

ROLE OF ASSISTIVE TECHNOLOGY IN IMPROVING QUALITY OF LIFE FOR THE STUDENTS WITH VISUAL IMPAIRMENT

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ABSTRACT

The study focused on investigating the effectiveness of assistive technology in enhancing the quality of life for visually impaired students. Specifically, it examined the role of assistive technology in improving various aspects of life for students with visual impairments, including health, academics, environment, leisure, daily skills, and social interactions. The research employed a mixed-method design and consisted on the 44 visually impaired students enrolled in Government Special Education Institutions within the Multan division, spanning elementary to secondary levels. The study employed a comprehensive questionnaire based on nine distinct life indicators, which was validated by field experts to ensure its accuracy and reliability. After data collection, analysis carried out using software such as Microsoft Excel and SPSS. Descriptive statistics, such as frequency tables, means, and percentages, were employed to assess questionnaire responses. Inferential statistical techniques like t-tests, ANOVA, and correlation were used to analyze further. The outcomes of the research aligned closely with the research objectives, highlighting the positive impact of assistive technology on the lives of visually impaired students. Consequently, the study concluded that assistive technology significantly contributes to enhancing the quality of life for these students. The researcher suggested expanding the scope of investigation from the divisional to the provincial and national levels. Furthermore, there is a strong emphasis on ensuring the accessibility of assistive technology to individuals with special needs, both at the individual and governmental levels.

Keywords: Assistive Technology, Quality of Life, Visually Impaired Students

INTRODUCTION

Visual impairment is a term that includes all types of visual loss. Individuals who experience complete or partial vision loss may be classified as visually impaired. The former is called completely blind, and the latter is referred as "legal blindness". People with legal blindness have a partial vision, but they need to be much closer to the object than someone with a perfect vision to see it well. In its 10th update The WHO International Statistical Classification of Diseases, Injuries, and Causes of Death defines poor vision as a visual acuity of less than 6/18 but greater

than or equal to 3/60, or a corresponding loss of visual field to less than 20°, in the better eye with the best available correction. The term 'blindness' refers to a condition where a person's visual acuity is below 3/60, or there is a comparable loss of visual field to less than 10°, even with the best feasible correction for the better eye. The term "visual impairment" encompasses both low vision and blindness, as defined by the World Health Organisation in 2019. Visual impairment can occur at birth or appear due to several traumatic events or diseases that affect a person's life. There are several typical visual

impairments that people may experience, such as a decrease in central and peripheral vision, blurry vision, a general haziness, heightened sensitivity to light, and difficulty seeing at night. These are just a few examples of the various visual challenges individuals may encounter (Naipal and Rampersad, 2018).

Assistive technology enables individuals with visual impairments to engage in activities that might otherwise be difficult to do for them. According to the WHO, Assistive Technology may help persons to participate more fully in society and improve their quality of life (WHO, 2021). Assistive technology includes a range of devices, from simple tools to complex equipment that incorporates advanced software. Several studies have shown that AT improve the life quality of children having problem related to vision. For example, Huang et al. (2021) lead a review (systematic) of 25 studies that investigated the use of assistive technology for children with visual impairment and found that AT can improve the socialization, communication, and academic performance of children with visual impairment.

Persons with visual impairment, for hundreds of years, had been fighting for equality, opportunities, and the right to live unfettered lives in their communities as fully integrated citizens. This fight continues today. Few people are aware of the existence of state vocational rehabilitation (VR) organizations for the blind and visually impaired, with the exception of blind community member and those who are employed in the field of vocational rehabilitation (VR). It is not well understood what these publicly supported programs are intended to accomplish or how large a part they play in the lives of persons with disabilities. People who have vision impairments should have the ability to spend life independently and safely in their homes and communities. The American Foundation for the Blind reports that more than ten million Americans are affected by vision impairment or blindness. However, technology has played a crucial role in creating a more inclusive world by providing opportunities for individuals, including those who are blind or visually impaired (Covarrubias, 2022).

In Pakistan, an estimated 1.12 million were found blind, and 1.09 million people had severe vision loss out of a total population of 207.7 million in a study

conducted in 2017 (Hassan et al., 2019). In advanced countries, blind citizens are playing an equal role in almost all fields of life. Visually impaired are also eager to learn the details. Young people who lose their eyesight have significant challenges in school, in their future careers, and in their personal relationships. Even a slight impairment in near eyesight can significantly impact a child's ability to engage in various activities, including reading. In educational settings, where more than 85% of learning occurs through visual presentation, visually impaired children may face challenges in performing optimally due to their visual limitations (Atowa et al., 2019).

