Analyzing the Advantages of Assistive Hearing Aids for the Hearing-Impaired Students in India

Dande Shashi kala[1], Dr. Chandrakala[2]
[1] *Research Scholar, Career Point University*
[2]*Research Supervisor, Career Point University*

Abstract **- India is no stranger to diversity, and we Indians don't need any lectures on it because we've been dealing with it happily for a long time. The variety that is provided by abilities and disabilities is not well cared for. The common perception of impairment as a curse or a 'fork in the track' is widespread. Hearing impairment is one of the disabilities that has a particular situation that can render the inclusion phase more complex and time consuming. A large number of these individuals (roughly 285 million) are visually disabled, with 39 million blind and 246 million having poor vision. 90% of people with vision disorder reside in developed nations, according to estimates. Hearing loss affects a further 360 million individuals. Visually and hearing-impaired people experience a variety of difficulties in community, including educational, housing, and general well-being issues. It is now possible to detect hearing loss (HL) at birth and provide early care for children with moderate HL thanks to the introduction of mandatory newborn hearing screening (NHS) services. Hearing loss has an effect on mental and behavioral well-being, social engagement, day-to-day life satisfaction, and job status. The benefits of assistive hearing aids for hearing-impaired students in India are discussed in this report.**

Index Terms **- Assistive Hearing Aids, Hearing-Impaired Students, children, India, etc.**

I.INTRODUCTION

Every day, most citizens take for granted their ability to speak without assistance. People with sight, voice, movement, and language impairments exist all around the world, and it may be impossible for them to express their wishes to others through the use of technology. Any individuals who are deaf, hard of hearing, talking, or language disabled were born with these impairments and may not be aware of it. Others might have impaired their capacity to speak or hear owing to disabilities, aging, or even injuries.

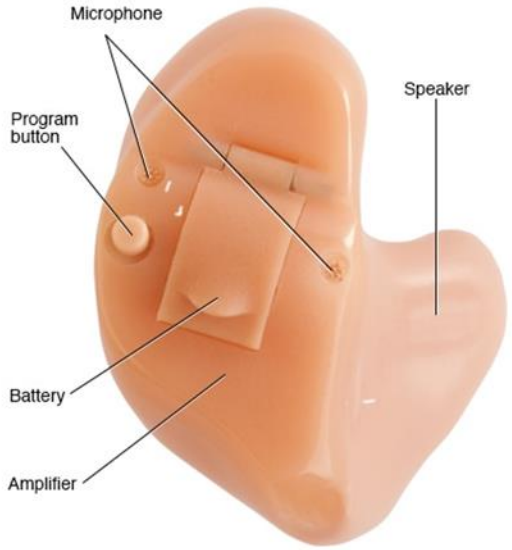
An assistive device is some form of technology or additional device that assists an individual in communication. Assistive technology is another term for these machines. These two words are interchangeable and have almost the same meaning. It's an umbrella word for aids that assist individuals with listening, vision, or language impairments in communicating with others. There are a number of technologies that may help patients with communication problems, although based on the person's personal needs, a system can be selected to better accommodate their condition.

1.1 Hearing Aids

A tiny electrical appliance you carry inside or behind the ear is a hearing aid. It allows those noises louder so that a person with a hearing disability can respond, talk, and engage in everyday activities more thoroughly. A hearing aid can aid users in silent and loud environments to hear better. But just around one out of five users who may profit from a hearing aid do wear one. There are three main components of a hearing aid: amplification, amplifier and speaker. The hearing aid is transmitted by the microphone to transform the sound waves into electric signals and transmitted to an amplifier. The amplification raises the power of the signals and delivers them through a speaker to the ear. Both hearing aids use the same fundamental components to get the noises into your ear from the world to make them clearer. The majority of auditory devices are electric, all operated by a conventional battery or a rechargeable battery.

Small microphones collect environmental noises. "The incoming sound is converted into digital code through a computer chip with amplification.'' It analyzes and changes the sound according to the hearing disability, listening preferences and the sound quality. The enhanced signals are then translated to

sound waves and transmitted to your ears through speakers, also known as receivers.



1.2 Assistive Hearing Aids and Devices

The words helping equipment or helping technology can be used by any device that allows an individual to interact with hearing loss or expression, or language impairment. These terms also refer to devices which allow an individual to hear and understand what is said more clearly or more easily. Anything that encourages connectivity will clearly be regarded as 'assistive technology.' Today there are many programs and technologies that enable people with hearing loss to become assistive, but this could not have been their intention. Examples are: text, blogging, e-mail, short message relay (SMS), fax, laptops and smartphones, and apps like Skype, for instance, Dell Latitude and iPad. Naturally, more conventional systems, such as amplified telephones, signals, alarm clocks or TV hearing devices, are also possible to name just a handful. In addition, hearing aid vendors provide links to their hearing aids and other products, for example mobile phones, FM and home TV and telecommunications devices.

