



RESEARCH ARTICLE

# Effectiveness Use Application Screen Reader To Improve The Independence Of Blind People With Disabilities In Pertuni, Bengkulu City

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## Abstract

This study discusses how screen reader applications help visually impaired people in Bengkulu City in carrying out their daily activities and increasing their independence. The study was conducted qualitatively by involving ten informants who are active members of PERTUNI. They have been using screen readers for at least six months and are accustomed to interacting with this technology in their daily activities. The results show that screen readers not only help them achieve their initial goals of use, such as working, communicating, or accessing social media, but also strengthen social relationships and improve their ability to adapt to technology. Although some informants experienced difficulties at the beginning of use because they had never used a smartphone, they were still able to adapt with the support of their families and environment. In terms of independence, screen readers made the informants more confident in making decisions, managing their personal lives, and carrying out activities without relying heavily on others. Thus, it can be concluded that screen readers are a very useful technology for people with visual impairments because they help them live more independent and empowered lives.

**Keyword:** Screenreader, Visuallyimpaired, Independence, Assistivetechonology.

## Introduction

Indonesia has strived to create an inclusive society, but in reality, people with disabilities still face various limitations. According to data from the Central Statistics Agency (BPS), around 12.15% of the population in Indonesia has a disability, but their participation in social and economic activities is still very low due to inadequate infrastructure, limited accessibility, and a lack of skills. Independence refers to a person's capacity to complete daily tasks without relying on the help of others. According to Barnadib (1983), as cited in a study conducted by Rini (2012), independence can be defined as a set of behaviors that include the ability to take initiative, overcome obstacles or problems, have a high level of self-confidence, and the capacity to carry out activities on one's own without relying on help from others.

In the context of persons with disabilities, independence includes the ability to perform daily activities, make decisions, and actively participate in social life.

(Santrock, 2011) adds that social independence is greatly influenced by support from the environment, such as family, community, and the availability of support facilities. Therefore, assistive technology plays an important role in creating conditions that enable people with disabilities to live independently and empower themselves in their environment.

Limitations in the independence of persons with disabilities arise due to disability (Pioh, 2017). This often poses a significant challenge for them in their daily lives. For persons with disabilities, achieving maximum independence can be a complex challenge. For example, in a study conducted by Pioh et al. (2017), it was revealed that in social institutions for children with disabilities, they work hard to increase their level of independence by providing practical daily training, such as bed layout, which is repeated until it is fully mastered by the children.

Amidst the complex challenges faced by persons with disabilities, there have been important developments that have

provided new hope and opportunities for persons with disabilities to increase their independence. One of the most important developments in efforts to increase the independence of persons with disabilities is the application of assistive technology. The phenomenon of assistive technology has brought about significant changes in the way individuals with various types of disabilities interact with the world around them. The PERTUNI organization first entered Bengkulu in 1994 through the Bengkulu Provincial Social Service. In that year, the first DPD PERTUNI Bengkulu was formed, with Mr. Herman as its first chairman. At that time, the majority of PERTUNI members were still students. However, in the early stages, PERTUNI only existed formally without any ongoing activities or work programs, because the chairman at that time was still pursuing his education. As a result, PERTUNI was inactive for quite a long time. PERTUNI became active again in 2013 with the holding of the first Regional Conference (Musda). At the Musda, Mr. Hendri was elected as chairman. Under his leadership, several programs began to be implemented, such as advocacy, hearings, and participation in activities related to disability.

After Mr. Hendri's term ended, he was unable to hold the next Musda. Therefore, leadership was continued by Acting Officer (PLT) Mr. Asmadi in 2019. However, Mr. Asmadi was also unable to hold the Musda. Then in 2022, the PLT was carried out by Mr. Ardi Susanto. Under his leadership, the second Musda was successfully held in 2024, and Mrs. Magdalena was elected as the chairperson of PERTUNI Bengkulu.

Based on the 2024 Bengkulu City Disability Data, it is recorded that people with sensory disabilities, including the visually impaired, are spread across various sub-districts such as Gading Cempaka, Ratu Agung, Ratu Samban, Kampung Melayu, and Muara Bangka Hulu. The data shows that there are still a number of individuals with visual impairments with varying levels of productivity, ranging from productive to unproductive. Based on data obtained from PERTUNI, there are 70 visually impaired individuals spread across the city of Bengkulu.

