



Review Article

Copyright© Muhammad Zubair Nazar

The Role of Assistive Technology in Enhancing the Quality of Life for Individuals with Low Vision: A Narrative Review

Muhammad Zubair Nazar^{1*}, Saleh Shah¹, Naveed Babur¹, Khalid Mahmood², Muhammad Tayyab Bilal²

¹Department of Allied Health Sciences, The Superior University Lahore, Pakistan

²Avicenna medical college and hospital, Pakistan

*Corresponding author: Muhammad Zubair Nazar, Department of Ophthalmology, University of Lahore Islamabad campus, Pakistan.

To Cite This Article: Muhammad Zubair Nazar*, Saleh Shah, Naveed Babur, Khalid Mahmood, Muhammad Tayyab Bilal. *The Role of Assistive Technology in Enhancing the Quality of Life for Individuals with Low Vision: A Narrative Review. Am J Biomed Sci & Res.* 2025 27(6) AJBSR. MS.ID.003614, DOI: [10.34297/AJBSR.2025.27.003614](https://doi.org/10.34297/AJBSR.2025.27.003614)

Received: 📅 July 07, 2025; **Published:** 📅 July 17, 2025

Abstract

Low vision significantly impacts daily functioning, independence, and overall quality of life. Assistive Technology (AT) has emerged as a crucial intervention to mitigate these challenges by enhancing visual accessibility. This narrative review explores the various types of low vision assistive technologies, their benefits, and their impact on patients' lives. We discuss optical devices, electronic aids, smartphone applications, and emerging innovations while addressing barriers to adoption. The findings highlight the transformative potential of AT in improving education, employment, social participation, and psychological well-being for individuals with low vision.

Keywords: Low vision, Assistive technology, Quality of life, Visual aids, Electronic magnifiers

Introduction

Low vision, defined as irreversible vision impairment that cannot be corrected with standard glasses, contact lenses, or medical intervention, affects millions worldwide. According to the World Health Organization (WHO), at least 2.2 billion people have near or distance vision impairment, with many experiencing low vision. Individuals with low vision face challenges in reading, mobility, and performing daily activities, leading to reduced independence and quality of life [1-5].

Assistive Technology (AT) plays a pivotal role in bridging this gap by providing tools that enhance residual vision. This narrative review examines the role of AT in improving the lives of individuals with low vision, focusing on available technologies, their applications, and their psychosocial benefits.

Types of Assistive Technology for Low Vision

Optical Devices

Traditional optical aids remain fundamental in low vision rehabilitation:

- Magnifiers:** Handheld, stand, or spectacle-mounted magnifiers help with near-vision tasks.
- Telescopes:** Used for distance viewing (e.g., watching TV, recognizing faces).
- Prismatic Glasses:** Aid in field expansion for patients with peripheral vision loss.



Electronic and Digital Aids

Advancements in technology have led to more sophisticated solutions:

- a. **Electronic Magnifiers (CCTVs):** Provide adjustable magnification, contrast enhancement, and text-to-speech functions.
- b. **Screen Readers and Voice Assistants:** Software like JAWS and NVDA enables computer and smartphone accessibility.
- c. **Smart Glasses:** Devices such as eSight and OrCam use augmented reality to enhance real-time vision.

Smartphone and Tablet Applications

Mobile technology has revolutionized accessibility:

- a. **Magnification Apps (e.g., Seeing AI, Magnifier):** Use smartphone cameras to enlarge text and objects.
- b. **Text-to-Speech Apps:** Convert printed text into audio (e.g., KNFB Reader).
- c. **Navigation Apps (e.g., Google Maps with VoiceOver):** Assist in mobility and wayfinding.

Emerging Technologies

Innovations such as Artificial Intelligence (AI) and Virtual Reality (VR) are expanding possibilities:

- a. **AI-Powered Object Recognition:** Helps identify currency, products, and faces.
- b. **Bionic Eyes (Retinal Implants):** Experimental devices aim to restore partial vision in degenerative conditions.

Impact on Quality of Life

Education and Employment

AT enables students and professionals to access printed and digital materials, fostering academic and career success. Screen readers and Braille displays facilitate learning, while workplace adaptations improve productivity.

Social Participation and Independence

Devices like smart glasses and navigation aids enhance mobility, reducing reliance on caregivers. Social interaction improves with tools that assist in facial recognition and communication.

Psychological Well-being

Low vision often leads to depression and anxiety due to functional limitations. AT mitigates these effects by restoring autonomy, thereby improving self-esteem and mental health.

Challenges and Barriers

Despite its benefits, AT adoption faces obstacles:

- a. **High Costs:** Many advanced devices are expensive and not universally covered by insurance.
- b. **Lack of Awareness:** Patients and healthcare providers may be unaware of available technologies.
- c. **Technological Complexity:** Elderly users may struggle with digital interfaces, necessitating training programs.

Conclusion

Assistive technology is a transformative tool in low vision rehabilitation, significantly enhancing independence, social engagement, and emotional well-being. Continued innovation, cost reduction, and increased awareness are essential to maximize its accessibility and impact. Future research should focus on user-centered designs and long-term outcomes of AT utilization.

Acknowledgement

None.

Conflict of Interest

None.

References

1. World Health Organization (2021) World report on vision. WHO.
2. Crossland MD, Rubin GS (2019) The use of assistive technology in low vision rehabilitation. *Ophthalmic & Physiological Optics* 39(5): 341-348.
3. Peli E, Peli D (2020) Assistive technology for visual impairment: Current trends and future directions. *Optometry and Vision Science* 97(5): 321-332.
4. Alotaibi A, Al Khalaf H (2021) Smartphone applications for low vision: A systematic review. *Oman Journal of Ophthalmology* 14(2): 78-85.
5. Bowers AR, Meek C (2020) The impact of electronic magnifiers on reading performance in low vision patients. *Clinical and Experimental Optometry* 103(4): 456-463.