Swami Vivekananda Advanced Journal for Research and Studies
Online Copy of Document Available on: www.svajrs.com
ISSN:2584-105X Pg. 139 - 143

Use of Assistive Technologies by Undergraduate Students with Visual Disabilities

Brijlal
Teacher, MSVD, National Institute for the Empowerment of Persons with Visual Disabilities, 116 Rajpur Road, Dehradun – 248001
brijlal774@gmail.com
Dr. Pankaj Kumar
Assistant Professor, National Institute for the Empowerment of Persons with Visual Disabilities, 116 Rajpur Road, Dehradun – 248001

Accepted: 22/07/2025
Published: 27/07/2025

Abstract

This study investigates the role of assistive technologies in enhancing the academic and daily functioning of students with visual disabilities. A tool on 'Use of Assistive Technologies Scale' (UATS-VI), consisting of 32 items, was used to assess their usage patterns. The tool demonstrated strong reliability (r = 0.99) and validity through expert review and pilot testing. Results indicate moderate but uneven adoption of assistive technologies, reflecting disparities in access and awareness. Findings highlight the importance of inclusive policies, user training, and equitable distribution to improve autonomy and educational outcomes of students with visual disabilities.

Keywords: *Assistive Technologies, Visual Disabilities, Inclusive Education, Accessibility in Higher Education, Technology Adoption among Visually Impaired Students.*

Introduction:

Education plays a crucial role in the development of every human being. All children in the world have the right to education. India implemented the 'Right to Education Act' in 2010 to fulfil the purpose of education for all. Education is also important for inclusion among diversity in society. The education system aims to cultivate ethical, rational, and empathetic individuals who contribute meaningfully to an inclusive and pluralistic society, in line with constitutional values (NEP, 2020). Education plays a crucial role in fostering individual growth across all sectors of society, including those with disabilities. Technologies have expanded access and created more inclusive learning environments for students with disabilities, paving the way for greater equity in education (Fernández-Batanero et al., 2022). Like their peers, these learners deserve full and equal participation in all spheres of life.

Technology that assists persons with disabilities in daily life is called assistive technology. WHO (2001) defines Assistive Technologies as "any piece of equipment, product or tool, whether it is acquired commercially, modified or customized, that is used to increase, maintain or improve the functional capabilities of individuals with disabilities." This study explores the role of assistive technologies in enhancing the quality of life of individuals with visual disabilities. It supports educational attainment, social engagement, and economic participation by equipping visually impaired learners with tools such as voice recorders, optical scanners, and customised software (Jung, 2020; Al-Attal & Al-Debei, 2021). The integration of Braille with digital interfaces has further expanded access and connectivity with mainstream technology platforms (WHO, 2022). Assistive technologies foster independent living by enabling individuals to navigate physical environments more confidently (Smith et al., 2019). Moreover, studies show that computer-based assistive solutions significantly improve the functional ability among individuals with visual disabilities (Morad et al., 2020). However, disparities persist between high-income and low-income regions in terms of access to such technologies, underscoring the need for more equitable global distribution (UNESCO, 2021).

In the emerging digital era, technologies have made life easier. People are attracted towards the use of technologies. Assistive technologies are upgrading rapidly day by day according to the needs and requirements of persons with visual disabilities (Reddy, 2020). These technologies help to increase the functioning and performance of individuals with disabilities. According to Viner, Singh & Shaughnessy (2020), the use of assistive technologies has changed the educational experiences for students with disabilities. Students with visual disabilities are also using these technologies in their studies and day-to-day life. Many new assistive technologies are being developed in the field of visual disabilities. Refreshable Braille Display (RBD), Braille note taker, Orbit reader, OCR technologies, Screen reading software, Smart Brailler and Instant reading software, etc., are a few examples. It helps to make persons with disabilities confident and independent which lead to a good and quality life.

Technologies enable full participation in the social, cultural, and economic development of students with visual disabilities (Arrigo, 2005). Ngandu, Nyaruwata, and Simui (2017) found that technologies such as voice recorders, scanners, and computers significantly facilitate learning for students with visual impairments. Clark (2014) also argues that Braille, when integrated with modern assistive technologies, expands opportunities and connects visually impaired individuals to the same technologies as their sighted counterparts. Scherer (1996) highlights how assistive technologies enhance independence and improve quality of life, enabling individuals to function effectively in their communities.

Rosner and Perlman (2018) confirm the effectiveness of computer-based technologies in improving the quality of life and functioning of individuals visual disabilities. Baldassin, Shimizu, and Martins (2018) provide evidence that computer-related assistive technologies positively impact the quality of life of individuals with other disabilities. Lastly, Chakraborty (2020) addresses the global divide in accessibility, stating that better access to assistive technologies can enable more people with disabilities—especially in developing regions—to live independently. Dhalwal (2020) also found that assistive technology significantly enhances the psychological and functional well-being of individuals with visual disabilities by fostering independence and social inclusion.

