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Research paper



Screen Reader on the Wall: Tell Me, How Do I Look on the Photo?

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Abstract

Screen reader has become one of the tools that can accommodate the needs of blind people. A lot of information can be accessed directly by blind people independently and do not have to depend on other people's help. Along with the development of technology, there is also the need for the visually impaired, especially for young people with visual impairments who are familiar with information communication technology, to be able to enjoy an image or photo through their smartphone screen. This need arises along with their interaction with the environment that provides knowledge about images that can be enjoyed on a photo, or personal experience before they experience blindness. In addition, there are still some things that are expected by blind people to screen reader capabilities as the main tool they use to "see". Therefore, this study conducted a study on mapping the needs of blind people to the screen reader function through aspects of accessibility tools, based on information sharing patterns, which foster new needs within the people with visual impairments.

Keywords: *screen reader, applications, smartphones, ICT development, visual impairment*

1. Introduction

"I experienced a decrease in my visual power due to illness, initially only blurred, gradually I could only see shadows, and eventually it was completely dark. Now, I have been able to accept my blindness, but over time, my memory of something I have seen as a child began to disappear gradually, including my memory of mama's face. Before my mother died, I could still touch her face to strengthen my memory, but now I could only touch the picture. I really want to be able to remember mama's face. If only, when I touched the screen, a screen reader could describe what Mama's face looked like in a photo, I would have felt very happy, because I wanted to be able to re-imagine the face of the smiling mama".
The fragments of outpouring heart that are full of emotion, inspire researchers to raise the topic of the limitations of young people who are blind in using communication and information technology.

Admittedly, the existence of a screen reader has opened the accessibility of blind people to participate in communication and information sharing activities through technology. Screen reader has become the main tool in using the internet for individuals with visual impairments [1]. Screen readers allow blind people who have visual limitations, so they are able to "read" through technology media. However, it is important to realize that not all information communication technologies are compatible with the conditions of limitations possessed by persons with disabilities, one of them is blind. Though disability conditions such as deafness and blindness, tend to spur people with disabilities to utilize the technology in full than others.[2].

In principle, the greatest hope of blind people, both those who experience blindness from birth and blindness experienced from childhood, adolescence, and adulthood is to be able to see (again). If these expectations are considered impossible, then at least they hope that sophisticated technology will be able to help them to "see". Some of their hopes were fulfilled by the existence of a screen reader that was able to help them "to see and read" the text that was on the screen of a media technology. One of them is a design that provides web-based "pronunciation" accessibility with a better navigation system for information retrieval [1], screen reader technology, and braille system. Some of this software can read and speak with the style and character of a particular person or spell text on the screen, both for documents, menus, web pages, and e-mails [3]. But there is still a myriad of hopes that they rely on in the development of information communication technology that is expected to materialize in the future.

There have been many discoveries and inventions produced from a number of ICT research and development for people with disabilities. Some devices, programs, and applications on tablets and mobile phones have opened wide opportunities for individuals with communicative disorders to minimize their differences with others in the use of mainstream technology and cultural relevance [4]. For example, this screen reader application can convert text to talk, allowing users to read and navigate screen content through hearing, to send e-mail, listen to music, and surf the web. Initially, screen readers on mobile phones are only physical buttons but are becoming available for phones with touch screens [5].

New findings in the development of technology in the digital era are increasingly fostering the hope of people with disabilities to be able to carry out their activities as non-disabled. The hope of not relying on others and being independent is based primarily on the development of communication technology because the things that people with disabilities don't want are the limitations they have made their lives marginalized and even alienated. The hope of persons with disabilities is humane because the right to

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information and communications is the right of all parties including disabled persons [6].

Indonesia has a population growth rate of 1.49 percent. So in one year, the Indonesian population increased by around 4 million, as said by the Head of the BKKBN Center, Surya Chandra in yogya.tribunnews.com. That is, in July 2017 Indonesia's population was more than 262 million, based on data.go.id, while the number of people experiencing disability can be seen in table 1.

