who acquire blindness later on in their lives (adventitious) have vastly different life experiences (Beverly, Bath, & Booth, 2003; Williamson, Schauder, & Bow, 2000). People with congenital blindness have no direct experience with visual aspects of the world, unlike people who lost their sight later. When it comes to Web access, and the possible differences in experiences and perceptions with having seen and interacted with the Web visually or not, it is interesting to find three possible groups:

- those who never saw either the world or the Web
- those who saw the world but lost their sight before seeing the Web
- those who interacted with the Web visually and became blind subsequently

This research did not examine differences across these groups. Exploring such differences might provide valuable insights on the impact of each of these situations on online credibility perception.

Even though this research was about everyday information practices, it was observed that participants brought the paradigms of their primary life roles to the credibility perception process. For example, students were more concerned about the source and about critical evaluation of the message even in their discourse about their everyday information practices. This aspect was observed but not examined deeply in this research. Such specific aspects brought out by this work relating to online credibility perception by screen reader users who are blind or visually impaired could be examined through controlled studies.

A potential area for future research is whether (and if so, how) accessing information through the audio modality instead of visual modality changes a user’s perception of online credibility. Such research might also include in its purview podcasts and audio rendering of
websites for access via phone. Impact of the gender of the voice chosen for rendering the information on credibility perception also affords an interesting area for future research.

The phenomenon of technology opacity introduced and explained in Chapter 5 deserves further research to understand its deeper implications for the attitude of screen reader users towards the Web regarding the design of Web pages and the onus of responsibility for inaccessibility of web content. Furthermore, the experience of technology opacity might not be exclusive to screen reader users; it could well manifest in novice Web users who do not use assistive technology.

It would be useful to get inputs from screen reader users through studies involving hands-on activity about their conceptualization of interface affordances and about how mental representations are formed to connect various screen reader announcements of interface components to possible actions. Participatory design of better screen reader affordances could be a useful means to more effective versions of screen readers.

Research on credibility perception has shown that community involvement is a key component in the credibility perception process for all Web users (and not just screen reader users.) Examining the role of the community in the online credibility perception process in the context of the emerging social Web could further the existing understanding of this area. This research brings out the benefits of online participation for screen reader users and also shows how participation is currently suboptimal. Research focused on exploring the reasons for poor participation in the use of specific social technologies and remedies for the same could improve participation. The access-participation loop discussed in Chapter 8, whereby access leads to participation and participation leads to access, provides a framework for future research aimed at how Web accessibility and online participation could be enhanced through the initiation of a virtuous spiral of participation and access.

9.4 Final Remarks

This research was spurred by the observation that the “design look” of websites is reportedly a predominant determinant of credibility for sighted users. Starting as an exploration of what factors might determine credibility when websites are accessed nonvisually, this research developed into an exploration of the information interactions, information practices, and
credibility perception of screen reader users in an online context. Not only did the research examine the “how” of each of these processes from the users’ standpoint, but it also probed the role played by the screen reader in each of them. As a result, several interesting observations emerged besides possible answers to the two research questions that drove the research.

Importantly, online interaction proficiency played an important role in information accessibility besides web design. This led to an examination of the affordances of the screen reader interface and suggestions for their improvement. The communicative aspects of the everyday information practices of the participating screen reader users supported them in technology management and information seeking and evaluation, making community involvement key to their online information credibility perception. This result, coupled with the observation of the low level of their participation in new online social technologies, raised a concern that online participatory resources are not optimally used/usable by screen reader users.

A suggestion was made, therefore, to promote inclusion in the online participatory culture to enhance the online experiences, online information practices, and credibility perception abilities of screen reader users. That such inclusion is possible is emphasized by the following observation:

“… in this digitally transformed reality that we live and work in—where consumption does not consume and space has no limits—there is no downside to inclusion and it is possible to make room for us all.”

71 Jutta Treviranus, as quoted on http://atrc.utoronto.ca/index.php?option=com_content&task=view&id=1&Itemid=245, para 3 (last accessed April 7, 2010).
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CALL FOR PARTICIPATION IN RESEARCH STUDY

Hello, and welcome to be a part of my doctoral research study about “Credibility Perception on the Web without Visual Cues.”

I invite you to participate in an electronic survey if you are an English-speaking adult living in Ontario who is blind or vision impaired, and have accessed the Web auditorily for at least one year using a screen reader. If you know some others who would be eligible, please give them my contact details.

As compensation for completing the survey, which could take around one hour, you will be entered in a raffle where you stand 1-in-4 or better chance to win one of fifteen cash prizes totaling $500. The survey will close upon receiving 60 responses; so hurry up and email me to receive further details and the survey questionnaire in MS-Word format. My contact details are given below.