The rationale behind selecting this topic was how the assistive technologies enhance the performance of visually impaired children and what does it impacts on the life of visually impaired students. The gap of present study suggests that the researcher has used the quantitative and qualitative research method by applying the 5 point Likert scale questionnaire on the elementary to secondary level visually impaired students of Multan division. The research in hand attempts to observe whether or not there is change propagated through assistive technologies. Moreover, to fill in this gap, the researcher has attempted to validate the finding of questionnaire through quantitative and qualitative analysis. This is how the research is different from previously conducted researches in the same genre.

STATEMENT OF THE PROBLEM

This study was focused to investigate the role of assistive technology in improving quality of life for the students with visual impairment.

OBJECTIVES OF THE STUDY

The objectives of the study were:

1. To analyze the effectiveness of assistive technology on the physical and mental health of visually impaired students.
2. To examine the role of assistive technologies in academics achievements of visually impaired student.
3. To explore the effect of environment friendly assistive technology on the life of visually impaired students.

4. To identify whether or not assistive technology has positive impact on the leisure time of the visually impaired students.
5. To examine the positive effect of assistive technology on the daily living skills, independence and social life of the visually impaired students.
6. To observe whether assistive technology prepares visually impaired students for jobs.

RESEARCH QUESTIONS

Research questions serve as a definitive focal point and guide researchers in their pursuit of discovering knowledge and gaining profound understanding. Research questions are crucial in determining the research aims and developing hypotheses, if relevant. The research questions were as follows:

1. Do the assistive technologies have positive impact on the physical and mental health of the visually impaired students?
2. Whether there is change propagated through the assistive technologies on the academic achievements of the visually impaired students or not?
3. Do the assistive technologies play role to make the environment friendly for visually impaired students?
4. Do the assistive technologies provide opportunities to the visually impaired students to take part in the recreational activities?
5. Do the assistive technologies help the visually impaired students to perform their daily living skills independently?
6. Do the assistive technologies assist the visually impaired students to enhance their skills to get jobs?

DESIGN OF THE STUDY

This research consisted of the quantitative survey research design. The primary rationale for choosing this approach in the research was the need to promptly and precisely examine the population's opinions.

POPULATION AND SAMPLE

In the present study, population comprised of the 44 visually impaired students from elementary to secondary level studying at government special education institutions of Multan division. In Multan

division, there are 4 districts having 14 tehsils and total 7 special education institutions. Researcher has taken all 44 visually impaired students studying in special education schools in Multan division for study's sample. The researcher used census sampling technique to select the sample. 7 institutions have 44 visually impaired students, 33 males and 11 females enrolled from elementary to secondary level that is the population and sample as well. The detail is as under:

- There were 13 visually impaired students of district Multan of which 2 males and 4 females in 6th, 3 males and 1 female in 7th, 2 males and in 8th class of Tehsil Multan City (Multan City 12), and 1 male in 6th class of Tehsil Shuajabad.
- There were 11 visually impaired students from district Khanewal of which 1 male and 1 female in 6th, 1 male in 8th, 1 male in 9th and 1 female in 10th of Tehsil Kabirwala (Kabirwala 5) and 2 males in 6th, 1 male in 7th, 1 male in 8th, 1 male in 9th and 1 male in 10th of Tehsil MianChanu (MianChanu 6).
- There were 1 male in 10th class from Tehsil Duniyapur District Lodhran.
- There were 19 from District Vehari of which 6 males and 2 females in 6th, 1 male and in 7th, 3 males and 1 female in 8th and 1 male and 3 females in 10th class of Tehsil Burewala (Burewala 17) and 1 male in 6th and 1 male in 8th class of Tehsil Mailsi (Mailsi 2).

All the data were collected from the office of District Education Officer, Special Education, Multan.

TOOL DEVELOPMENT AND VALIDATION

The researcher adapted the questionnaires from the research article of Wachiuri Reuben Nguyo (2015) and from the research article of Cenorina Covarrubias (2021). The researcher took 9 statements from the research article of Wachiuri Reuben Nguyo (2015) and changed the statements according to her research purpose. The researcher took the 6 statements from the research article of Cenorina Covarrubias (2021), altered them according to her research purpose and added these adapted statements to her research instrument. The detail of the statements was given in Table 1.