Table 1: Disability Total in Indonesia

Type of Disability	Total
Blind Disability	1.780.200
Deaf Disability	472.855
Speech Disability	164.690
Mental Disability	402.817
Body Disability	616.387
Disability of Difficult to takes care of themselves and around	170.120
Multiple Disabilities	2.401.592

Source: kemensos.go.id Bulletin, The Disability situation, Indonesian Ministry of Health, semester II, 2014

When referring to the amount of the visually impaired, the level of demand for screen reader as a tool for communication and information media mainstay blind in Indonesia, to be significant. Like other developing countries, Indonesia is a country that is slow to adopt the acceleration of technological development for people with disabilities. This is related to prevailing cultural issues so that the fulfillment of the needs of persons with disabilities is often not a priority.

There is a blind rehabilitation center complex in Indonesia, which provides blind people empowerment facilities in Bandung, namely Wiyataguna. Wiyataguna provided various educational facilities from the early education level to high school, plus training and supporting facilities that supported the empowerment process to prepare the visually impaired to live a full community life. Based on the results of pre-research it is known that, since the junior high school level, students already have and are able to operate the Mobile to communicate. This means, since junior high school, blind students in Wiyataguna have adapted and utilized this communication technology.

As a millennial generation, some of them even joined the information technology "lovers" community. It is through this community that the technological barriers experienced by blind people often arise. One of them is about the limitations of screen readers as their main tools in utilizing IT. Therefore the purpose of this paper is to map the pattern of IT needs by blind people, especially for screen reader facilities.

2. Method

This study uses data collection techniques, which are obtained from the results of interviews through Focus Group Discussions conducted on a number of blind people who have an interest in the ICT field and some of them are incorporated in the WhatsApp Group ICT for Blind. In addition, data was also collected based on participant observation, when the resource person operated their mobile phone. Because the method used is a descriptive case study, the next step is the data that has been collected is processed and classified based on analysis and interpretation, and also verifies through confirmation to the resource person, then draws conclusions to show the findings of the research results.

3. Results and Discussions

Based on the results of the Focus Group Discussion on the community of young blind people who were in the Wiyataguna Bandung environment, there were some difficulties which they felt when using their smartphone, so there are also hopes of them that someday they will be able to do something like done by people who can see with the help of technology. However, there were speakers, namely Yuli (22 years old) who felt that the existing screen reader facilities had fulfilled their needs, *"the important thing is that I can call, text or WhatsApp, that's enough, because so far what I prioritize is the need to communicate, so the current screen reader is enough"*

On the other hand, there is a need for the blind to be able to optimize the use of ICT media, as stated by Astri (30 years), *"I want to be able to sell online like everyone else so that it is faster selling, but yes because of this condition, it is difficult to make the media."* She needed something but realizing the condition of the blind that she experienced forced her to accept her limitations. Another thing with Rifli (15 years) who stated that: *"it's hard if I'm looking for symbols, I don't know how?"* Based on his statement, it can be seen that there are speakers who need certain facilities that make it easier for the blind to type certain symbols but have not been able to do so.

Furthermore, there are resource persons who need certain assistance, in the form of the finding, and have found a solution. *"Initially it was difficult if there were two languages in the text, had to change the language settings, but it turned out that there were special settings, so now if there is a two-language text, it will automatically change the language without needing to change settings."* In contrast to the case of the two-language setting which he was finally able to find a solution, in another case, still from the same resource person, Cito (15 years), also stated: *"the most difficult thing is to know the contents of photos or images that already shared, sometimes I was very curious to want to be able to see, especially if the photo or picture made low vision friends who still had the rest of their eyes, commented on something and the atmosphere of the conversation became exciting".* This means that as a blind person who has ICT capabilities, so far he has not found the tools he needs.

Another obstacle was revealed by Sami (23 years): *"are there any applications or settings that can make us read graphics? The problem is I wonder what the graph looks like, because sometimes when reading texts with lots of numbers, there was once someone who said, "just look at the graph" but the screen reader that I have is not able to read graphs"*. In fact, there has been braille and tactile graphic for the blind [7], but so far the resource persons have not obtained information and also have not had the opportunity to access it.