If you wish, you could also participate in a follow-up hands-on online task session and interview that might take about two hours, for which you will receive $50 as compensation.

Your participation will contribute to a better understanding of how Web users relying primarily on hearing to access the Web determine the trustworthiness and quality of online information. This could lead to better design of online content for all users.

You are also welcome to contact me for clarifications to help you decide about participating in the study. I look forward to hearing from you at the earliest.

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This announcement is valid till July 31, 2008.
Appendix II – Survey Information Letter and Consent Form

Title of research project:

“Credibility Perception on the Web without Visual Cues.”

Thank you for your interest in this study, which is a part of my doctoral research at the University of Toronto. I invite your participation if you are an English-speaking adult living in Ontario who is blind or vision impaired and having at least one year’s experience in accessing the Web auditorily using a screen reader. Your participation will contribute to a better understanding of how Web users relying primarily on hearing and other non-visual methods determine the trustworthiness and quality of the information they find on the Web.

Please complete the enclosed survey questionnaire in MS-Word format, which contains questions about your technology use and online experiences. It could take about one hour to complete the questionnaire. I will be collecting data from 60 participants or until July 31, 2008, whichever happens earlier. So, at your earliest, please fill in the consent details at the end of this document, and your answers in the survey questionnaire. Then send the two saved documents to my email address sambhavi.chandrashekar@utoronto.ca as email attachments. You will receive acknowledgement of receipt of your documents.

As compensation for your time, you will be entered in a raffle, where you have a 1-in-4 or better chance to win one of the following cash prizes:

- One first prize of $100;
- Four second prizes of $50 each;
- Ten third prizes of $20 each.

All participants will receive an email at the end of the survey, thanking them for their participation. In the case of the prizewinners, intimation about the prize won will also be included in their email and details will be sought to enable dispatch of the prize amount.

Your participation is voluntary. If you feel uncomfortable with any question, you may refrain from answering it without negative consequences. You are also free to withdraw from this study at any time without negative consequences. Participation in this study does not involve any foreseeable risk.
Your name or contact details will not be used in the study. Your responses will be confidential and your identity will not be known to anyone except me. I will assign a number to the response you submit, and only I will know which number was assigned to you. Your data will be stored securely on a password-protected computer and only I will have access to them. All data from this study will be destroyed at the end of three years. The data will be used only for scientific purposes.

The results would likely be published in academic publications and presented at conferences, but your identity will not be disclosed in publications and presentations. At the end of the study, I will write an article for a popular magazine, which I will make available to all participants. You are also welcome to contact me if you wish to discuss the general outcomes of the study.

Please contact me at any time if you need any further clarifications about the study. My contact details are provided at the end of this information letter. If you have questions about the research, please contact my faculty supervisor Dr. Nadia Caidi at nadia.caidi@utoronto.ca. If you have questions about your rights as a participant, please contact the University of Toronto Ethics Review Office at 416-946-3273 or email: ethics.review@utoronto.ca.

I also invite you to indicate your willingness, at the end of this document, to be considered for a follow-up hands-on online task session.

Please retain a copy of this information and consent form for your own reference. I look forward to receiving the completed questionnaire and consent form from you at the earliest.

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CONSENT FORM

1. I freely volunteer to participate in this study.
2. I am aware that I have the right to withdraw consent and discontinue participation at any time without negative consequences.
3. I believe that I satisfy the eligibility criteria.
4. I have been given a description of the study.
5. I am aware how to contact the investigator and/or supervisor to ask any question any time.
6. I understand that the information I provide will be treated confidentially and my identity will not be revealed in the reporting of the study results.
7. I am aware that I have a 1-in-4 or better chance to win a cash prize in the associated raffle and I will be intimated if I win.
8. I have retained a copy of this information letter & consent form for my own reference.
9. I am typing the word ‘YES’ (or ‘NO’) on the following line to indicate my willingness (or unwillingness) to be considered for a follow-up hands-on session.
10. I am typing the words ‘I AGREE’ on the next line followed by my name and today’s date to indicate my consent to participate in this study.
11. I am giving my contact email ID below for receiving further communications relating to the study, such as raffle results.

End of Consent Form
Appendix III – Survey Questionnaire

Title of project:

“Credibility Perception on the Web without Visual Cues”

Survey Questionnaire

Instructions

Thank you for consenting to participate in this study. There are three sections in this questionnaire. Section 1 has questions about your demographic and personal information. Section 2 has questions about the technologies you use to connect to the Internet. Section 3 has questions about your experiences on the Web.