This situation illustrates that the existence of visually impaired people in Bengkulu City requires special attention, both in terms of education, social rehabilitation, and economic empowerment. With this systematic data collection, the government and community are expected to be able to design more inclusive programs to support independence and improve the quality of life for people with sensory disabilities, especially the visually impaired. (Sutedja & Nugroho, 2021) explain that a blind person is someone who has an impairment in one or both of their senses of

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sight as a channel for receiving information so that they are unable to see like other people. Meanwhile, based on visual ability, Asrori (2020) distinguishes blind people into three categories:

(1) low vision, which refers to individuals who still have some residual vision and can participate in visual activities with the aid of certain devices; (2) partially sighted, which refers to individuals who have lost some of their vision and require assistive devices such as magnifying glasses or large print; and (3) totally blind, which refers to individuals who have completely lost their ability to see. According to Smart & Sandra (2010), blindness can be divided into two main categories, namely low vision and total blindness. Individuals with low vision still have limited vision, such as blurred vision or having to get closer to objects to see clearly, and usually require optical aids such as magnifying glasses or special glasses.

Meanwhile, individuals who are classified as totally blind have no remaining vision, and cannot even recognize objects or fingers in front of them, although some can still perceive normal light in their daily activities. (Ratnasari, 2015) also states that visually impaired individuals are those whose vision is less accurate or less good than sighted individuals, even though they are assisted by visual aids, causing them to require more energy and time to perform visual tasks.

According to (Aulia & Nurdibyanandaru, 2020), blindness is classified into two main categories, namely total blindness and low vision. Total blindness is a condition in which individuals have no visual experience whatsoever and are unable to receive light stimuli from outside (visual acuity = 0). Meanwhile, the category of low vision describes individuals who still have some vision and reflexes to light stimuli, albeit with significant limitations. Furthermore, (Asrori, 2020) classifies blindness based on the time of onset and visual acuity. Based on the time of onset, blindness is divided into three categories, namely: (1) blindness before or since birth, which refers to individuals who have no visual experience at all; (2) blindness after birth or in childhood, which refers to individuals who have visual impressions but are still weak and easily forgotten; and (3) blindness that occurs during school age or adolescence, that is, individuals who have fairly strong visual experiences that have an impact on their personal development.

This makes the issue relevant to research in the context of social welfare, as it concerns the role of the state, family, and society in supporting social functioning, reducing communication barriers, and strengthening the quality of life of persons with disabilities. Social stigma against persons with disabilities is still very strong, leading to marginalization and social exclusion. This worsens their situation, as it limits their access to equal opportunities in education and employment. social exclusion. This worsens their situation, as access to equal opportunities in education and employment becomes very limited. Often, persons with disabilities are considered incapable or less productive, which further reduces their opportunities to contribute actively to society (Fakhrudin, 2021).

Assistive technology, such as software designed to aid communication, mobility devices, and digital applications, can support people with disabilities to participate more inclusive in society. By utilizing this technology, they can access information, obtain skills training and participate in the world of work with greater flexibility (Organization, 2021). Technology also enables them to manage various aspects of their lives, including health, education, and employment, more independently.

In the context of persons with disabilities, adapting to assistive technology is an important process for increasing independence. The successful use of technology is determined not only by the technical abilities of the individual, but also by social acceptance and the support of the surrounding environment. If society accepts the use of assistive technology as normal and supportive, people with disabilities will be more confident in using it in their daily lives.

Assistive technology refers to various devices or tools that can be obtained commercially or created specifically with the main purpose of improving and supporting the functional abilities of individuals facing various types of disabilities (Wong & Cohen, 2011). Meanwhile, according to Buehler (2011), the scope of assistive technology covers the entire spectrum of devices that enable individuals with disabilities to complete tasks that may be difficult or even impossible for them to do due to their disability. (Carlson &

Ehrlich, 2005) mention that the role of assistive technology is increasingly crucial and rapidly developing in improving the quality of life of people with disabilities. According to Damastuti (2021), there are various types of assistive technologies specifically designed for the visually impaired. These assistive technologies include: Screen Reader, which converts text on the monitor screen into sound, allowing the visually impaired to access documents, office files, browse the internet, and view scientific presentations. The following are the types of Screen Readers that can be used: TalkBack/Android Accessibility, which is a screen reader for smartphones that identifies the screen display and converts it into audio, so that what is on the screen will be read aloud using a text-to-speech voice engine. Voice engines that can be used include Vocalizer, Smart Voice, Smart TTS, and Google Text to Speech. In addition to emphasizing independence, this study also examines how effectively technology is used, particularly screen reader applications, as an aid for individuals with visual impairments. According to (Gibson et al., 1996), effectiveness refers to the degree of success of an activity in achieving predetermined goals. A program is considered effective if the results obtained are in line with the objectives and have a positive impact on the recipients. (Steers, 1985) adds that effectiveness is measured not only by the final results, but also by the alignment between the objectives, tools, processes, and results achieved.