Collectively, these studies highlight the critical role of assistive technologies in fostering inclusion and improving the overall well-being of individuals with disabilities.

Development of the Test:

To study the 'use of assistive technologies' by the students with visual disabilities, a self-made tool UATS-VI was used. The tool was initially drafted with an item pool of 42 items from six different domains of 'Use of Assistive Technologies', including: 1) Braille writing, 2) Print writing, 3) Orientation & Mobility, 4) Activities of daily living, 5) Reading and 6) Advanced academic works. A tool with 42 items was given to five experts in the field for their expert opinion. On the grounds of agreement of all experts, 04 items were dropped. Therefore, the

first draft of the tool was constructed with the help of 38 items as follows:

Table 1

Sr. No.	Domains	Sr. No.	Total Items
1	Braille writing	1-4	4
2	Print writing	5-9	5
3	Orientation and Mobility	10-14	5
4	Independent Living	15-21	7
5	Reading	22-28	7
6	Advanced academic works	29-32	4

To record the responses of persons with visual disabilities against each item, a four-point scale (Always, Often, Sometimes and Never) was used where 'always' as highest was given 4 score and 'never' as lowest was given 1(one).

Scoring:

Table 2

	Reponses			
Four Points	**Always**	**Often**	**Sometime**	**Never**
Score	**4**	**3**	**2**	**1**

Piloting/Administration of the Tool:

This tool serves as a self-administering scale suitable for both individual and group settings. Prior to its administration, it is essential to build a good rapport with the students with visual disabilities to foster trust and ease. The administrator should clearly explain the purpose and process, including all instructions provided on the title page of the tool. Although there is no strict time limit for completing the test, it has been observed that most individuals are able to finish it within 10 to 15 minutes. Participants are required to respond to each item using a four-point scale (Always, Often, Sometimes, and Never) based on what they feel is most accurate and appropriate. Completing all items is mandatory to ensure the validity and reliability of the assessment. Responses should be authentic and not influenced by perceived expectations or social desirability.

The first draft of the tool was administered as a pilot study on students with visual disabilities. The primary aim of this study was to identify potential design flaws, evaluate the tool's functionality in real-world settings, and gather user feedback to refine its features. A pilot study was done on a small group of students with disabilities. Data were collected after establishing rapport with the participants. Then, each answer sheet form of the pilot study was scored separately to obtain its total score. Out of 38 items on the basis responses received from the persons with visual disabilities, 6 items were dropped as they got 100 percent the same answers. The pilot study established a foundational understanding of the tool's feasibility and guided necessary adjustments for broader application.

Reliability and Validity:

The test-retest method (N=44) was employed to determine the temporal stability of the test. The product-moment correlation between test and retest scores has been found to be 0.99. The 32-item self-made tool titled '*Use of Assistive Technologies Scale-UATS-VI'* shows strong validity and reliability. It was tested with 44 students who have visual impairments, ensuring its practical relevance to the target group. Additionally, feedback from five specialists in special education, assistive technology, and orientation and mobility was incorporated, reinforcing both content and construct validity. The tool also achieved a remarkably high reliability coefficient of 0.99, reflecting excellent internal consistency and suggesting that it effectively measures its intended purpose. Overall, the tool appears to be well-designed for evaluating assistive technology use among students with visual disabilities.

Norms for the Tool:

In this study, a norm-referenced framework was employed to interpret participants' levels of assistive technology use. Based on total scores obtained from the 32-item UATS-VI tool, respondents were categorised into performance bands ranging from "Extremely Low" to "Extremely High." These categories were derived from the score distribution within the sample of 44 students with visual disabilities, making the norms sample-specific rather than based on standardised benchmarks.

Table 3

Sr. No.	Level	Range
1	Extremely Low	35 and below
2	Low	36-55
3	Average	56-82
4	High	83-98
5	Extremely High	99 and above

This approach enabled relative comparisons among participants, providing insight into where individuals stand within their peer group in terms of assistive technologies usage. Such classification is particularly useful in pilot studies, as it helps identify variation in

engagement levels and informs targeted areas for further investigation or support.

Discussion:

This study reveals that undergraduate students with visual disabilities demonstrate a moderate but inconsistent use of assistive technologies across various aspects of their academic and daily routines. While certain areas show stronger engagement, others highlight gaps in access or application. The assessment tool used in this research proved to be highly reliable, with a correlation coefficient of 0.99, indicating strong temporal stability. Moreover, expert feedback affirmed the tool's relevance and accuracy, reinforcing its value for measuring assistive technology usage within this demographic.

