



THE WEB NAVIGATION BARRIERS FACING BY BLIND USERS IN SOCIAL NETWORKING SITES

¹BAVANI RAMAYAH, ²AZIZAH JAAFAR, ³NOOR FAEZAH MOHD YATIM,

¹Faculty of Science, University of Nottingham (Malaysia Campus), Selangor, Malaysia.

²Institut of Visual Informatics (IVI), ³Faculty of Information Science and Technology, University Kebangsaan Malaysia (UKM),

E-mail: ¹bavani.ramayah@nottingham.edu.my, ²aj@ftsm.ukm.my, ³nfmy@ftsm.ukm.my

ABSTRACT

Social Networking sites (SNS) are increasingly attracting attention of everyone including blind users. However, some navigation barriers make them to stay away from SNS. A preliminary study was conducted to understand and to explore blind users' navigation barriers in SNS. In this study, ten blind users who are using screen reader were interviewed and their activities on their favorite social networking web sites are discussed. This study revealed that complexity of web pages, CAPTCHA, AJAX in SNS become the main factors of their web navigation barrier. Based on findings from qualitative survey, a comparative analysis was performed with Web Content Accessibility Guidelines (WCAG) 2.0.

Keywords: *Social Networking Sites, Navigation, Blind, Screen Reader, WCAG*

1. INTRODUCTION

World Wide Web (WWW) is a tool to connect millions of people around the world. Web sites consist of web pages fundamentally designed to work for all people. When Web meets this goal, it is accessible to people with a diverse range of hearing, movement, sight, and cognitive ability. The impact of disability is radically changed on the Web because the Web removes barriers to communicate and interaction that many people face in the physical world [14]. However, improper structure and poor web design could become barriers for disabilities and exclude them from internet world. Social networking sites (SNS) widely used by everyone and also access by blind users in Malaysia. The blind users navigate around the web content by using screen reader. However, complexity of web pages makes them to stay away from SNS.

2. SOCIAL NETWORKING SITES (SNS)

SNS is evolving and used by many people from all ages. Therefore accessibility is very important for social network sites and it will enable to all including blind people. SNS make users moving from passive reading to active in sharing information. Social networks like Facebook,

Twitter, LinkIn and GooglePlus allow people interact by exchanging news, comments, photos and videos [12].

SNS can be used for communicating, collaborating, and strengthening professional relationship. Currently, there are thirteen million Facebook users in the Malaysia, which makes it as fifteen in the ranking of all Facebook statistics by country [15]. As social networking becomes more acceptable as a legitimate collaborative workplace tool, the level of accessibility and usability for all users should be continually evaluated. The World Health Organization (WHO) estimates that there are nearly 285 million visually impaired users worldwide, 39 million are blind and 246 have low vision [13]. Screen readers such as JAWS, System Access, or Window-Eyes are software that audibly reads the visual content on a computer screen to a blind user, and this is the dominant method that blind users use to access computers and web sites. In a survey on screen reader usage by Web Accessibility in Mind (WebAIM) indicated that Facebook is a web site that is avoided by a majority of screen reader users [19]. Same time, the World Wide Web Consortium (W3C) noted that many SNS had not yet addressed accessibility requirements [17].

3. PREVIOUS STUDIES

There are many studies were carried out to explore and investigate issues related to SNS. Many accessibility issues arise when blind users using screen reader to view SNS from different platform such as mobile and desktop interface. Lazar [6] found that there is issues in usability and functionality even the interface is known as “accessiblle” version. By having multiple interfaces where one is accessible and the other is not completely accessible is never a good idea because typically one of them will not be updated as often as the other [10].

Twitter is a micro-blogging platform that in just a few years has attracted millions of users. Thus, the main issues with Twitter is related to usability and accessibility aspects. Maria [11] found that form elements in Twitter are very difficult to use and did not detected by JAWS. Besides, “security checker” (CAPTCHA) is not appropriately made accessible even they provided audio version [8].

There are many issues involved when interacting with Facebook via screen reader. According to the study by Maria [11], the Facebook environment is not easy to navigate for a blind user who interacts via screen reader. The greatest accessibility and usability issue is related to the announcement of new events. This means that when a user connects to his/her own Facebook Homepage, new comments or messages are not immediately perceived, unless the user explores all messages in a sequential way each time, by using the exploring JAWS mode.