On the other hand, (Rogers, 2003) in Diffusion of Innovations Theory explains that the effectiveness or success of a technology depends on how well users accept the innovation. Rogers proposes five key factors for measuring the effectiveness of technology adoption, namely: relative advantage, compatibility, ease of use, trialability, and observability. These five criteria can be used to evaluate the extent to which screen reader applications are truly useful and acceptable to individuals with visual impairments in their daily lives. Therefore, in the context of this study, effectiveness is defined as the degree of success of screen reader applications in helping individuals with visual impairments achieve functional and social independence. This application is considered effective if it can improve the user's skills in accessing information, communicating, learning, and actively participating in social and economic activities independently. Several studies show that the use of technology can significantly increase the independence of people with disabilities.

Research on the use of screen reader applications by people with visual impairments has actually been conducted extensively, but most previous studies have focused more on the technical aspects of use and the educational context. For example, research conducted by Nur'aisah et al. (2022) focused on the effectiveness of NVDA in helping visually impaired students access learning materials in higher education. This study assessed how screen readers facilitate academic processes, such as reading digital documents or accessing learning platforms. The same was found in a study by Karolina and Aulianto (2020), in which they highlighted the use of TalkBack as a basic communication tool via WhatsApp, thus placing more emphasis on the technical capabilities of devices to assist with digital activities. These various studies show that screen readers are indeed effective as information access technology, but they do not describe in depth how screen readers impact the independence of visually impaired people in their daily lives.

In other words, there is a research gap in the form of a lack of studies that focus primarily on independence, especially in relation to decision-making, managing personal life, and building self-confidence. In addition, the research gap is also evident from the context and scope of previous studies, which tend to be limited to formal educational environments, such as special schools, inclusive schools, and universities. Studies such as those conducted by Syahindra (2024) and Atakari (2024), for example, examine screen readers in the context of digital learning. This shows that the experiences of visually impaired users in broader social contexts, such as in communities, community organizations, informal work, or daily activities, have not been widely explored. The lack of research conducted on disability communities such as PERTUNI also reinforces the research gap, especially in the Bengkulu City area. In fact, communities such as PERTUNI have rich social dynamics and allow researchers to see how screen readers are used to communicate, work, organize, and manage routines without relying on others. Therefore, this study fills this gap by focusing its analysis on PERTUNI members in

Bengkulu City, thereby providing new insights into the use of screen readers in a more diverse social and daily context. Next is the theoretical aspect.

Most previous studies only assessed the effectiveness of screen readers partially, for example, in terms of ease of access to information or the achievement of specific tasks. No research has yet comprehensively linked Steers' (1985) theory of effectiveness, which covers goal achievement, integration, and adaptation, with Havighurst's (1953) theory of independence, which emphasizes decision-making, managing personal life, and building self-confidence. However, combining these two theories allows for a more comprehensive analysis of how the effectiveness of assistive technology use develops into increased independence for the visually impaired, both functionally and socially. By using both theories simultaneously, this study fills a theoretical gap that has not been addressed by previous studies, thus presenting a new perspective on how technology not only facilitates access to information but also strengthens the social functioning and empowerment of people with visual impairments.

Research by (Handoko & Sutanto, 2022) shows that mobile application-based technology can improve the accessibility of health services, enabling people with disabilities to manage their health conditions more independently.

This is important because good health is a prerequisite for achieving independence. In addition, (Kusuma & Sari, 2020) found that the use of assistive technology tools in the work environment can increase the productivity and ability of groups with disabilities to complete their tasks independently. (Damastuti, 2021) highlights the importance of providing assistive technology in the educational environment. This study found that various devices such as screen readers, text-to-speech, and visual aids play a significant role in helping students with learning disabilities understand the material and complete academic tasks. In particular, screen readers are said to function to convert text on the screen into sound so that visually impaired users can access digital documents, give presentations, and surf the internet independently. The results of this study reinforce the view that assistive technology is an important factor in improving the independence and social functioning of persons with disabilities. (Widianingtyas & Priatna, 2025) In the context of social welfare, the application of assistive technology plays an important role in supporting the social functioning and independence of persons with disabilities.

