



Improving Visual Information Access for Blind Students Using Crowdsourced Assistance Technology

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ABSTRACT

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This study aims to explore how the Be My Eyes application supports independent visual information access among totally blind students, with particular attention to user preferences between volunteer-based assistance and AI-driven features. A qualitative exploratory design was employed involving five totally blind students, with data collected through semi-structured in-depth interviews and analyzed using thematic analysis. The findings reveal that participants strongly prefer the Be My AI feature over live volunteer assistance due to its perceived advantages in privacy, convenience, speed, and emotional comfort. The study also identifies that the main operational difficulty is not related to software accessibility but to users' physical ability to align and frame the camera when capturing visual objects. Despite these challenges, Be My Eyes significantly enhances students' autonomy by enabling independent access to visual information in daily activities, although human assistance remains necessary for complex or high-stakes tasks. The implications suggest that AI-based assistive technologies have strong potential to transform inclusive education by promoting flexible, user-centered, and self-reliant access to visual information for blind learners in special education contexts.

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INTRODUCTION

The rapid expansion of digital technology has fundamentally reshaped how information is created, shared, and consumed in modern society (Adzimah, 2024; Kunta, 2025). Most contemporary information is delivered in highly visual formats such as images, videos, infographics, documents, and online media platforms, which require visual interpretation for full understanding (Fitriani, 2025; Nadhifah, 2026). This creates a significant accessibility gap for individuals with total visual impairment, particularly in educational and social participation contexts. The importance of addressing this issue lies in the principle of digital inclusion, where equitable access to information is a fundamental right rather than a privilege (Hikmah, 2026; Mohlas, 2025). Without adequate support

systems, visually impaired individuals may experience exclusion from academic content, communication processes, and daily decision-making activities. Assistive technology therefore becomes essential as a bridge to reduce this inequality. Kaya & Boşnak (2025) emphasize that accessibility barriers directly affect autonomy and participation. Consequently, research on inclusive digital solutions is critical to ensure equal opportunities in an increasingly visual and technology-driven society.

Despite rapid technological advancement, a major societal problem persists in ensuring equal access to visual information for individuals with disabilities, particularly those with total blindness. Most digital ecosystems are designed primarily for sighted users, resulting in systemic exclusion of visually impaired individuals from fully engaging with information-rich environments (Holidi, 2026; Najiburohman, 2025). Although screen readers and assistive tools exist, they often cannot interpret visual content such as images, scanned documents, or real-world objects without additional support (Kusumawati, 2026; Ni'am, 2025). This limitation reduces independence and increases reliance on sighted assistance in both academic and daily life contexts. Furthermore, the growing volume of visual-based communication in education and social media intensifies this gap. As a result, visually impaired individuals face continuous challenges in accessing timely and accurate information. This situation highlights a broader accessibility problem in digital transformation, where technological progress does not always align with inclusive design principles, thereby reinforcing the need for more adaptive and intelligent assistive solutions.

In real educational settings, particularly among blind students, the use of mobile assistive applications has become increasingly common as a response to visual accessibility barriers. One prominent application is *Be My Eyes*, which allows users to access visual information through both live volunteer assistance and artificial intelligence features. In practice, students use this application to interpret images received via messaging platforms, read printed documents, identify objects, and understand environmental contexts. However, field observations suggest that usage patterns are highly situational and dependent on immediate needs rather than continuous engagement. Many users demonstrate a clear preference for the “Be My AI” feature due to its instant response and independence from human availability. At the same time, operational challenges remain, particularly in physically aligning the camera to capture clear images. These real-world experiences illustrate a shift in assistive technology usage behavior, where AI-based systems are gradually replacing traditional human-mediated support in everyday visual information access.

Previous studies have extensively examined the development and impact of assistive technology in supporting individuals with visual impairments. Assistive technology is defined as tools, systems, or software designed to enhance functional independence and improve access to information for

individuals with disabilities. In the context of visual impairment, such technologies have evolved from basic mechanical tools to advanced digital and AI-based systems capable of recognizing objects, reading text, and interpreting visual environments (Albustomi, 2025; Rahman, 2025). The integration of artificial intelligence has significantly expanded these capabilities by enabling more interactive and context-aware assistance. AI systems can now provide real-time descriptions of visual content, supporting users in both academic and daily tasks (Rahman, 2026; Shoha, 2026). However, Kaya & Boşnak (2025) argue that despite technological progress, accessibility challenges remain, particularly regarding reliability, user-centered design, and contextual accuracy. These findings indicate that while assistive technologies are promising, their effectiveness still depends on real-world usability and user experience.

