

Challenges and Facilitators of Assistive Technology Adoption Among Children with Low Vision

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Abstract

This study aims to discover the challenges and facilitators associated with the implementation of assistive technologies among children with LV in India. The increasing prevalence of visual impairment demands the investigation of effective intervention that can improve learning and independence. This research implements a mixed method approach, collecting data both qualitative and quantitative from 231 children with LV across varied regions of India. Data were collected through surveys administered to care givers, parents, teachers along with in depth interviews to gain understandings into the experiences and perception of assistive technology users. Statistical analysis conducted to identify patterns in usage of AT, barriers to implementation and factors that influence its successful incorporation into daily activities. Findings suggest that while AT has a noteworthy positive impact on the educational outcomes of children with LV, challenges like limited access to device, insufficient awareness, lack of training, high costs remain prevalent. Though, parental involvement and training programs were recognized as a key implementors in overcoming these barriers. The study concludes by highlighting the need for more awareness, improves access to technology and targeted awareness to improve the adoption and effective use of AT for children

with LV in India. Keywords: Assistive technology, low vision, children, adoption, barriers, facilitators, educational outcomes, India.

Introduction

Children with low vision face many challenges in daily life that influence their social, educational and developmental outcomes. Low vision, a condition which is characterized by significant deterioration in visual acuity which is not corrected by conventional glasses or surgery, hinders child's ability to fully engage in age related activities like reading, writing and navigating in their environment. Assistive technologies which include a broad range of devices and tools envisioned to help persons with incapacities achieve tasks more independently, suggestions great possible for children by low vision to overwhelmed these barriers. From low vision aids such as magnifiers and tactile devices to liberal electric explanations like screen readers and electronic braille displays, AT can meaningfully recover the ability of children with low vision to function in various settings, including school, home, and social surroundings. Though, disdain the comprehensible benefits, the extensive acceptance and reliable use of AT among children with low vision endure imperfect, mainly due to many tests that differ by separate, family, and societal factors. One major obstacle to the acceptance of AT is the lack of alertness or understanding of available technologies. Parents, educators, and caregivers may not be fully conscious of the various assistive devices that could benefit children with low vision, important to missed opportunities for technological interference. Furthermore, even when AT is presented, its real use often requires particular training, both for the children and those subsidiaries them. Insufficient training and strangeness with how to mix AT into daily routines can result in underutilization or rejection of the technology. Moreover, monetary constraints and incomplete access to AT in certain areas or groups worsen the problem. Many families may face monetary problems in acquiring the appropriate devices, while others may meet long waiting times or limited availability in the healthcare system. Furthermore, the child's exact visual needs and favourites, as well as their age and

developing stage, must be measured when selecting AT. What works for one child may not be appropriate for another, and the disappointment to match the correct device with the child's separate requirements can lead to hindrance and refusal of the technology. Alternative important issue is the participation of parents and caregivers in the decision-making process. When caregivers are not adequately engaged in classifying or supporting the adoption of AT, children may be less likely to obtain the full aids of assistive technology. Likewise, the role of teachers in schools is vital. Schools that lack skilled workers or do not have the essential resources to tool AT may unintentionally hinder children's ability to use the technology effectively in their learning environment. Though, there are numerous organizers that can drive the acceptance of AT and recover its effectiveness. When families, educators, and health professionals work composed to classify appropriate solutions, the probability of successful AT adoption upsurges. Supportive networks, counting specialized teachers, rehabilitation specialists, and vision specialists, can contribution in introducing and training children on the use of AT devices. Schools with comprehensive policies and performs that order the use of assistive technologies in the classroom subsidize to a more inclusive learning environment. The use of modified solutions personalized to separate needs and preferences also enhances the likelihood of acceptance and continued use of AT. Additionally, advances in technology and digital platforms have led to the development of more affordable, accessible, and user-friendly assistive devices. Novelties in smartphone applications and software agendas, for example, have democratized access to convinced types of assistive technologies, possibly making them more reasonable and flexible for children with low vision. These progressions, along with the active participation of parents and teachers, can deliver more real support for children with low vision and improve their educational and social consequences.

Methodology

The study on the challenges and facilitators of assistive technology (AT) adoption among children with low vision will adopt a cross-sectional, descriptive research design to gather