(Fahrudin, 2012) states that social welfare aims to support individuals and families in achieving maximum social functioning, namely the ability to perform social roles efficiently within society. (Suharto, 2014) emphasizes the importance of empowerment and social inclusion for vulnerable groups, such as people with disabilities, so that they can contribute maximally to society.

In this context, assistive technology serves as an empowerment tool that helps persons with disabilities overcome functional barriers and improve their abilities in various areas of life. The use of assistive devices such as mobile devices, communication technology, and digital applications not only increases individual independence but also strengthens their social relationships within the family and community. Legally, (Law of the Republic of Indonesia Number 11 of 2009 concerning Social Welfare, 2009) concerning Social Welfare and (Law of the Republic of Indonesia Number 8 of 2016 concerning Persons with Disabilities, 2016) on Persons with Disabilities, affirm that all persons with disabilities are entitled to social services, education, health care, employment, and access to public facilities on an equal basis. This places assistive technology within the framework of government and community efforts to create an inclusive environment and support the social functioning of persons with disabilities.

Therefore, the application of assistive technology is in line with the objectives of social work, namely to improve individuals' ability to perform their social functions and to strengthen the social support systems around them. When persons with disabilities are able to use assistive technology effectively, they not only achieve functional independence, but also attain greater social well-being through increased participation, productivity, and quality of life. This study will examine the use of assistive technology in enhancing the independence of persons with disabilities.

## Method

This study uses a qualitative method with a case study design. The main data was obtained through direct research on disability organizations relevant to the topic of the effectiveness of using screen reader applications to increase the independence of visually impaired people with disabilities. The analysis process was carried out through observation and interviews aimed at identifying, categorizing, and drawing conclusions from important information contained in the study. The focus of the research was on the effectiveness of using screen readers in increasing the independence of people with disabilities. This was followed by the selection of informants using purposive sampling techniques, whereby informants were selected based on specific criteria (Sugiyono & Ramdhan, 2021).

In this case, informants were selected based on the criteria of having used a screen reader application for at least 6 months, being registered as a member of Pertuni, residing near the Pertuni secretariat on Jl. Kandis Raya Belakang, Kampung Melayu, and being at least 17 years old, resulting in 10 informants. Data was collected through direct observation and in-depth interviews. Observation was used to observe in detail the effectiveness of screen reader applications in increasing independence, while interviews aimed to explore the informants' views and understanding in greater depth. The results of these two data collection techniques were then combined to obtain a complete and comprehensive picture. Data analysis in this study used three stages, namely data reduction, data presentation, and conclusion drawing.

## Results and Discussion

This section presents research findings on the effectiveness of screen reader applications as tools for visually impaired people in supporting their daily activities. Based on data obtained in the field, this study seeks to examine how screen reader applications function not only as technological devices, but also as media that enable users to be more independent in accessing information, communicating, and managing various aspects of their lives.

To understand the effectiveness of using these applications, this study refers to three effectiveness factors proposed by Steers (1985), namely goal attainment, integration, and adaptation. The goal attainment factor is used to assess the extent to which screen reader applications help users achieve needs and activities that were previously difficult to do without the help of others. The integration factor looks at how the application supports users in interacting with their environment, whether in a social, educational, or work context. Meanwhile, the adaptation factor assesses the user's ability to adapt to technology and how the application adapts to diverse individual needs.

In addition to assessing effectiveness, this study also examines the extent to which the use of screen readers affects the level of user independence. To that end, three indicators of independence according to (Havighurst, 1953) were used as a reference, namely the ability to make decisions independently, the ability to manage one's personal life, and the ability to demonstrate self-confidence. These three indicators are important because they describe changes not only in technical abilities but also in psychological and social aspects related to the independence of visually impaired people.

Through the combination of these two theoretical frameworks, this section presents the research results in detail and depth. The discussion explores the relationship between the use of screen reader applications and changes in the level of user independence, thereby providing a comprehensive picture of how assistive technology can be an important means of improving the quality of life of people with visual impairments.