Answers options are marked with letters a, b, c, etc. At the end of each question, there is a space marked with the word ‘Answer:’ where you can type the letter or letters corresponding to the answer choice or choices you are making. Where the choices offered do not cover your answer, please feel free to type in your own answer in the space provided. For questions that have no options offered, please write answers in your own words using as many words as you wish to.

Along with the questionnaire you would have received an information and consent form document. After completing the consent form, please start answering the questions on the next page. When you have completed answering, please send the saved questionnaire and the saved information & consent form to the email address sambhavi.chandrashekar@utoronto.ca as email attachments. I will acknowledge receipt of your documents.

Thank you very much for your participation!
Section 1: Demographic information

1. What is your age?
   a) 18 to 30
   b) 31 to 50
   c) 51 to 64
   d) 65 & above
   Answer:

2. What is your gender?
   a) Male
   b) Female
   Answer:

3. What is your highest completed level of education?
   a) High School
   b) Undergraduate degree
   c) Master’s degree
   d) Doctorate or professional degree
   e) Any other
   Answer:
   If your answer is ‘e’, please specify:

4. Are you currently a student?
   a) Yes
   b) No
   Answer:

5. Do you possess enough functional vision to view the computer screen even while primarily using auditory input?
   a) Yes
   b) No
   Answer:

6. Have you accessed the Web visually at any time?
   a) Yes
   b) No
   Answer:
   If your answer is ‘a’, please specify the year you accessed last:

7. What term or terms would you use to describe your vision condition?
   Answer:

8. What are the first three characters of your residential postal code?
   Answer:
Please indicate your opinion about statements in questions 9 to 13 below by selecting an option from the choices given.

9. In general, people really do care about the well being of others.
   a) strongly agree
   b) agree
   c) neither agree nor disagree
   d) disagree
   e) strongly disagree
   Answer:

10. I usually trust people until they give me a reason not to trust them.
    a) strongly agree
    b) agree
    c) neither agree nor disagree
    d) disagree
    e) strongly disagree
    Answer:

11. I generally give people the benefit of the doubt when I first meet them.
    a) strongly agree
    b) agree
    c) neither agree nor disagree
    d) disagree
    e) strongly disagree
    Answer:

12. All things considered, my using the Web as an information source is
    a) very wise
    b) wise
    c) neither wise nor unwise
    d) unwise
    e) very unwise
    Answer:

13. All things considered, my using the Web as an information source is
    a) very beneficial
    b) beneficial
    c) neither beneficial nor harmful
    d) harmful
    e) very harmful
    Answer:

End of Section 1
Section 2: Use of computer, assistive and Internet technologies

14. What type of computer do you primarily use to access the Internet?
   a) PC
   b) laptop
   c) mobile device
   d) some other
   Answer:
   If your answer is ‘d’, please specify:

15. What operating system do you primarily use while accessing the Internet?
   a) Microsoft Windows
   b) Apple Macintosh
   c) Linux
   d) some other
   Answer:
   If your answer is ‘d’, please specify:

16. What type of Internet connection do you primarily use?
   a) dial-up
   b) broadband
   c) wireless
   d) some other
   Answer:
   If your answer is ‘d’, please specify:

17. Which browser do you primarily use to access the Web?
   a) Internet Explorer
   b) Firefox
   c) Safari
   d) some other
   Answer:
   If your answer is ‘d’, please specify:

18. From which location do you primarily access the Internet?
   a) home
   b) work
   c) school
   d) some other
   Answer:
   If your answer is ‘d’, please specify:
19. Which screen reader program do you primarily use for browsing the Web? Please type in the version number after giving the answer option.
   a) JAWS
   b) Window-Eyes
   c) HAL
   d) some other
   Answer: 
   If your answer is or includes ‘d’, please specify:

20. Do you use any other assistive devices and/or programs with your computer?
   a) Yes
   b) No
   Answer: 
   If your answer was ‘a’, please specify what they are:

21. If you access the Web from more than one place, do you use the same browser and assistive technology from everywhere?
   a) Yes
   b) No
   c) I do not access the Web from more than one place.
   Answer: 
   If your answer was ‘b’, please explain:

22. How would you describe your level of expertise in using your computer?
   a) beginner
   b) novice
   c) average
   d) advanced
   e) expert
   Answer: 

23. How would you describe your level of expertise in using your preferred screen reader?
   a) beginner
   b) novice
   c) average
   d) advanced
   e) expert
   Answer: 

24. Do you use your screen reader’s command to bring up a list of all the links present on a webpage?
   a) Always
   b) Sometimes
   c) Never
25. Do you use your screen reader's command to move from header to header while reading a web page?
   a) Always
   b) Sometimes
   c) Never
   Answer:
   If your answer was ‘b’ or ‘c’, please explain why:

26. Do you use your screen reader's place markers to mark links, headers, tables, etc. on web pages that you visit often?
   a) Always
   b) Sometimes
   c) Never
   Answer:
   If your answer was ‘b’ or ‘c’, please explain:

27. Do you use your screen reader's commands for the following actions? (please select all relevant options)
   a) Moving from table to table
   b) Moving from button to button
   c) Moving from form field to form field
   d) Moving from check box to check box
   e) Moving from link to next link
   f) Moving from link to previous link
   g) All of the above
   h) None of the above
   Answer:

28. Do you use scripts or set-up files with your screen reader?
   a) Mostly
   b) Sometimes
   c) Never
   Answer:

29. How often do you typically use the computer?
   a) every day
   b) a few times a week
   c) a few times a month
   Answer:

30. How often do you typically use the Web?
   a) every day
b) a few times a week
c) a few times a month
Answer:

31. For how many years have you been using a computer with screen reader?
a) under 2 years
b) 2 to 5 years
c) over 5 years
Answer:

32. For how many years have you been using email?
a) under 2 years
b) 2 to 5 years
c) over 5 years
Answer:

33. Around how many emails do you typically send per week?
a) less than 10
b) between 10 and 50
c) more than 50
Answer:

34. Around how many emails do you typically receive per week?
a) less than 10
b) between 10 and 50
c) more than 50
Answer:

End of Section 2

Section 3: Online information practices & experiences

35. How would you describe your level of expertise in using the Web?
a) beginner
b) novice
c) average
d) advanced
e) expert
Answer:

36. Have you used the Google Accessible Search engine to locate information on the Web?
a) Yes
b) No
Answer:
If your answer was ‘a’, please comment on the accessibility of the results and the accessibility of the search engine itself:

37. Have you booked travel tickets on the Web?
   a) Yes
   b) No
   Answer:
   If your answer was ‘a’, please specify one travel website you usually use:
   If your answer was ‘b’, please explain why:

38. Do you read news on the Web?
   a) Yes
   b) No
   Answer:
   If your answer was ‘a’, please specify one news website you usually use:
   If your answer was ‘b’, please explain why:

39. Do you perform banking online?
   a) Yes
   b) No
   Answer:
   If your answer was ‘a’, please specify one banking website you usually use:
   If your answer was ‘b’, please explain why:

40. Have you purchased any item online?
   a) Yes
   b) No
   Answer:
   If your answer was ‘a’, please specify one shopping website you usually use:
   If your answer was ‘b’, please explain why:

41. Have you sought any health-related information online?
   a) Yes
   b) No
   Answer:
   If your answer was ‘a’, please specify one health-related website you usually use:
   If your answer was ‘b’, please explain why:

42. How do you decide which website to go to, for the information you want? (please select more than one if necessary)
   a) I use a search engine and select from the results
b) I always use a few websites that I can trust from my experience
c) I go to websites recommended by those I trust
d) I use websites recommended in other trusted websites
e) I use only offline information sources as I feel I cannot trust anything on the Web
f) some other

Answer:
If your answer is, or includes, ‘f’, please specify:

43. When would you consider some online information to be of good quality?
Answer:

44. What other information sources do you use, besides the Web?
Answer:

45. How frequently do you feel concerned about whether you can trust the information that you find online?
a) never
b) rarely
c) sometimes
d) often
e) almost always
Answer:

46. How frequently do you feel concerned about the quality of the information you find online?
a) never
b) rarely
c) sometimes
d) often
e) almost always
Answer:

47. Based on your experience, name some highly accessible websites.

48. Please explain why you consider these as highly accessible.

49. Based on your experience, name some poorly accessible websites.

50. Please explain why you consider these as poorly accessible.
51. Based on your experience, name some highly trustable websites.

52. Please explain why you think you can trust these websites.

53. Based on your experience, name some poorly trustable websites.

54. Please explain why you think you cannot trust these websites.

55. Do you “belong to” or “participate in” online communities such as “meetup” groups?
   a) Yes
   b) No
   c) I have not heard about online communities.
   Answer:
   If your answer was ‘a’, please specify the names of the online community or communities:

56. Do you participate in email lists?
   a) Yes
   b) No
   c) I have not heard about email lists.
   Answer:
   If your answer was ‘a’, please specify the names of some email list or lists in which you participate:

57. Do you communicate with others using online chat or Instant Messaging services such as Yahoo messenger, MSN messenger, etc.?
   a) Yes
   b) No
   c) I have not heard about online chat.
   Answer:
   If your answer was ‘a’, please specify the name(s) of some chat services you use:

58. Do you talk with others using Internet Telephony (Voice Over IP) services such as Skype, Google Chat, etc.?
   a) Yes
   b) No
   c) I have not heard about Internet Telephony or Voice Over IP.
   Answer:
   If your answer was ‘a’, please specify the name or names of some Voice Over IP services you use:

59. Do you subscribe to RSS feeds?
   a) Yes
b) No  
c) I have not heard about RSS feeds.  
Answer:  
If your answer was ‘a’, please specify the names of some RSS feeds to which you subscribe:  

60. Have you used a tag cloud on any website?  
a) Yes  
b) No  
c) I have not heard about tag clouds.  
Answer:  
If your answer was ‘a’, please specify the names of some websites where you have used tag clouds:  

61. Have you used tags to label any information on the Web?  
a) Yes  
b) No  
c) I have not heard about tags or tagging.  
Answer:  
If your answer was ‘a’, please specify the names of some websites where you have used tags:  

62. Are you a member of any social networking website such as Facebook, Myspace, etc.?  
a) Yes  
b) I do not participate because social networking websites are not very accessible.  
c) I do not participate because I do not have the time.  
d) I simply do not wish to participate in social networking websites.  
e) I have not heard about social networking websites.  
Answer:  
If your answer was ‘a’, please specify the name of the social networking website or websites:  

63. What is your experience with blogs?  
a) I read blogs  
b) I write comments on blogs.  
c) I have my own blog  
d) I have not heard about blogs  
e) I have heard about blogs but have not read any.  
Answer:  
If your answer was ‘e’, please specify the name of your blog:  

64. Do you have your own website?  
a) Yes  
b) No  
Answer:  
If your answer was ‘a’, please specify the name of your website:
65. Have you interacted with a wiki website?
   a) I have read and written into wiki websites.
   b) I have read wiki websites.
   c) I have used Wikipedia.
   d) I have not heard about wikis.
   Answer:
   If your answer was ‘a’ or ‘b’, please specify the names of some of those wikis:

   **End of Section 3**

66. Finally, could you share your general views about or particular experiences with how you assess trustworthiness and quality of information on the Web?

Thank you very much for completing the survey. Please save this file and email it as an attachment to the email ID sambhavi.chandrashekar@utoronto.ca along with the saved information & consent form. If you need assistance or clarification, please write to the same email address.

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Appendix IV – Interview Information Letter and Consent Form

Interview Information Letter & Consent Form

Title of research project:

“Credibility Perception on the Web without Visual Cues”

Thank you for your response to my survey questionnaire, which helped me in expanding my understanding of the online experiences of Web users during non-visual interaction using a screen reader. I am happy to be able to meet you in person for a hands-on session to gather further insights. I will be asking some questions related to your online experiences, and also requesting elaborations from you to some of your responses to the survey. As part of the session, you will be asked to do some online tasks, during which you will be requested to think out your experiences aloud.

The hands-on session will be held in a place preferred by you. You could suggest a place of choice where you would be able to do the online tasks using your own computing and Internet facilities. Alternatively, you could come to the Adaptive Technology Resource Centre (ATRC), a part of the Faculty of Information Studies, in the University of Toronto, where arrangements could be made for setting up computing, assistive technology and Internet facilities for you to complete the online tasks. You could also bring in your own portable computer with screen reader and use only the Internet facilities of ATRC. Please let me know, so that I can arrange the session at that location.

The entire session will be audio recorded. During the online tasks, your computer screen will be video recorded to capture data about your online activities. However, your face will not be recorded. Audio and video recording will be done only if you indicate your consent in the consent form. All audio and video recordings are done to facilitate transcription of data at a later date. You can contact me if you wish to review the transcript. In case you do not consent for audio and/or video recording, no recording will be done, and only notes will be taken.

You will remain anonymous and your name or contact details will not be used in the study. Your responses will be confidential and your identity will not be known to anyone except me. You will be identified in all data only by the participant number assigned to you when you submitted your survey response, which is only known to me. Your data will be stored securely
on a password-protected computer and only I will have access to them. All data from this study will be destroyed at the end of three years. The data will be used only for scientific purposes.

Your participation is voluntary. If you feel uncomfortable with any question, you may refrain from answering it without negative consequences. You are also free to not participate in parts of the session or withdraw from this study at any time without negative consequences. Participation in this study does not involve any foreseeable risk.

This session could take about two hours. As compensation for your time, you will be paid a sum of $50 in cash. Even in the event of your not completing the entire session, you will be allowed to retain the amount.

The results would likely be published in academic publications and presented at conferences, but your identity will not be disclosed in publications and presentations. At the end of the study, I will write an article for a popular magazine, which I will make available to all participants. You are also welcome to contact me if you wish to discuss the general outcomes of the study.