The discussion above presented various issues in SNS. The aim of this preliminary is to explore and investigate navigation barriers on social networking site to blind users in Malaysia.

4. INTERACTING WITH SOCIAL NETWORKING SITES

4.1 Evaluation Methodology

The objective of the present study is to investigate navigation barriers by visually impaired user who using screen reader in SNS. A semi-structured interview was conducted to explore blind users’ web experience on SNS. Quantitative and qualitative data about the participants’ perception on various SNS were collected. The participants were interviewed using either one of these methods: email or phone-in. The interview session was divided into few sections. In the first section, details about the participants such as proficiency in screen reader and internet, type of screen reader were collected. In the following sections,

participants were given open-ended questions to explore about web experience, accessibility and use of SNS.

4.2 Demographic

There are ten participants were involved in this study: nine males and one female. All of them are blind who using screen reader to read the web page. The range of age of the participants is between 35 – 58 years old. The responses for internet proficiency and screen reader proficiency were similar (see Figure 1). Twenty percent of participants have chosen advanced level for internet and screen reader proficiency however eighty percent have intermediate skills in internet and screen reader. Majority of participants using JAWS for their web activities (see Figure 2).

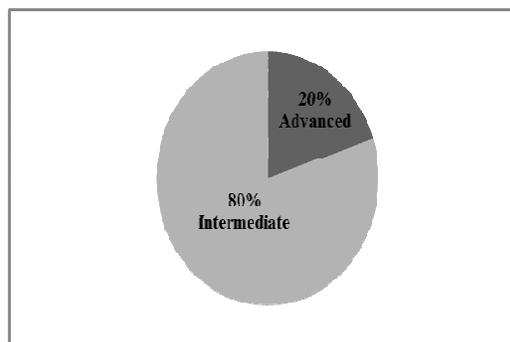


Figure 1: Participants' Proficiency In Screen Reader And Internet

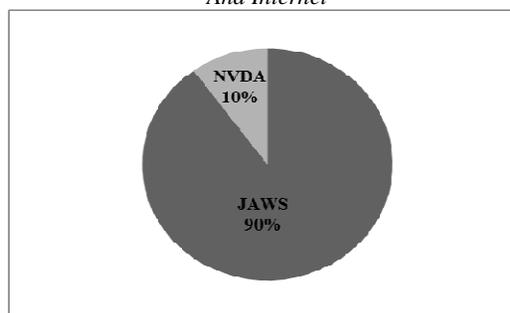


Figure 2: Type Of Screen Reader Software Use

4.3 Experiences With Social Networking Sites

For sighted web users, signing up to any SNS is easy. It does not take too long to set up a profile, viewing page, search for friends or add comments on people’s walls. However, these are not easy tasks for blind users who using screen reader such as JAWS and Window-Eyes. Participants accessed to various types of SNS. Few of them prefer to access Facebook compare to other sites. However, majority of blind users prefer to stay away from SNS after they experienced some problems during their navigations (see Figure 3). According to the

participants, various factors such as accessibility, interest, friends influenced them to actively navigate around the certain SNS.

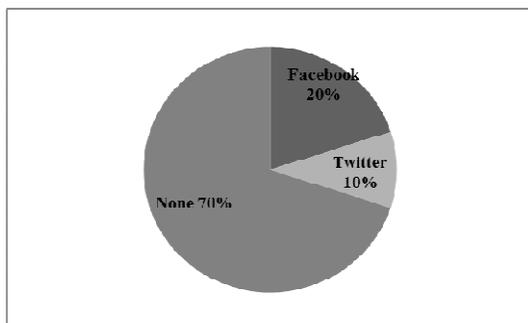


Figure 3: Participants' favorite Social Networking Sites

Those who are active users in SNS, almost every day they are visiting SNS and spent minimum thirty minutes in that particular web site. There are many features available in SNS, however only minority of them accessed by blind users. Many of them prefer to use features for communication purpose only. Browsing friends profile pages, chat functions, joining online group or an pages, looking through friends lists of other friends to see who might add, searching for old friends are the activities by most of blind users who using screen reader. Some of them not even interested to use SNS after they attempt failure several time.