Table 1: Sources of Research Instruments

Name of Author	Year	No. of Statements	Explanation
Wachiuri Reuben Nguyo	2015	9	<p>The author, in his research instruments asked about</p> <ul style="list-style-type: none"> ▪ Access to general curriculum ▪ AT increase students’ performance ▪ Use of assistive technology ▪ Braille ▪ Brailled material ▪ Touch windows ▪ JAWS ▪ Magnifiers ▪ Speech output devices.
Cenorina Covarrubias	2021	6	<p>The author, in his research instruments asked about</p> <ul style="list-style-type: none"> ▪ Impact of assistive technology on Psychological and emotional health ▪ Positive impact of assistive technology on independence and quality of life ▪ Daily use of assistive technology ▪ Effect of assistive technology on education system and social network. ▪ Impact of assistive technology on your personal and professional life. ▪ Challenges faced in using assistive technology.

CONTENT VALIDATION INDEX

1. A self-structured questionnaire based on the 5-point Likert scale was used with visually impaired students. At first, researcher delved into respondent age, schools, class, type of disability, level of disability, districts and tehsils in demographic details. Then the researcher asked questions about role of assistive technology in improving quality of life for students with visual impairment. There were 56 statements that were divided into 8 quality of life’s indicators. Each statement has five possible responses (strongly agreed, agreed, undecided, disagreed, and strongly disagreed) on a 5-point response scale to evaluate the role of assistive technology in improving quality of life for students with visual impairment. Two open ended questions were also included in the questionnaire.



2. Eight Government Special Education Teachers from visually impaired field of Multan division were requested to review the research instrument developed for this study through the Content Validation Index. All the teachers were polled to verify the reliability of the tools (Inked print both English & Urdu versions and Urdu Brailled version questionnaires). They thoroughly analyzed the piece and their comments contain very few spelling and grammar errors. They also recommended polishing the text by fixing the grammar errors that impede readability. In the end, some statements were added and others were dropped. The instrument's relevancy was confirmed by responses of Content Validation Index. The summery of responses is shown in the given table 2.

Table 2: Responses of Content Validation Index

Sr. No.	Area	Yes f (%)	NMR f (%)	INR f (%)	No f (%)	Mean
1	Relevancy	7 (87.5%)	1(12.5%)	0	0	3.88
2	Clarity	7 (87.5%)	1(12.5%)	0	0	3.88
3	Simplicity	7 (87.5%)	1(12.5%)	0	0	3.88
4	Ambiguity	7 (87.5%)	1(12.5%)	0	0	3.88
					Total	3.88

For mean: Scale from 1 to 4 where, Yes = 4, NMR (Needs Minor Revision) = 3, INR (Item Needs Revision) =2, No = 1

Table 2 shows the result of experts’ opinion about the content of the tool. In terms of relevancy, a significant majority of the teachers (87.5%) considered the questionnaire to be very relevant, indicating that it effectively addresses the intended factors. However, one teachers (12.5%) suggested minor revisions to enhance the relevancy further. Regarding clarity, simplicity, and ambiguity, the questionnaire performed exceptionally well. A vast majority of the teachers (87.5%) found the questions to be clear, simple, and devoid of ambiguity, which indicates that the questionnaire effectively communicates its content and is easy to understand. Nevertheless, one teacher (12.5%) recommended minor revisions to improve these aspects slightly.

Overall Mean value of 3.88, on a scale of 1 to 4 where 4 represents (Yes) i-e a strong agreement with contents. Hence, the finding yielded positive results, with a majority of respondents indicating satisfaction across all areas. Minor revisions were suggested in a few instances, but no major revisions or issues were reported. These findings imply that the questionnaire is well-designed, as it successfully captures the intended factors and is easily comprehensible to the teachers who reviewed it.

RELIABILITY OF THE TOOL

Cronbach alpha, a measure of inter-variable correlation, was applied to data collected during pilot testing to ensure the test's validity. With this technique, we were able to calculate the correlation between different sets of data and check the validity of our hypotheses. The tool's reliability was .86, making it valid and reliable by any measure.