Please contact me at any time if you need any further clarifications about the study. My contact details are provided at the end of this information letter. If you have questions about the research, please contact my faculty supervisor Dr. Nadia Caidi at nadia.caidi@utoronto.ca. If you have questions about your rights as a participant, please contact the University of Toronto Ethics Review Office at 416-946-3273 or email: ethics.review@utoronto.ca.

Before the start of the session, please complete the consent form at the end of this document and email it to me. Please retain a copy of this information letter and consent form for your own reference.

Thank you, once again, for contributing to my study.

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Hands-on session Consent Form

1. I freely volunteer to participate in this study.
2. I have been given a description of the procedures of this session.
3. I am aware how to contact the investigator and/or supervisor to ask any question any time.
4. I understand that the information I provide will be treated confidentially and my identity will not be revealed in the reporting of the study results.
5. I am aware that I have the right to withdraw consent and discontinue participation at any time without negative consequences, and that all data collected from me will be destroyed.
6. I have been provided a copy of the interview information letter & consent form for my own reference.
7. I agree / do not agree to the audio recording of this session.
8. I agree / do not agree to the video recording of the computer screen during online tasks. I understand that the video recording will not cover my face.
9. I have received $50 as compensation for my time in participating in this session.
10. I am typing the words ‘I AGREE’ on the next line followed by my name and today’s date to indicate my consent to participate in this study.

End of Consent Form
Appendix V – Interview Guide

Credibility Perception on the Web without Visual Cues

Interview Guide

Before participant arrival:

• Print out the Consent form received by email from the participant while indicating consent for the interview; fill in the participant number, participant name and interview date on the form.
• Print out the survey response submitted by the participant and mark out points to be probed during the interview.
• Fill in the Interview session information below.
• Check that the audio recording device and video camera are ready.

After participant arrival:

• Confirm from the participant that they have read and understood the Interview Information Letter.
• Ask if they have any questions, and answer them if they do.
• Explain to them the set up of the recording devices and assure them that the video camera will only be used to capture activity on the computer screen.
• Read out the Consent Form, and get the participant’s signature.
• Hand over the compensation amount to the participant.
• Ensure that the participant’s computer, assistive technology and Internet connection are working.
• Start the recorder and announce the interview session information.

Interview session information

Participant number: Date:
Session start time:
Interviewer:
Location:
Computer used:
Assistive Technology used:
Introduction

Thank you for your participation in my study. Please remember that your participation is voluntary. If you feel uncomfortable with any part of the session or any of the questions, you may request to skip it. You are also free to withdraw from this study at any time. You can feel assured that there will be no negative consequences.

Whenever you are using the Internet during this session, I will periodically request you to pause your screen reader and think out aloud about what you did up to that point; why you did that; and what prompted you to move from one web page to the next. I will also ask you questions to clarify my understanding of your online activities and experiences. During today’s session, we will also go over some of the responses you had submitted to the questions in the earlier survey to see what has changed over the year that went by, and why.

Before we begin, let us practice the think aloud process for a few minutes. Please go to the website www.commcent.org and browse as you normally would browse any new website. Every time I prompt you, please pause the screen reader and think out aloud about all that you did up to that point and then continue to browse further.

[Check if the participant is comfortable with the process; explain again if necessary, and stop the exercise when the participant appears to have understood the process.]

ONLINE ACTIVITY & RELATED QUESTIONS

1. Online information seeking activity

[Start a conversation about swine flu (both as a news topic and as a health concern.)]

a. What is your opinion about the publicity swine flu seems to be receiving?
b. How did you first learn about the outbreak?
c. Has anyone close to you been affected by it?

Scenario 1: Current news lookup:

d. Have you been looking up news online to follow the spreading of the swine flu?
e. [If Yes] Could you show me how you go about doing it? [If No] Could you show how you would go about looking it up online?  
[Limit activity to ten minutes – encouraging periodic think aloud]

Scenario 2: Health information lookup:

f. Imagine that your close friend, who is not as savvy about the Internet as you are, just phoned you that he/she [use same gender as participant] is worried about getting the swine flu. He/she wants you to get reliable information about swine flu prevention and cure from the Internet. How would you go about this?

[Limit activity to ten minutes – encouraging periodic think aloud]

[Note up to three websites during the above activity.]
2. **Post online activity questions:**
   * [For up to three of the websites they went to, ask these questions, one website at a time]*
   
   a. Why did you choose to go to [name of website]
   b. How did you learn about it?
   c. What do you feel about using or not using the information you found there?
   d. Why do you feel that way?
   e. If you had more time, what else would you have done to find further information?
   f. How comfortable do you feel about passing on the information you found to your friend?
   g. Could you describe any aspect of using this website that was particularly difficult for you?