Blind users are very interested in SNS and prefer to explore most of the features available. However their bad experiences and the problems encountered during web navigation in SNS make them to stay away from SNS forever.

4.4 Various Accessibility Issues In Social Networking : Based On Users' Experience

4.4.1 complexity of web pages

Accessibility is an important factor to determine web activities by blind users. According to feedbacks from participants, this study found that there are some accessibility issues in SNS. The most common problem is complexity of the web page. Blind users are unable to reach to their destination page and feel difficult for them to move from one web page to another web page. The web navigations become more complicated since they depend on navigation method provided by screen reader. Blinds users navigate through the web content by headings, links and read through the web page from top to bottom [1]. Screen reader such as JAWS could display list of link and text with heading tags [20] (see Figure 1 and Figure 2). Keyboard shortcuts such as insert+F7 for links and insert+F6 for headings are very useful for blind users to continue

their web navigation. These navigation methods caused the blind users perceive webpages differently compared to sighted users. For the blind, the screen reader as audio mediated software read the information for them directly from source code. As we know, source code only has one column with information one after another line. Therefore, the sighted users view the page as three columns. However, for blind users, screen reader will read the source code starts from heading followed by navigation bar, body text and images. Some responses proved that they are facing navigation problem in certain SNS.

4.4.2 appearance of asynchronous JavaScript and xml (AJAX) and CAPTCHA

According to the blind users, practice will make them possible to understand the structure of web page. However, often use of AJAX will make them difficult to keep track the web content especially for screen reader users. AJAX is the art of exchanging data with a server, and updating parts of a web page without reloading the whole page [18]. This dynamic alteration on web pages make blind users' web navigation into more crucial due to complexity to "scan" the web pages. In some cases, certain functions may be inaccessible because of the scripting techniques used. Even where the elements are adapted to be accessible to modern assistive technologies, it is important to remember that many users will have older versions which are not compatible [4]

CAPTCHA is another main problem that causing accessibility problem on most of the social networking pages. CAPTCHA is an abstract rendering of random characters that ask users to retype the word they see on the screen [3]. It also known as the "vision test" and CAPTCHA is meant to keep spam programs out of the system, but unfortunately they also keep out people with vision loss because they are essentially jumbled text embedded in an unlabeled graphic [3]. Since there is no descriptive ALT text, screen readers unable to read them and it's extremely difficult for blind users to understand the content. Blind users always seek for sighted users' help if they encountered pages that use CAPTCHA as it is part of the registration process. Most of blind users mentioned that, whenever they start using a web site, they will try to familiar with its structure and content presentation. This process could take a long time depending on the complexity of the site. Therefore, they first examine any web site quickly to gain a general overview and then they return to it to examine it in greater detail.



5. COMPARISON WITH WCAG 2.0

Based on results obtained, a comparative analysis on highlighted problems has been done with latest version of Web Content Accessibility Guidelines (WCAG) 2.0[7] (Table 1). Guidelines and recommendations are available for each problem reported by the participants. For inaccessible of CAPTCHA, guidelines and recommendation are given under guideline 1.1. Besides, guidelines such as 3.2 are given in WCAG 2.0 for problem which is related to AJAX. Apart from that, guidelines 2.4.8 are the recommendation for overly complex layout that reported by the participants. Based on the comparative analysis between reported problems and WCAG 2.0, it is clearly shows that even though guidelines on accessibility are available but blind users still facing navigation barriers in SNS.

Table 1. Participants' Favorite Social Networking Sites (SNS)

Navigation Barriers reported by participant	WCAG 2.0 guidelines and recommendation
Users frustrated with inaccessible of CAPTCHA	<p>Guideline 1.1</p> <p>Text Alternatives: Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.</p> <p>1.1.1 Non-text Content (Level A)</p> <p>If the purpose of non-text content is to confirm that content is being accessed by a person rather than a computer, then text alternatives that identify and describe the purpose of the non-text content are provided, and alternative forms of CAPTCHA using output modes for different types of sensory perception are provided to accommodate different disabilities.</p> <p><u>Sufficient Techniques for 1.1.1 - Non-text Content</u></p> <p>G143: Providing a text alternative that describes the purpose of the CAPTCHA G144: Ensuring that the Web Page contains another CAPTCHA serving the same purpose using a different modality</p>
Web page not predictable with AJAX	<p>Guideline 3.2</p> <p>Predictable: Make Web pages appear and operate in predictable ways.</p> <p>3.2.5 Changes on Request : - Changes of context are initiated only by user request or a mechanism is available to turn off such changes. (Level AAA)</p>