### Achieving goals

The results of the study show that each informant had different goals when they first started using screen reader applications. Some used the application to continue socializing and accessing social media as part of their daily activities. Others used it to support their work, such as running their own businesses, selling phone credit, or promoting services. In addition, there were also those who used screen readers to obtain information, communicate with others, and support various work and daily activities.

All informants agreed that screen reader applications helped them achieve these goals. Screen readers enabled them to perform activities that were previously difficult to do without the help of

others. However, some informants admitted to facing obstacles at the beginning of use, mainly because they had never used a smartphone before. This initial adaptation process required them to learn basic things such as recognizing gestures, reading voice commands, and using the navigation menu.

These findings are in line with research (Nur'aisah et al., 2022) which shows that the NVDA screen reader helps visually impaired students access learning materials so that they can achieve their academic goals independently. Research (Atakari, 2024) also proves that the use of NVDA improves accessibility and makes it easier for blind individuals to achieve their technology use goals, especially in the context of education and public services. The results of research (Karolina & Aulianto, 2020) emphasize that the use of TalkBack and WhatsApp enables blind users to achieve communication goals and basic digital activities, supporting the findings of informants in this study.

### Integration in the Social Environment

The use of screen readers not only helps informants meet individual needs but also plays a significant role in improving their social integration. All informants are active in the PERTUNI organization, and they stated that communication between members has become much more effective since using screen readers. Informants also explained that organizational coordination can now be conducted seamlessly via WhatsApp, as all members are able to read and send messages independently. Furthermore, family support plays a significant role in their successful social integration. One informant shared that he initially used a second-hand cellphone that did not support accessibility features. However, thanks to family support, he later acquired a new, more compatible device that made it easier for him to communicate and participate in organizational activities.

Research (Karolina & Aulianto, 2020) shows that the use of TalkBack and WhatsApp by blind people helps them communicate effectively and strengthen social relationships, aligning with the experiences of the informants in this study. Research (Arifin et al., 2024) also found that assistive technology plays a role in increasing the social and educational participation of blind people because they can participate in activities independently. In addition, research (Syahindra, 2024) shows that screen readers are the main means for blind students in SLB in participating in the learning process and social interactions, strengthening the finding that technology greatly supports social integration.

### Adaptation

Informants varied in their duration of screen reader use. Some began using them in 2021, while others had been using them since 2019.

Of the 10 informants, only one experienced blindness due to an accident. This was a significant difference because this informant already knew how a mobile phone worked, while the other nine had to adapt more slowly due to their unfamiliarity with mobile phones. However, all informants agreed that adapting to screen reader use was not an easy process. They had to familiarize themselves with how the device worked, learn to understand voice navigation, and even get used to the gestures.

This difficulty was particularly felt by informants who had never used a smartphone before. They needed time to understand the basics of using a mobile phone before being able to fully utilize the screen reader feature.

Research (Syahindra, 2024) revealed that visually impaired students require a significant adaptation period when first introduced to screen readers in their learning, especially if they had no experience with digital devices. Research (Atakari, 2024) also confirms that successful adaptation is heavily influenced by training, mentoring, and the suitability of the device. Research (Hikmah et al., 2021) even highlights that voice- and AI-based technologies require additional adaptability skills from the blind, particularly regarding familiarity with digital devices and interfaces.

### Making Independent Decisions

All informants stated that they were able to make independent decisions without relying on family or friends. One informant emphasized that their choice of college major was a personal decision based on their interests and individual considerations. However, some informants still required technical assistance in certain situations, such as ordering Maxim or conducting digital

transactions. This difference was not due to a lack of ability, but rather influenced by differences in the mobile devices they used. One informant was able to order online motorcycle taxis on their own because their mobile phones supported more accessibility features.

Research (Arifin et al., 2024) found that assistive technology enables blind students to make independent academic decisions because they can access information without the assistance of others. Research (Nur'aisah et al., 2022) also showed that screen readers increase blind students' independence in accessing course materials, which results in improved decision-making skills related to education.

### Managing Personal Life

Informants demonstrated a good level of independence in managing their personal life. One informant was also able to complete college assignments independently, while another was able to carry out work and daily activities using a mobile phone and a screen reader. One informant also explained that the major he was pursuing was the result of his own decisions. Another informant explained that everything they did in their personal lives was managed by themselves.