DATA COLLECTION

The necessary authorities gave their consent for the questionnaire to be distributed in the Multan division

schools. Before the questionnaires were distributed, all students received a briefing on it to ensure that there would be no errors made in filling it out. The questionnaire was distributed by the researcher to the targeted sample. After being completed at the same time, the questionnaires were collected from the VI students. All 44 visually impaired students received questionnaires. Low vision received Urdu translated questionnaires with large font size and the totally blind received Urdu braille version questionnaire for their ease and better understanding. Each participant completed their questionnaire with the help of researcher and teacher. Participants were free to choose from the available options.

RESULTS: Factor Wise Mean

Table 3: Mean of all factors / Life Indicators / sections of Questionnaire

Sr. No.	Life Indicator	Mean
1	Physical Health	4.17
2	Mental Health	3.69
3	Academics	4.03
4	Environment	
	a-Classroom Environment	4.09
	b-School Environment	3.86
	c-Home Environment	3.85
5	Recreation and leisure time	3.57
6	Daily Living Skills	3.78
7	Safety, security and freedom	4.33
8	Social Belongings	4.18
9	Employment	3.90
Overall Mean		3.95

From table 3, it can be concluded upon the mean of all factors = 3.95 that indicate the overall opinion of respondents towards agreement that assistive technology has strong positive impact in improving quality of life of students with visual impairment.

CORRELATION ANALYSIS

Table 4: Relationship between different life indicators & role of assistive technology on overall lives of visually impaired students

Life Indicators	Description	Overall impact of AT on life
Physical Health	Pearson Correlation	.609**
	Sig. (2-tailed)	.000
	N	44
Mental Health	Pearson Correlation	.620**
	Sig. (2-tailed)	.000
	N	44
Academic Performance	Pearson Correlation	.387**
	Sig. (2-tailed)	.009
	N	44
Environment	Pearson Correlation	.704**
	Sig. (2-tailed)	.000
	N	44
Leisure Time	Pearson Correlation	.578**
	Sig. (2-tailed)	.000
	N	44
Daily Living	Pearson Correlation	.507**
	Sig. (2-tailed)	.000
	N	44
Security & Freedom	Pearson Correlation	.300*
	Sig. (2-tailed)	.048
	N	44
Social Belongings	Pearson Correlation	.304*
	Sig. (2-tailed)	.045
	N	44
Employment	Pearson Correlation	.184
	Sig. (2-tailed)	.233
	N	44

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

From Table 5 correlation analysis reveals the relationships between various life aspects and the overall impact of Assistive Technology (AT) on visually impaired students' lives. The correlation coefficients, along with their corresponding

significance levels, shed light on how different aspects of life are related to the use of AT and its influence on their overall life.

One crucial aspect examined in the study is "Physical Health." The analysis shows a strong positive correlation (Pearson Correlation = 0.609 with significance value of .000) between the impact of AT on physical health and the overall life of visually impaired students. This result indicates that utilizing AT to manage their physical health needs significantly contributes to their overall well-being and life.

Similarly, the aspect of "Mental Health" exhibits a robust positive correlation (Pearson Correlation = 0.620 & significance value is .000) with the overall impact of AT. The use of AT to address mental health concerns is associated with higher life level among visually impaired students.

Academic performance is another area of interest, and the correlation analysis reveals a moderate positive correlation (Pearson Correlation = 0.387 with significance value of .009) between the impact of AT on academic performance and the overall life impact. This suggests that employing AT in academic settings positively influences their performance, thus contributing to their overall life satisfaction.

The study also delves into the influence of AT on the "Environment" of visually impaired students. The correlation is notably strong (Pearson Correlation = 0.704 & significance value is .000), indicating that using AT to interact with and adapt to their environment has a significant impact on their overall life.

Similarly, Leisure Time is positively correlated with the overall impact of AT (r = 0.578, P=.000). The use of AT in leisure activities contributes to their overall well-being.

Daily Living is also positively correlated with impact of assistive technology with (r = 0.507 with P = .000). The use of AT in daily tasks contributes to their overall well-being.

The aspects of "Security & Freedom" and "Social Belongings" also show moderate positive correlations with the overall impact of AT (Pearson Correlation = 0.300 with significance value of .048 and 0.304 with significance value is .045, respectively). Utilizing AT to enhance their sense of

security and freedom and to improve social interactions positively affects their overall life.