The elimination of items with identical responses across participants indicates that certain assistive technologies are widely adopted, while others see limited use, highlighting an uneven distribution and reinforcing international concerns about unequal digital access (UNESCO, 2021). This pattern aligns with previous studies that underscore the powerful impact of assistive technologies in promoting autonomy, educational progress, and social inclusion (Scherer, 1996; Clark, 2014). Nonetheless, challenges like high costs and limited awareness continue to hinder broader adoption, underscoring the urgency for more robust policies and institutional support. Ultimately, the effectiveness of such technologies in enhancing quality of life hinges on fair access, user training, and their seamless incorporation into educational systems.

Conclusion:

The study concludes that while assistive technologies offer significant potential to enhance the academic and social lives of students with visual disabilities, their usage remains uneven and context-dependent. The reliable and validated assessment tool used in this research revealed both encouraging levels of engagement and areas where access or application lags behind. These disparities echo global concerns about digital equity and highlight the need for targeted interventions. Promoting broader adoption of assistive technologies will require not only improved accessibility and affordability but also increased awareness, institutional commitment, and integrated support structures. Addressing these gaps is essential for realizing the full transformative promise of assistive technologies in fostering independence, inclusion, and academic achievement.

Acknowledgement:

I would like to express my sincere thanks to Dr. Vinod Kumar Kain (Incharge, Department of Special Education & Research, NIEPVD, Dehradun for granting the necessary permissions to conduct data collection for this research work. His support and cooperation were instrumental in making this study possible.

References:

- Al-Attal, M. A., & Al-Debei, M. M. (2021). Utilizing ICT to improve education and inclusion for visually impaired students. *Journal of Educational Technology Development and Exchange*, *14*(2), 77–93.
- Arrigo, M. (2005). ICT in education for people with special needs: A comparative analysis. *European Journal of Special Needs Education*, *20*(3), 233–247.
- Baldassin, V., Shimizu, H. E., & Martins, S. T. (2018). Impact of assistive technology on the quality of life of people with physical disabilities. *Assistive Technology*, *30*(4), 199–206.
- Chakraborty, A. (2020). Bridging the assistive technology gap: Global perspectives on access and inclusion. *Disability and Rehabilitation: Assistive Technology*, *15*(5), 530–538.
- Clark, M. (2014). Braille and digital inclusion: Challenges and opportunities for learners with visual impairments. *International Journal of Special Education*, *29*(1), 123–134.
- Dhalwal, S. (2020). Enhancing independence through assistive technology: A study on persons with visual impairments. *Indian Journal of Disability Studies*, *9*(2), 45–58.
- Fernández-Batanero, J. M., Montenegro-Rueda, M., García-Martínez, I., & Soto, F. (2022). Use of ICT and assistive technology in inclusive education: A systematic review. *Education and Information Technologies*, *27*, 425–447. https://doi.org/10.1007/s10639-021-10734-2
- Jung, H. (2020). The impact of digital tools on the academic performance of blind students: A Korean perspective. *Journal of Special Education Technology*, *35*(1), 23–34.
- Morad, A., Al Moubayed, N., & Meziane, F. (2020). Assistive technologies for visually impaired: A performance assessment. *Journal of Accessibility and Design for All*, *10*(1), 1–22.

- Ministry of Education, Government of India. (2020). *National Education Policy*. https://www.education.gov.in/
- Ngandu, M., Nyaruwata, L. T., & Simui, F. (2017). ICT use in higher education: Perspectives of visually impaired students in Zambia. *African Journal of Disability*, *6*, 1–9.
- Reddy, P. (2020). Assistive technology evolution and its impact on visually impaired students in India. *International Journal of Emerging Research in Management & Technology*, *9*(8), 28–35.
- Rosner, D. K., & Perlman, M. (2018). Designing inclusive assistive systems: Social and ethical considerations. *ACM Transactions on Accessible Computing*, *11*(2), 1–24.
- Scherer, M. J. (1996). *Living in the state of stuck: How assistive technology impacts the lives of people with disabilities* (3rd ed.). Brookline Books.
- Scherer, M. J. (1996). Outcomes of assistive technology use on quality of life. *Disability and Rehabilitation*, *18*(9), 439–448. https://doi.org/10.3109/09638289609165907
- Smith, D. L., et al. (2019). Navigating the world: Assistive devices and independent mobility among the blind. *Disability and Health Journal*, *12*(1), 22–30.
- UNESCO. (2021). *Global report on assistive technology*. United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000373655
- Viner, R., Singh, A., & Shaughnessy, M. (2020). Reimagining education with assistive technology: A global review. *International Journal of Educational Development*, *74*, 102135.
- World Health Organization. (2001). *International classification of functioning, disability and health (ICF)*. World Health Organization.
- World Health Organization. (2022). *Global report on assistive technology*. https://www.who.int/

****