The difficulties raised by teenagers with visual impairment during the discussion, among them was stated by Sandi (20 years) who stated: "*often crossed my mind, it would be better if the intonation on the screen reader was more like a human voice, so if there was a text ending with the question mark, at least the tone rises a bit like in general, people read question sentences, so they are not flat like ordinary sentences*". Another thing stated by Cito (15 years) as follow, *"I was once asked by a researcher, he asked 'why do you rarely use emoticons when posting messages in WhatsApp Group? because, if in the deaf community they use emoticons often'... I answer, because usually, those who use emoticons are the low vision, while for totally blind people like me, they tend to find it difficult to find where the emoticon is. I want it to be, I even tried to explore it, but at that time I roamed the part of the flag, I felt that not all emoticons of flags and equipment were immediately read by the screen reader."*

In addition to difficulties caused by limited information and tools, there are technical difficulties as revealed by Een (27 years), *"very helpful by this screen reader, but my palms often sweat a lot, so sometimes because of relying on touch, beats, swipes or slides, often wrong when giving instructions."* Based on the opinions expressed by the resource person, it can be seen that there is an accessibility search pattern that can be mapped into the following picture:

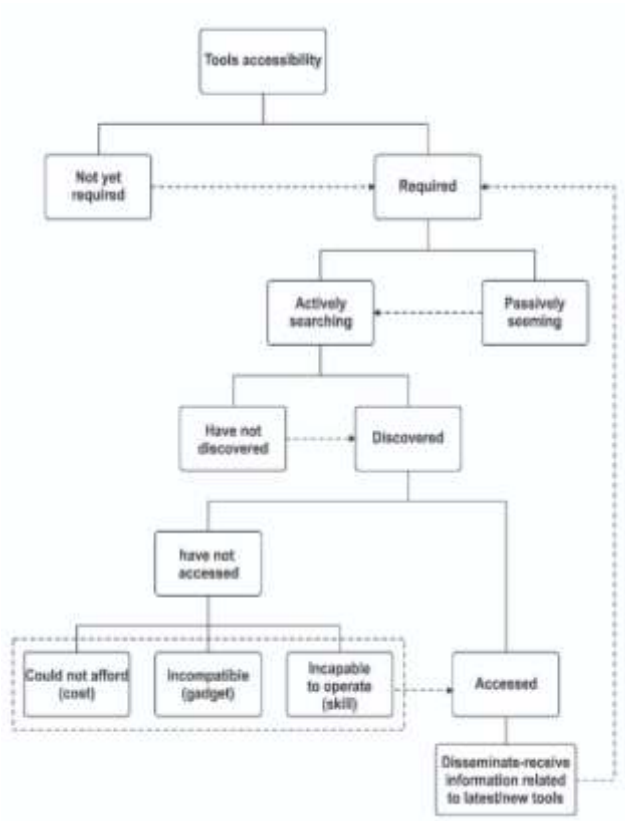


Fig 1:. Model of meeting the needs of accessibility tools by people with visual impairment

For the blind speakers, the most useful tool is a screen reader, this is in accordance with the statement that: "for the blind, the most used way of interacting with information applications and voice synthesis" [8]. That is reinforced by research findings which mention that people with visual impairments tend to use screen readers and screen magnifiers on mobile and desktop platforms.[9]. Thus, the modalities for the visually impaired include braille, screen readers, [10], and other types of assistance applications as alternative choices.

However, there are still challenges and obstacles raised by blind people who are resource persons, which also reinforces the results of previous research from Leporini which states that there are challenges in using VoiceOver and screen readers through the iPhone [11]. In addition, there are difficulties faced by the visually impaired when facing inaccessible content, opening audio plus having to remember the interface layout, therefore, the findings of this study can be used as a first step in developing inclusive cellular applications to bridge 'disability divide' [12]. This can be caused because there are times when the configuration found on a computer screen, less considering the needs of people with visual impairments, to be easily read by a screen reader [13]. In addition, the main things that are considered difficult for blind people include a page layout that confuses screen readers to respond to conflicts that occur between screen readers and applications [14].