One widely discussed application in assistive technology literature is Be My Eyes, which initially functioned as a crowdsourced platform connecting blind users with sighted volunteers through live video calls. Recently, it has evolved by integrating “Be My AI,” a generative AI feature that provides automated visual descriptions and interactive feedback. Despite increasing academic interest in such systems, existing research still focuses predominantly on technical performance, system design, and general accessibility features rather than lived user experiences. Empirical studies exploring how visually impaired students interact with these technologies in real educational contexts remain limited (Jusup et al., 2024; Soim et al., 2026). Additionally, Stangl et al. (2022) highlight that privacy concerns and usability constraints are often overlooked in assistive technology evaluations. There is also limited understanding of how users compare AI-based assistance with human volunteer support in terms of trust, efficiency, and autonomy. This gap highlights the need for context-specific, qualitative investigations.

The current development of assistive technology demonstrates a clear shift from human-dependent systems toward AI-driven autonomy, particularly in visual assistance applications such as Be My Eyes. The “Be My AI” feature represents a significant innovation by enabling instant image interpretation without requiring external human involvement. This technological advancement introduces a new paradigm in accessibility, where users can independently obtain visual information in real time. However, despite its growing adoption, there is still limited empirical evidence on how this transition affects user behavior, learning experiences, and psychological independence among visually impaired students. Existing literature has not sufficiently addressed the comparative preference between AI assistance and volunteer-based support in educational contexts. Therefore, this study contributes to the state of the art by focusing on user-centered analysis of AI-assisted accessibility tools. It highlights not only technological effectiveness but also experiential dimensions such as privacy, autonomy, and usability in real-life educational environments.

This study is grounded in the assumption that AI-assisted applications such as Be My Eyes can significantly enhance independent access to visual information among totally blind students, but their effectiveness is shaped by user experience, context of use, and operational constraints. The primary research problem focuses on how these students utilize Be My Eyes in daily life, why they prefer AI-based assistance over human volunteers, what challenges they encounter, and how the application influences their independence. It is argued that while AI technology increases efficiency and autonomy, physical interaction barriers such as camera alignment still limit optimal usage. Furthermore, psychological independence emerges not only from functional access but also from reduced social dependence on others. Therefore, this study contributes to the field by providing empirical insights into the real-world application of AI-based assistive technology in special education settings. The findings are expected to inform future improvements in inclusive design and adaptive learning technologies for visually impaired learners (Stangl et al., 2022).

RESEARCH METHODS

This study employed a qualitative research approach with an exploratory design. A qualitative approach was considered appropriate because it enables an in-depth and contextual understanding of the lived experiences of totally blind students in using the Be My Eyes application to support independent access to visual information. The exploratory design was selected because this study aims to uncover meanings, patterns of use, and subjective interpretations of participants rather than measuring technological effectiveness through numerical indicators (Gautam, 2023; Takona, 2024). This approach allows the researcher to capture rich, descriptive insights regarding how assistive technology is integrated into daily life, particularly in relation to autonomy and accessibility.

The research was conducted at SLBN-A Citeureup Cimahi. This location was chosen because it represents a specialized educational setting for students with total visual impairment who actively engage with assistive technologies in their learning and daily activities. The site provides a relevant context for examining real-world usage of Be My Eyes, as students routinely face challenges in accessing visual information in academic and social environments. Therefore, this setting is considered appropriate for exploring authentic user experiences and ensuring that the findings reflect actual practices in special education contexts.

Data collection was carried out through semi-structured, in-depth interviews with five totally blind students who actively use the Be My Eyes application. Participants were selected using purposive sampling based on specific inclusion criteria to ensure relevance to the research objectives. The

criteria included active enrollment at SLBN-A Citeureup Cimahi, diagnosis of total blindness, regular use of smartphones and screen readers, active use of Be My Eyes, and a minimum of three months of application usage. The three-month threshold was applied to ensure participants had sufficient experience to provide reflective and meaningful insights rather than initial impressions. The interview guide was structured around three main themes: UI accessibility, user experience, and the impact of usage on independence, with all interviews conducted directly and audio-recorded with informed consent.