   **ONLINE INFO SEEKING AND USE - TECHNOLOGY FACTORS**

3. **Finding and using information on websites**
   * [Encourage them to demonstrate online, where relevant]*

   **General questions**
   
   a. Could you tell me how you decide in general which website to go to for the information you want?
   b. When you go to a totally new website (like commcent.org), how do you go about using it?
   c. Could you tell me how you obtain an overview of the information on a Web page?

   **Orientation**
   
   d. Could you tell me how you determine the structure of a Web page?
   e. Could you tell me how you find out where you are in a web page?
   f. Do you look for a site map and use it?
   g. Do you use the website search function, if available?
   h. Could you tell me how you locate the search function on new websites?

   **Navigation**
   
   i. Could you tell me how you move to specific locations on a Web page?
   j. Could you tell me how you distinguish visited links from new links?
   k. Do you use header information on Web pages?

   **Finding the required information**
   
   l. Tell me more about how you try to find specific information on a website or web page.

   **Interpreting information**
   
   m. When the screen reader is unable to interpret some information for you, how do you feel about it?
   n. Could you describe why you feel that way?
WEB ACCESSIBILITY AND FIRST IMPRESSION

4. Websites, Web accessibility and Web technologies
   a. Are there any websites that you would like to visit but avoid because they are
difficult to use?
   b. Could you share with me some of the problems you found on these sites?
   c. Could you describe some things that make it frustrating for you to use websites?
   d. Are there any other technologies you want to tell me about in the same context?
   e. Help me understand your feelings about the oft-used term ‘Web accessibility’.
      When you say that a website is not accessible, what exactly do you mean?
   f. Which are some of your favourite websites?
   g. I am interested to know what exactly you like about them.
   h. In general, what makes websites appealing to you?
   i. Tell me about the kind of experiences on such a website that would make you go
      back there again and again.
   j. What matters to you in forming an initial impression about people you meet for
      the first time?
   k. What matters to you in forming an initial impression about web pages you visit
      for the first time?
   l. Could you explain if you see any parallels between the two?
   m. [If Yes] How? [If No] Why not?
   n. Is the feeling of trust for a person same as the feeling of trust for a website?
   o. [If Yes] How? [If No] Why not?

QUESTIONS BASED ON THE SURVEY RESPONSES

5. Technology used
   a. In the survey, you had mentioned that you use the following technologies (list
      them). Have any of these changes since then?
   b. Have you considered using a different browser?
   c. [If Yes] Why? [If No] Why not?
   d. Have you considered using a different screen reader?
   e. [If Yes] Why? [If No] Why not?
   f. If you use Braille display when do you use it?
   g. Did you change your computer system and/or upgrade your software in the past
      year?
   h. [If Yes] Why? [If No] Why not?

6. Experience
   a. Tell me something about when and how you started using a computer.
   b. When did you start using a screen reader?
   c. Could you describe the role that the Screen Reader plays for you?
   d. What led you to start using email?
   e. When did you start looking up information on the Web?
   f. Do the terms Web and Internet mean the same or different things to you?
7. Self perceived technology expertise
   a. On a scale of 1 to 5 (1 = beginner … 5 = expert) how would you rate yourself in using
      - Computer
      - Screen reader
      - Internet
      [In each case ask]
   b. Why do you consider so?
      [If different from survey response, probe for reason]

8. Training
   a. How did you learn to use the computer, screen reader and Internet?
      [Probe further whether received training / was self learnt / had a mentor]

9. Tech support
   a. When you have trouble using these various technologies, who do you approach for help?
      [Probe for Vendor; Friends; Mailing lists; Forums; Online search]
   b. Do you help others in technology troubleshooting?
   c. [If yes] In what ways?

10. Information access/sharing/verification across media
    a. Could you describe how you first started using online information sources?
    b. What sources were you using before that?
    c. Which information sources do you use currently in your everyday life?
    d. What information do you seek in your daily life from these different sources?
    e. Tell me about some of the ways in which you use the Internet in your everyday life.
    f. Has the way you look for information changed over the past five years?
    g. [If yes] How? [If not] Why not?
    h. Among Radio, TV, Printed media and People/organizations, which source would you believe most?
    i. What does this depend on?
    j. How do you assess information obtained through these sources? [ask one by one]
    k. Do you use similar methods to assess information you get from websites?
    l. Who are the people, groups and organizations you turn to for information?
    m. Among your friends and other people who you are in touch, how many people with vision impairments use a computer and the Internet?
    n. Roughly what proportion does this form of all the people who you are in touch with?