There are other accessibility problems faced by blind people, for example, there are no subtitles, or the subtitles cannot be accessed by screen readers, there is no spell checker [15]. In addition, there are research results that state that the resource persons have difficulty reading mathematical notation [16], or the output of the standard equation editor cannot be read by screen readers [17], this difficulty also concerns non-text elements such as graphics and maps or no images can't be accessed by screen readers [18] therefore another tool is needed that can describe the element.

Besides, the data from this study about their difficulties when they want to optimize the screen reader function for the sake of science, there are also data that revolve around their difficulties in social media, as stated by Cito (15 years) *"Instagram is more difficult than Facebook, so I am rarely active on Instagram"*, but there are studies that have also discussed the difficulties of screen readers for people who have visual disabilities in facing Facebook since the pages are designed as uniform templates [19].

In principle, blind and low-vision people, generally rely on the sense of hearing in using communication media so that their sense of hearing ability is often sharper than sighted people. So that we need to adjust the speed level of the screen reader that is on the personal device [20], it is not surprising that Sandi (20 years) feels that the speed of the screen reader in the reading text is not fast enough.

Even though Sandi's ability to listen to screen readers is quite high, on the other hand, he states that he has difficulty in being in a crowd and noisy, this is in line with the findings that voice commands and screen readers are often not ideal because users with visual impairments depend in hearing sounds.[21], this caused them difficulty in relying on both applications if they were in a crowded environment because the noise behind them would interfere with the effectiveness of the voice command, and the sound produced by the screen reader is difficult to hear with perfect in a crowded environment.

There are also a number of studies that have also examined the limitations of ICT for blind people, among others, suggesting that the operation of screen readers should be developed to make it easier to run through shortcut keys.[27]. Sound cards can be accessed in a pre-OS environment, allowing the development of solutions for screen reader users [13], or Abanumy's research that suggests the design of a web page should support compatibility with enable people to access these pages [28]. In addition, the suggestions put forward are not limited to being useful only for blind people, for example text that can be converted into sound using translation components, can also be used by people with dyslexia who tend to prefer sound rather than text [29], so that existing ICT development can be used to meet the needs of users with various conditions of limitations.

Initially, communication and information technology was developed to meet human needs with general capabilities, which is why the cellular interface is often designed with reference to the condition of alert users, so that difficulties are experienced by individuals who are blind when using cellular screen readers to access content [12]. Some technology companies such as Microsoft or Google realize that technology products such as screen readers and other assisting devices are very important for their customers who have special needs [22], so there are many efforts from the developers to continue to develop their products to meet the needs of users with special needs which is not infrequently it creates new difficulties for blind people to access it, because of the high costs to buy a smartphone, including completing it with various additional tools and internet access, as well as lack of skills, making blind people not have the opportunity to try out the various technology facilities that have been developed, and in the end they tend to ignore [23]. For some blind people, operationalizing screen readers and adaptive programs are not easy, especially if there is a lacking of accessibility. For example, scoring programs, there are only can be used by a blind person [24]. This is also reinforced by research results that say that few students have used text-to-speech devices or software while other students have not heard about the technology. The cost factor can be one of the causes [30]. Based on this, the problem is not just a factor of the unavailability of ICT facilities but also the accessibility to ICT that is available.

4. Conclusion

The accessibility of blind people to ICT cannot be separated from the awareness of technology developers to be willing to present special facilities according to the needs and limitations of blind people. The presence of a screen reader has helped the blind to "see" the world, but this facility has not met the needs of blind people in media, therefore it is hoped that in the future, the devel-

opment of screen readers can refer to taxonomies which consist of five categories (interactivity, stability, representation, structure, and personalization) that can be used to make richer visual content representations for screen reader users [25], thoroughly. Therefore, the development of digital media tools should consider the accessibility of blind users during the design process, from the beginning [14], including considering the experience of low-vision or non-visual, or non-spatial users, so that they are able to navigate the online world well [26]. Every technology development requires the process and investment in the form of time, funds, energy, expertise and experience. The thing that also deserves to be brought to the surface is the awareness of technology developers to develop every technology they develop so that they can also be enjoyed by people with disabilities from various types of disabilities so that the spirit of togetherness and equality can be realized through this strong awareness.

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