When it comes to "Employment," the correlation with the overall impact of AT is positive (Pearson Correlation = 0.184 with significance value is .233) and not statistically significant. This suggests that the use of AT in employment-related activities does not significantly influence their overall life satisfaction, at least in this particular sample.

In conclusion, the correlation analysis highlights there is a linear relationship between the variables that reflects critical role of Assistive Technology in various aspects of visually impaired students' lives specifically strong positive correlation upon environment, mental health and physical health. The study additionally demonstrates that the use of AT has also positive and significant impact on their academic performance, leisure time, daily living, security, and social interactions as well as upon employment. These findings provide valuable insights for educators, policymakers, and caregivers to better understand the benefits of incorporating AT to improve the overall well-being and life satisfaction of visually impaired students.

DISCUSSION

The findings obtained from the previous section indicate that assistive technology (AT) has a positive impact on various aspects of visually impaired students' lives, spanning across multiple domains. In terms of physical health, respondents reported that AT lessens the effect of disability on their lives. This suggested that AT plays a crucial role in promoting physical well-being by mitigating the limitations imposed by disabilities. It allows individuals to overcome barriers and engage in activities that contribute to their overall health and mobility. Moving on to mental health, the data revealed that AT has a positive influence in this domain. Respondents reported enhanced positive self-concept, decreased hurdles, and better control over negative thoughts. AT also played a role in changing the attitudes of others towards individuals with disabilities, fostering inclusivity and acceptance.

These findings highlighted the importance of AT in improving mental well-being, boosting self-esteem, and facilitating social interactions. In the realm of academics, the majority of respondents expressed that various AT tools, such as Braille, Braille boards,

Math Braille slate, and Abacus, have been instrumental in their learning journey. These tools empower individuals to read, write, and comprehend various subjects independently. By enhancing accessibility and providing alternative methods of learning, AT promotes educational inclusivity and enables individuals with disabilities to thrive academically.

When considering the impact of AT on the environment, specifically the classroom, respondents highlighted the benefits of audio books, Perkin machines, and MP3 devices. These tools facilitate access to educational materials, aid in writing tasks, and enable the recording of lectures. By creating an inclusive learning environment, AT empowers students with disabilities to actively participate in classroom activities and academic discussions. In the school environment, respondents recognized the value of AT in promoting mobility. Railings and white canes were reported as beneficial tools for navigating school premises, thereby increasing independence and ensuring a safe learning environment. However, some respondents noted that tactile maps were not as effective for navigation purposes, suggesting the need for further improvements in this area. Within the home environment, AT played a significant role in enhancing efficiency and access to information. Touch tablets and voice assistants, such as Google Assistant, were identified as useful tools for various tasks, including searching for cooking recipes and increasing productivity while using cell phones. Additionally, radio served as a quick source of information and entertainment for individuals with disabilities.

In the domain of recreation and leisure, AT enabled individuals to participate in activities that were previously inaccessible. Respondents reported that audible balls and ropes were essential for engaging in sports and races. Furthermore, Braille Ludo was enjoyed by respondents as a recreational activity. However, some respondents noted that audio description did not significantly enhance their enjoyment as they were not aware of this technology. Daily living skills were positively impacted by AT, as reported by respondents. Using voice assistants, cash reader apps, and Braille dots on ATMs enabled individuals to navigate their daily lives more independently. However, some respondents

indicated that magnifiers were not effective because the magnifiers are only useful for students with low vision and useless for totally blind. Screen reader software facilitated online shopping, and TV served as a valuable source of entertainment and information. Safety, security, and freedom were enhanced through the use of white canes, as reported by respondents. White canes provided individuals with increased mobility and navigation assistance, ensuring safer movement in various environments. This promotes independence and instills a sense of security and freedom in individuals with visual impairments.

AT also played a significant role in fostering social connections and a sense of belonging. Respondents noted that AT enabled them to compete effectively; stay connected through messaging and cell phones, and feels encouraged to participate in family functions. By breaking down barriers to communication and social interaction, AT facilitates inclusive social experiences. Finally, in terms of employment, respondents recognized the potential of AT in expanding job opportunities. Computer skills were seen as advantageous for future employment prospects, and specific roles such as telephone operators and self-employment through cane work were considered viable options. However, some respondents expressed uncertainty regarding their proficiency as musicians, highlighting the need for further exploration of AT's potential in the arts and creative fields.