Data analysis was conducted using thematic analysis to identify, analyze, and interpret patterns within the interview data. The process began with repeated reading of transcripts to ensure deep familiarity with the data, followed by systematic coding of meaningful segments. These codes were then grouped into broader themes based on conceptual similarity and relevance to the research questions. The themes were continuously reviewed and refined to ensure accuracy and coherence in representing participants' experiences. Ethical considerations were strictly maintained throughout the study, including participant anonymity, informed consent, confidentiality of data, and exclusive use of information for academic purposes.

RESULTS AND DISCUSSION

Overview of Be My Eyes Utilization by Totally Blind Students

This study involved five totally blind students in grades X and XI who met the inclusion criteria, including daily use of smartphones, screen readers, and active experience with the Be My Eyes application. The participants were in late adolescence to early adulthood, with usage duration ranging from approximately five months to more than one year. All participants demonstrated consistent engagement with mobile assistive technologies as part of their daily academic and personal activities. This context indicates that digital accessibility tools have become integrated into their routine information-seeking behavior, rather than being used as occasional support systems. The findings suggest that Be My Eyes functions as a complementary assistive tool within a broader ecosystem of screen reader technologies that support independent digital interaction among visually impaired students.

All participants reported using Android-based smartphones as their primary device for accessing digital information, with screen readers serving as the main interface for interaction (Maisuroh & Aisyah, 2024; Ridlo & Yanti, 2023). The dominant screen reader used was TalkBack, although some participants preferred Jieshuo Screen Reader due to its perceived flexibility and responsiveness. The frequency of Be My Eyes usage varied between one to three

times per week, depending on situational needs rather than fixed routines (Hasanah, Munawwaroh, et al., 2024; Zahro, 2024). Usage was highly contextual, typically activated when participants encountered inaccessible visual content such as images or printed materials. This pattern indicates that Be My Eyes is not used as a continuous assistive tool but rather as an on-demand solution for specific visual interpretation needs.

The application was primarily used for interpreting images received through WhatsApp, reading digital posters or announcements, identifying printed documents, recognizing physical objects, and describing environmental contexts. Among its features, "Be My AI" was overwhelmingly dominant compared to live volunteer assistance. Participants consistently reported relying more on AI-generated descriptions due to its immediacy and practicality. This dominance suggests a behavioral shift from human-dependent assistance toward AI-based autonomy in visual information processing. Overall, Be My Eyes has become a functional tool that supports situational independence, enabling students to access visual information more efficiently within their daily educational and social environments.

Preference for Be My AI Over Volunteer Assistance in Accessing Visual Information

The findings show that although all participants had experience using both Be My AI and live volunteer assistance, they consistently preferred the AI-based feature for daily visual information tasks. This preference remained stable across participants regardless of differences in background or duration of application use. The preference pattern indicates that decision-making in assistive technology usage is strongly influenced by perceived efficiency, autonomy, and comfort rather than familiarity alone. Participants described Be My AI as a more practical solution for everyday needs, particularly in situations requiring quick access to visual descriptions without dependence on external human availability.

One of the primary factors influencing this preference is privacy. Participants expressed concerns about sharing sensitive visual content, such as identity cards, academic documents, and personal photographs, with unknown volunteers. In contrast, Be My AI was perceived as more secure because it eliminates human intermediaries. This aligns with Stangl et al. (2022), who emphasize that visually impaired users often face challenges in pre-evaluating the privacy risks of visual content before sharing it. As a result, AI-based systems are preferred for tasks involving confidential information, as they reduce social exposure and increase users' sense of control over personal data.

Another significant factor is convenience and time efficiency. Participants noted that Be My AI provides instant responses without waiting for volunteer

availability, making it more suitable for quick and repetitive tasks (Arifin et al., 2024). Additionally, the AI feature allows users to explore information iteratively without social pressure, enabling them to retake images or ask follow-up questions freely. This contrasts with live volunteer interactions, where users may feel constrained by conversational norms or hesitation in repeatedly requesting clarification (Sa'diyah et al., 2023; Saepudin, 2023). However, participants also acknowledged that volunteer assistance remains important in complex situations requiring spatial guidance or contextual interpretation. Thus, both systems function complementarily rather than competitively.