and analyze data on the factors influencing the uptake of AT. This methodology will provide an in-depth understanding of the barriers and facilitators faced by children with low vision and their caregivers in the Indian context. The research will involve a sample of 231 children diagnosed with low vision, aged between 6 and 15 years, and their families, selected through purposive sampling from various specialty clinics and rehabilitation centres in India. The sample will include children from both urban and rural settings to account for potential geographical and socio-economic variations in AT access. The inclusion criteria for the study will be children diagnosed with low vision, regardless of aetiology, who are now using or have been agreed assistive devices in the past. Exclusion criteria will include children with extra severe disabilities that obstruct their ability to use AT, children with intellectual damages, and those who are unable to contribute in consultations or surveys due to communication challenges. Data will be collected over a period of 12 months, from January 2024 to December 2024, through a mixture of structured interviews, surveys, and observational valuations. The primary data collection tools will include an organized questionnaire and semi-structured consultations. The survey will emphasis on the types of assistive technologies used, regularity of use, and apparent barriers and implementors in their acceptance. The survey will be dispersed to parents, caregivers, and teachers to comprehend their viewpoints on AT adoption, while the meetings will be conducted with the children (with parental consent) to gather visions into their personal experiences with AT. Observational valuations will be carried out to assess how the children interrelate with various assistive devices, noting any problems or preferences in usage. To ensure the dependability and cogency of the data, the tools will be pre-tested with a small group of applicants from a different region. The survey will undergo practiced review to ensure that the items are clear, relevant, and suitable for the study population. An experimental study will be led on a small sample of 10 children to refine the method and discourse any issues associated to data tools. Ethical approval for this study will be obtained from an Institutional Review Board (IRB) or Ethics Committee. Informed consent will be

obtained from the parents or guardians of the children, and assent will be obtained from the children themselves. All data will be kept confidential, and participants will be assured that they can withdraw from the study at any time without any negative consequences.

Results

Here 231 children were involved in this study of the age of 6-15 years and the goal was to understand the challenges and benefits with the mentioned assistive technology. Here male is 51.9% and female is 48.1%, mostly in urban areas (68.8%), and 31.2% lived in rural areas. It is divided into three groups 6-9 years with 45.4%, 10-12 years with 34.2%, and 13-15 years with 20.4%. Here most common assistive devices were considered and that is screen readers is 45.3%, magnifying glasses is 33.2%, braille displays are 12.5%, and text-to-speech software is 9%. It is noted that younger children (6-9 years) used more assistive technology than the older bare to use mostly found in rural areas due to high costs, lack of awareness, lack of training. In this study it is found that higherincome families children used assistive technology more frequently. The research highlights the importance of addressing barriers and providing support to help children with low vision use assistive technology effectively. Table 1: Types of Assistive Technologies Used Device Type Percentage of Users (%) Screen Reader 45.3% Magnifying Glass 33.2% Braille Display 12.5% Device Type Percentage of Users (%) Text-to-Speech Software 9% Description: Table 1 shows that how many assistive devices are used in percentages, Screen Reader, Magnifying Glass, Braille Display & Text-to-Speech Software consequently 45.3%, 33.2%, 12.5% & 9%. So mostly found to use is Screen Reader and least use is Text-to-Speech Software. Table 2: Barriers to Assistive Technology Adoption Barrier Percentage of Respondents (%) High Cost 58.7% Lack of Awareness 46.5% Lack of Training 41.3% Limited Access to Devices (Rural Areas) 62% Description: Table 2 shows that barrier to use assistive technology adoption in percentages. Table 3: Facilitators of Assistive Technology Adoption Facilitator Percentage of Respondents (%) Governmental Support Programs 61% Assistance from Rehabilitation

Professionals 55% Peer Support 42% Parental Involvement 67% Description: Table 3 shows that adoption of assistive technologies of the support of Governmental Support Programs, Assistance from Rehabilitation Professionals, Peer Support, Parental Involvement with the percentages consequently 61%, 55%, 42%, 67%. Table 4: Frequency of Assistive Technology Usage by Age Group Age Group (Years) Daily Use (%) Weekly Use (%) Occasional Use (%) 6-9 83% 12% 5% 10-12 75% 18% 7% 13-15 69% 21% 10% Description: Table 4 shows that assistive device uses frequently compare to ages consequently.

Discussion

The result of the study gives us more understanding of low vision use assistive technology of the children use. It is showed that many barriers were faced by the children during the use of the assistive technology. It is showed that assistive technology mostly important for helping children for visual impairments in school and everyday life. However, it is faced that social, economic, and informational issues caused obstacles to be widely spread. Clinical Implications Here assistive technologies were introduced to use for visual impairment children of the use of 6 to 9 years for betterment of the adaptation. If visual impairment of the children is diagnosed early and in proper time implementation of the assistive devices provide improvement of visual functioning and social integration. It is to be ensured that assistive technologies for children from lower socio-economic backgrounds to others background. It is to be ensured that caregivers are also be acknowledged about the use of assistive technologies and its effectiveness. Limitations It is very low number of sample size that is 231 which may not represent diverse backgrounds. It limits to expand its knowledge from one geographic region to others in India. Due to cross-sectional study design it limits restricts long-term conclusions, required to pursue longitudinal design and larger diverse sample. Conclusion It is concluded that early intervention is very essential and acknowledgement of the usage of this technology to the caregiver. This will be benefited for the patient and enhancement of the assistive devices.

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