So far as the difference in opinions of respondents are concerned the findings indicate, that the opinions from different age groups, classes, tehsil and districts are largely similar regarding the impact of AT. This suggests that age and class distinctions and geographical location do not play a significant role in shaping perceptions of the effectiveness of AT in improving quality of life for visually impaired students. However, the opinions of respondents from different levels of disability and gender vary, indicating that the severity of the disability and gender may influence how AT is perceived.

It can be generalized that the AT has a wide-ranging impact on various aspects of individuals' lives. It enhances physical health, mental well-being, academic performance, environmental accessibility, recreational opportunities, daily living skills, safety and security, social connections, and employment

prospects. These findings emphasize the importance of continued research, development, and implementation of AT to ensure inclusivity, independence, and improved quality of life for individuals with disabilities.

Research studies have consistently demonstrated the positive impact of assistive technology on the lives of visually impaired students. For instance, a study by Johnson & Harniss, (2016) examined the effects of assistive technology implementation in educational settings. The findings revealed that students who utilized assistive technology tools, such as Braille displays, screen readers, and tactile maps, experienced significant improvements in reading speed, comprehension, and overall academic performance. Moreover, the study highlighted that assistive technology promoted self-advocacy skills and increased students' confidence in navigating educational environments (Johnson & Harniss, 2016). Another study conducted by Smith et al. (2009) focused on the social benefits of assistive technology for visually impaired students. The research indicated that the use of communication aids, such as speech synthesizers and electronic braille note-takers, facilitated effective communication and socialization. This, in turn, contributed to the development of meaningful relationships, peer interactions, and a sense of belonging among visually impaired students (Smith et al., 2009). Furthermore, the employment of assistive technology in vocational and employment settings has been shown to enhance career opportunities for visually impaired individuals. A study by Chen and Wei (2020) explored the impact of assistive technology on the employment outcomes of visually impaired adults. The results indicated that the utilization of adaptive software, screen magnifiers, and speech recognition systems significantly increased job prospects, productivity, and job satisfaction among visually impaired individuals, ultimately improving their overall quality of life (Chen and Wei, 2020).

CONCLUSION

In conclusion, the findings from the data highlight the significant positive impact of assistive technology (AT) on students with visual impairment across multiple domains, some are listed below.

1. AT improves physical health by mitigating

the effects of disabilities, enhances mental well-being by fostering positive self-concept and reducing barriers, and promotes academic success through tools like Braille and specialized devices.

2. AT also creates an inclusive environment in classrooms and schools, supports daily living skills, facilitates recreational activities, and ensures safety, security, and freedom.
3. Additionally, AT fosters social connections, belonging, and employment opportunities.

These conclusions emphasized the importance of ongoing research, development, and implementation of AT to cater the diverse needs of individuals with visual impairment. By enhancing accessibility, promoting independence, and enabling full participation in various aspects of life, AT has the potential to significantly improve the overall quality of life for individuals with visual impairment. It is crucial for stakeholders, including researchers, policymakers, educators, and technology developers, to collaborate and continue advancing AT solutions to maximize their impact and ensure inclusivity for the persons having visual impairment.

RECOMMENDATIONS

Based on the observation and interaction made with students during data collection phase and findings of the study, the research recommends that:

1. Training should be provided to teachers on how to use AT tools and technologies to support students with visual impairments in their studies.
2. Awareness should be propagated to the visually impaired students and parents that how to use AT effectively in schools and daily life as observed in case of GPS and description audio description.
3. AT devices at affordable prices should be available by creating policies.
4. There is need to include AT in regular schools to ensure that students with VI can access education just like other students.
5. It is highly recommended to promote the use of AT in vocational training programs to help individuals with VI gain skills and find employment.

6. Tactile maps may be affixed on the walls of special education institution so that VI students studying there may navigate in the school easily and independently.

SUGGESTIONS FOR FURTHER RESEARCH

1. It is suggested to conduct further research on a broader scale, encompassing elementary, secondary, and higher secondary levels, to build upon the findings of this study.
2. Utilizing a larger sample size is suggested to obtain more accurate and refined results in future research.
3. Advanced longitudinal research is suggested to explore the long-term effects and benefits of assistive technology on the lives of visually impaired students.

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