In an organizational context, the informants were able to schedule meetings, read messages, and communicate with other members through WhatsApp groups without any obstacles.

This research aligns with (Syahindra, 2024), who stated that screen readers improve the ability of blind students to organize their daily learning activities. Research (Pudrianisa, 2024) also confirmed that digital technology increases the independence of blind students in everyday instrumental activities, such as scheduling, working, and communicating.

### Demonstrating Self-Confidence

Most informants reported that they became more confident after using a screen reader, as they were no longer completely dependent on others for communication or digital activities. However, one informant still felt self-conscious when using a mobile phone in public because the sound of the screen reader attracted attention. However, thanks to his role as the head of PERTUNI (National Student Association) and an active student, he gradually began to feel more confident using his mobile phone in public spaces.

Research (Pudrianisa, 2024) shows that the use of digital technology can increase the self-confidence of people with disabilities because they feel more able to participate in society. Research (Arifin et al., 2024) also found that access to assistive technology strengthens the self-confidence of blind students in academic and social activities. Furthermore, (Hikmah et al., 2021) confirmed that voice-based technology can trigger feelings of self-consciousness initially, but with use and community support, blind users experience a significant increase in self-confidence.

### Limitation Of The Study

This study was limited to visually impaired individuals who were members of PERTUNI (National Association of Indonesian Students in Indonesia) in Bengkulu City and had used a screen reader application for at least six months. The study did not include individuals with other disabilities or users of other assistive technologies, so the focus of the study was solely on the use of the screen reader application as a primary tool to support their daily activities. Furthermore, the scope of the analysis in this study was limited to two main aspects: the effectiveness of the screen reader application and the independence of visually impaired individuals in carrying out their daily lives. Effectiveness was measured based on three indicators proposed by Steers (1985): goal achievement, integration, and adaptation. Meanwhile, the independence aspect was analyzed through three indicators according to Havighurst (1953): the ability to make independent decisions, the ability to manage one's personal life, and the ability to demonstrate self-confidence. Therefore, the discussion in this study did not focus on aspects other than these indicators.

In terms of data collection, this study utilized only in-depth interviews and field observations. This resulted in the research results placing greater emphasis on the subjective experiences, personal meanings, and contextual situations experienced by the informants. The findings produced are contextual in nature according to the social, cultural and environmental conditions of the

PERTUNI organization in Bengkulu City, so that generalizations to other regions or groups need to be made with careful consideration.

## Conclusions

This study shows that the use of screen readers has a significant impact on blind people in Bengkulu City, particularly in terms of technology effectiveness and increased independence. In terms of effectiveness, informants felt that the application truly helped them achieve their respective goals. Some used it for business, others for work, study, or simply to maintain social interactions on social media. The main obstacle they experienced was the initial adaptation process, especially for those who had never used a smartphone before.

Screen readers also impact social relationships. Informants can communicate more smoothly within the PERTUNI organization and within their families. Supportive devices and family encouragement have made them more confident in using this technology.

In terms of adaptation, all informants went through a challenging learning curve. However, once they understood the application's functions and how to use it, they were able to use their phones independently for various purposes. In terms of independence, screen readers help them make their own decisions, organize their personal activities, and boost their self-confidence. Although some still feel self-conscious when using the application in public spaces, over time, they develop courage and new habits that make them more confident. Overall, screen readers are not just assistive devices, but also a means of empowerment for people with visual impairments. This technology supports them in living more independently, productively, and functioning optimally in society.

## Recommendations

Based on the research findings, several measures can be taken to further support the use of screen readers for the visually impaired. Users are advised to continue familiarizing themselves with these applications to further develop their skills. Consistent practice will help them adapt and perform daily activities more independently. Organizations such as PERTUNI are expected to provide regular training and mentoring for members new to assistive technology. Sharing experiences among members is also crucial to facilitate the learning process and foster mutual support. Family support remains a crucial factor, particularly in providing appropriate devices and providing motivation during the adaptation process.

The government and social institutions need to strengthen policies related to digital accessibility and provide more training programs and device assistance for the visually impaired. Furthermore, application developers are expected to prioritize screen reader-friendly designs to ensure digital services are equally accessible to all users. Further research is needed to explore other

assistive technologies or conduct comparative studies in different regions and user groups. Future research could also further examine the impact of screen readers on the quality of life, employment opportunities, and social participation of the visually impaired.

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