	<p><u>Sufficient Techniques for 3.2.5 - Change on Request</u></p> <p>G76: Providing a mechanism to request an update of the content instead of updating automatically</p>
Overly complex layout very difficult to gain overview of web page	<p>Guideline 2.4</p> <p>Navigable: Provide ways to help users navigate, find content, and determine where they are</p> <p>2.4.8 Location (Level AAA) Information about the user's location within a set of Web pages is available.</p> <p><u>Sufficient Techniques for 2.4.8 - Location</u></p> <p>G65: Providing a breadcrumb trail G63: Providing a site map G128: Indicating current location within navigation bars G127: Identifying a Web page's relationship to a larger collection of Web pages.</p>

6. DISCUSSION

SNS changed people's behavior from being passive readers to active content creators. Therefore, accessibility and usability should always be considered in order to have universal access for everyone. SNS have accessibility and usability issues that affect blind users who are using screen reader.

In section 4.3 and 4.4, web experiences by blind users and accessibility issues on their selected SNS were presented. The inability to register and web page complexity are the greatest problems that users experienced when using SNS. They prefer to stay away from SNS since they need to seek sighted users' help every time. In this study, general comments given by blind users regarding overall SNS included "complex", "inconsistent", "unpredictable" and "inaccessible". Most participants prefer simple, accessible and consistent web pages. Facebook does include a page in its Help Center on Accessibility and Assistive Technology which discusses the audio CAPTCHA, the HTML-based mobile site, browser keyboard shortcuts, and other topics in an effort to address accessibility [5]. However, accessibility problems still encountered by many blind users. Similar problem was identified by other researchers [11] [16] where "security checker" that used CAPTCHA is not appropriately accessible even though an audio version is provided to the users. CAPTCHAs are the controversial topic in the accessibility community. Every type of CAPTCHA will be



unsolvable by users with certain disabilities. However, they are widely used, and the Web Content Accessibility Guidelines (WCAG) Working Group believes that if CAPTCHAs were forbidden outright, web sites would choose not to conform to WCAG rather than abandon CAPTCHA [7]. Inability to create user account in SNS such as Twitter is one of the main problems facing by blind users and this problem was founded by The American Foundation for the Blind (AFB) [2]. According to AFB, LinkedIn is the most user-friendly of all the SNS because its pages are well labeled and it does not include a CAPTCHA in the registration process [3].

In section 5, comparison between problem reported by participants and WCAG 2.0 was presented. There are guidelines and brief solution techniques given for each problem raised by blind users. Here, web designers and programmers are playing vital role in order to overcome the problems encountered by blind users particularly on navigation barrier. It is essential for designers and programmers to analyze the effectiveness of accessibility features included in web pages. When designing and developing user interface in any social networks, some basic concepts should be taken into account in order to fulfilled guidelines and standards approved by WCAG 2.0.

7. SUMMARY AND FUTURE WORK

SNS is playing vital role for communication, collaboration and professional networking [9]. In this study, we have identified blind users' experience and their navigation challenges in SNS. These challenges should not be ignored by any organization and governments entities since SNS is a platform being used as communication tool. There is an obvious correlation between accessibility issues and user experience. Blind users prefer to avoid web page that has more accessibility issues and become inactive users in SNS. This study revealed that majority of blind users avoid from using SNS due to inaccessible of web interface and features.

Validation of accessibility and usability of web page is needed and this can be achieved by constant web evaluation of SNS based on guidelines in WCAG 2.0. Besides, observation on navigation behavior by blind users is essential to understand their mental model [2] on how blind users perceive and interpreted the web structure in SNS. This study is part of ongoing research on navigation experience by blind users in SNS. This preliminary study is based on blind users' perspective on SNS

and as a future research, navigation tracking software will be used to analyse blind users' navigation behavior in selected social networking site in more detail.