Obstacles in Using Be My Eyes to Access Visual Information

Despite generally positive experiences, participants reported several operational obstacles in using Be My Eyes effectively. Interestingly, these challenges were not related to software accessibility or interface design but were primarily associated with physical interaction during image capture. This indicates that the main limitations lie outside the digital system itself and instead emerge from the interaction between users and visual environments. Participants emphasized that while screen reader compatibility was not an issue, the physical process of capturing usable images presented consistent difficulties in daily usage contexts.

The most frequently reported challenge was aligning the smartphone camera to properly capture target objects. Participants often needed multiple attempts before obtaining a clear image suitable for AI interpretation, especially when reading printed text, labels, or signs. The absence of real-time auditory or haptic feedback further complicated this process, as users could not determine whether the object was centered or fully framed. As a result, they relied heavily on trial-and-error methods or occasional assistance from sighted individuals. This issue was less significant when processing pre-existing digital images, where framing was already complete.

Additional challenges included occasional internet connectivity issues that delayed image processing and reduced usability in time-sensitive situations. Although not considered a major barrier, latency still affected user experience in certain contexts. Participants also acknowledged the possibility of AI misinterpretation, particularly in identifying colors or fine details (Honainah et al., 2025; Sholehah & Ichsan, 2025). However, such errors were infrequent and did not significantly reduce trust in the system. Instead, users adapted by retaking images or seeking confirmation when necessary. Overall, these findings indicate that challenges are primarily physical rather than technological, highlighting the importance of improving user-environment interaction in assistive systems.

The Role of Be My Eyes in Supporting the Independence of Visual Information Access

The findings demonstrate that Be My Eyes plays a significant role in enhancing the independence of totally blind students in accessing visual information. Participants consistently reported that the application enabled them to independently access materials that were previously inaccessible without sighted assistance. This includes interpreting digital images, reading documents, identifying objects, and understanding environmental contexts. The application thus functions as an enabling tool that expands the scope of independent information access in both academic and daily life situations.

However, the independence fostered by Be My Eyes is not absolute but rather partial and situational. Participants explained that the application primarily supports initial independent exploration of visual information before deciding whether further human assistance is required (Hasanah, Fauzi, et al., 2024; Makiyah, 2024). This indicates that Be My Eyes does not replace human support but instead reduces dependency in low-complexity tasks. In cases requiring high accuracy or critical decision-making, participants still relied on sighted individuals for verification. This demonstrates a hybrid model of independence where technological assistance and human judgment coexist in complementary roles.

Beyond functional independence, participants also described psychological benefits associated with using Be My AI. The ability to access information independently reduced feelings of burden when asking others for help and increased confidence in handling daily tasks (Badriyah, 2025; Thohir, 2024; Zahro, 2024). Additionally, AI-based interaction provided emotional comfort by removing social pressure associated with human assistance. This suggests that independence in this context is not only practical but also psychological, contributing to a stronger sense of agency, dignity, and self-reliance in managing visual information needs.

CONCLUSION

This study provides important insights into how Be My Eyes supports independent visual information access among totally blind students by highlighting that its greatest benefit lies not only in functional accessibility but also in psychological empowerment and user autonomy. The key lesson learned is that assistive technology is most effective when it addresses both informational and emotional needs, where AI-based features such as Be My AI significantly reduce dependence on others while maintaining user dignity and privacy. Scientifically, this study contributes to the growing body of literature on AI-assisted accessibility by offering empirical evidence from a real educational

context, emphasizing the shift from human-dependent to AI-supported visual assistance and its implications for inclusive education design. However, the study is limited by its small sample size, single institutional setting, and reliance on self-reported interview data, which may restrict generalizability and introduce subjective bias. Future research should involve larger and more diverse participant groups across different educational levels and geographic contexts, as well as incorporate mixed-method approaches to better validate behavioral patterns and technological effectiveness in assistive AI systems.

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