11. Online communication/ Online participation
    a. How do you share information with others?
    b. What technologies do you use to communicate with your friends and family?
    c. How do you usually find out about the latest technologies?
    d. Tell me something about your experience on Facebook.
    e. What could be done to make it such that you like it more and use it more?
f. I am hearing of late about a service called twitter on the Internet. Have you had a chance to hear about it so far?
g. [If Yes] Do you use it?
   i. [If Yes] What made you start using it? [If No] Why not?
h. [If not, describe twitter to them and ask if they would want to use it].
i. I see that you were / were not a member of any online community at the time of the survey. Has that changed in the past year?
j. Do you share your online experiences with others?
k. Does online participation in groups provide you a sense of “community”?
l. [If Yes] How? [If No] Why not?
m. Do you feel that you are able to contribute on the Web?
n. [If Yes] How does it make you feel? [If No] What do you think the reasons are?
o. Do you feel a sense of participation on the Web?
p. [If Yes] Could you describe why? [If No] Could you describe why not?

**Interview Conclusion**

This concludes our session. Let me thank you once again for your participation. Is there anything you thought I might ask that I missed asking? Do you have any other comments, suggestions or questions? Can I contact you later in case any clarification or follow-up becomes necessary? Feel free to call me if you remember anything you thought needs to be told. Thank you very much for your participation.

**Post-session:**

*Turn off the recorders. Check recording.*

*Ensure audio and video files are appropriately named.*

Interviewer’s notes:
Appendix VI – JAWS Web Tips Collated from Research Participants

Controlling JAWS reading speed:

- To temporarily reduce / increase JAWS speech rate while JAWS is reading a web page - Press Insert + Page-down / Insert + Page-up.
- To increase / decrease JAWS speech rate across sessions - Press Control + Alt + Page-up / Control + Alt + Page-down

Opening websites:

- To open websites - Press Control + O or Control + L (for IE); Press Control + L (for Firefox); type in the url and Press Enter.
- To read out the page title - Press Insert + T.
- To check the address bar or type a new url - Press Alt + D.
- To go back to the previous page - Press Alt + Left-arrow; to return to the current page - Press Alt + Right-arrow.

Learning about page layout:

- To know how many links, landmarks, headings and forms a web page has - Press Insert + F1.

Searching:

- To find a term within a page - Press Control + F; type in the search term and Press Enter.
- To find the website search box from anywhere on the page - Press Insert+F7 and Press s to look for search; or Find the term ‘search’ using Control + F.
- To find the website search box when you are at the start of the page - Press f to go to the first form field or Press e to go to first edit box or simply arrow down till you hit the search box.
- To search a website that does not have a search box - Go to Google and enter the search term followed by ‘site:’ followed by the url of the website.

Navigating:

- To go to the start of the page - Press Control + Home.
- To skip repeating links at the top of web pages - Press n to go directly to the first piece of
non-link text.

- To quickly move through all the links on a web page – Press Tab / Shift + Tab; to view an alphabetical list of all the links on a web page – Press Insert + F7.
- To move through the familiar links on a page - Press v / Shift + v.
- To explore the unvisited links on a page - Press u / Shift + u.

**Reading through:**

- To slowly explore a web page, reading line by line - Press Down-arrow; to read the previous line - Press Up-arrow
- To read continuously – Press Insert + Down-arrow; to stop reading - Press Control (You could also Press Enter but that could sometimes invoke a link or command depending on where the cursor is).
- To check the spelling of a word - Press Right-arrow to read letter by letter.
- To get an overview of the contents of a document or page by viewing a list of all headings – Press Insert + F6.
- To skim through a long piece of text - Press Control + Down-arrow and read bits of each paragraph.
- To quickly get an idea of the text content of a web page – Press n repeatedly to move to the next piece of text.
- To quickly look through news headlines on a news website – Press h to go from heading to heading.
- To read long news articles on news websites - Search for the term ‘print’ using Control + F, click on the ‘print’ option and read or save the news article.

**Entering data:**

- To view a list of all the form fields (or user input areas) on the page – Press Insert + F5.
- To quickly move through an input form:
  - Press e / Shift + e to move to the next / previous edit field.
  - Press x / Shift+x to move to the next / previous checkbox.
  - Press c / Shift + c to move to the next / previous combo box.
  - Press b / Shift + b to move to the next / previous button.
  - Press f / Shift + f to move to the next / previous form field (which could be any one of the above four).
Managing Flash and Facebook:

- To turn off Flash - Press Insert+V to get the verbosity options and then press f to come to Flash and then press enter; repeat process to turn it on again.
- To use a simple version of Facebook - Try the mobile version m.facebook.com.

[Compiled January 9, 2010.]