ACKNOWLEDGMENT

The author would like to thank the participants who volunteered in this study and special thanks to Malaysian Blind Association (MAB), National Council of Blind Malaysia (NCBM) for their tremendous supports.

REFERENCES:

- [1]. Bavani Ramayah, A. J. (2012). Visually Impaired Users' Mental Model and Navigation Behavior on News Web Site. *GSTF Journal of Computing*, Vol.2(2), 36-40.
- [2]. Bavani R, A. J. (2010). A Study on Web Experiences Among Visually Impaired Users in Malaysia. *Proceedings of International Conference on User Science and Engineering(i-USERr)* (pp. 11-15). Shah Alam, Malaysia: IEEEExplore.
- [3]. Blind(AFB), T. A. (2012). *Are Social Networking Sites Accessible to People with Vision Loss*. Retrieved October 2012, from <http://www.afb.org/section.aspx?sectionid=57&topicid=167&documentid=3153>
- [4]. Coltham, J. (2009). *Accessibility and Social Media – an overview*. Retrieved from Social Media: <http://www.prettysimple.co.uk/blog/index.php/2009/06/accessibility-and-social-media/>
- [5]. Facebook. (2012). *Help*. Retrieved October 2012, from <http://www.facebook.com/help/?page=440>
- [6]. Graig Sauer, e. a. (2008). Towards a Universally Usable CAPTCHA.
- [7]. Group, W. W. (2012). *Understanding WCAG 2.0*. Retrieved from W3: <http://www.w3.org/tr/understanding-wcag20/conformance.html#uc-levels-head>
- [8]. Jonathan Holman, e. a. (2007). Developing Usable CAPTCHAs For Blind Users. *Proceedings of the 9th international ACM SIGACCESS conference on Computers and accessibility* (pp. 245-246). New York: ACM. doi:10.1145/1296843.1296894
- [9]. Lazar, B. W. (2011). Are separate interfaces inherently unequal?: an evaluation with blind users of the usability of two interfaces for a social networking platform. *Proceedings of the 2011 iConference (iConference '11)* (pp. 91-97). New York: ACM. doi:10.1145/1940761.1940774
- [10]. Lazar, J. (n.d.). *Universal Usability: Designing Computer Interfaces for Diverse Users*. Chichester: John Wiley & Sons.
- [11]. Maria Calaudia Buzzi, M. B. (2012). Is Facebook Really "Open" to All? *Technology and Society (ISTAS), 2010 IEEE International*



- Symposium* (pp. 327 - 336). Pisa, Italy: IEEE-Xplore. doi:10.1109/ISTAS.2010.5514621
- [12]. Maria Claudia Buzzi, M. B. (2011). Web 2.0: Twitter and the blind. *Proceedings of the 9th ACM SIGCHI Italian Chapter International Conference on Computer-Human Interaction: Facing Complexity* (pp. 151-156). ACM. doi:10.1145/2037296.2037333
- [13]. Organization, W. W. (2012). *Visual Impairment and Blindness*. Retrieved November 2012, from <http://www.who.int/mediacentre/factsheets/fs282/en/>
- [14]. Rachel Hewett, G. D. (2012). *A Survey of the social activity and social networking of blind and partially sighted young people: Technical Report*. Birmingham: RNIB.
- [15]. Socialbakers. (2012). *Socialbakers*. Retrieved November 2012, from <http://www.socialbakers.com/facebook-statistics/malaysia>
- [16]. Team, A. W. (2008). *Social Networking Websites*. Retrieved from AbilityNet: www.abilitynet.org.uk
- [17]. W3C. (2008). *W3C Workshop on the Future of Social Networking*. Retrieved October 2012, from <http://www.w3.org/2008/09/msnws/report>
- [18]. W3schools. (2012). *AJAX*. Retrieved October 2012, from <http://www.w3schools.com/ajax/default.asp>
- [19]. WebAIM. (2009). *Survey of Preferences of Screen Readers Users*. Retrieved October 2012, from <http://www.webaim.org/projects/screenreaders/survey/>
- [20]. WEBAIM. (2012). *Keyboard Shortcuts for JAWS*. Retrieved July 2012, from WEBAIM Web Accessibility in Mind: <http://webaim.org/resources/shortcuts/jaws>