People with hearing loss have hearing difficulties and speaking difficulties. Although considerable improvements in hearing aids and cochlear implants, these instruments are also not enough to enable people to listen to and comprehend what is shared in various environments.

Health professionals use a variety of names to describe assistive devices:

- Alerting devices connect to a doorbell, telephone, or alarm that emits a loud sound or blinking light to let someone with hearing loss know that an event is taking place.
- Assistive listening devices (ALDs) help amplify the sounds you want to hear, especially where there's a lot of background noise. ALDs can be used with a hearing aid or cochlear implant to help a wearer hear certain sounds better.
- Augmentative and alternative communication (AAC) devices help people with communication disorders to express themselves. These devices can range from a simple picture board to a computer program that synthesizes speech from text.

Hearing Assistive Technology (HAT) will change the lives of hearing losses significantly. Assistive listening technologies and applications bridge the divide between you and the sound source by removing the influence of space and external noise. They will circumvent difficult acoustics—sending sounds to users' ears directly. In public areas, such as auditoriums, church sites, meeting centers, galleries, concert halls, malls, hotels, transport centre, pharmacy counters, banking teller windows, customer care desks, etc., hearing aids and cochlear implants are sometimes inadequate. The American Disability Act (ADA) passed in 1990 acknowledges the difficulties in understanding the need for assistive hearing equipment in public spaces for individuals with hearing loss. In 2010 the guidelines were changed so that hearing aid compatibility is not enough to exclude those with hearing aids and cochlear implants.

II. REVIEW OF LITERATURE

Peter J Blamey, Lois FA Martin and Elaine Saunders (2010) quantified the association between symptoms and hearing damage by the Hearing Aid Performance Profile (PHAP). A 64-channel ADRO® hearing aid was given for Forty-one participants with 25-97 dBHL hearing loss. The percentage of issues with increased hearing damage has increased. The disparity between assisted and unhelped situations improved quietly with hearing loss, but in very hard noisy conditions. These findings suggest that an individual with a minor hearing loss will gain in reverberant or loud conditions

almost as well as a person with a more serious hearing loss.

Polgar, J. (2010) Assistive technologies may be a vital element in enabling disabled people to engage in their everyday lives and be involved in community. However, this technology is double-edged in that it is both a weapon for liberation and a clear symbol of incapacity. Help technology, which is used as a mechanism or as a means to do the desired operation, would most probably be integrated into the existence of the individual. Alternatively, the shame connected with the condition may be strengthened by technologies perceived as a tangible indication of a disability. Because people with the above perspective on technology may discourage or resist utilizing this technology, they may avoid practical interactions and are socially and physically isolated.

Elizabeth et al (2015) Consistent usage of hearing aid (HA) in children with minor hearing damage has been investigated (HL). Compared to non-users, full-time HA users showed slightly higher ratings on vocabulary and grammar tests. There were no major variations in articulation or voice perception tests between the three classes. Only the sum of frequent HA usage was an important indicator of grammar and vocabulary after adjusting the age difference at HL affirmation and audibility and enrolment in early intervention. The current findings show that the growth of children's languages gains from consistent usage of HA. In fields such as vocabulary and spelling, non-users are at disadvantage relative to those children with moderate HL who carry HA on a daily basis. Service providers should work together to promote the continuous usage of HA.

H Pelin Karasu (2017) In this research, students who were enrolled in public schools with hearing impairment assessed writing abilities, and analyzed the association between written ratings, audiological variables and educational variables. 17 pupils, who were registered and received funding from primary and middle school groups in public schools, engaged in this report. The findings of the report showed that the average student writing grade was 68.35 out of 100. The association between the age of the first hearing aid and the period of pre-school education was calculated. Results from the research indicates that children with hearing impairments studying in public schools profit from social programs tailored to their particular preferences, as well as early exposure to implants and early integration in schooling.

SuchitpornLersilp, SupawadeePutthinoi, and TheeratornLersilp (2018) The aim of this research was to analyze facilitators and obstacles to assistive technology (AT) in Chiang Mai, Thailand, as well as the learning climate for special needs children. The informants were hundred seventeen special needs children who studied in or alongside their caregivers in the nursery of grades 12. The instrument was a questionnaire from the International Functioning, Disability and Health Classification (ICF) and was assessed by five experts for the validity of substance. The AT findings found that the number of physically disabled children required it for stability and the usage of school buildings for others with hearing disabilities. Although most children did not have to use AT for music, entertainment or competition, although many regarded AT as an educational facilitator. The academic atmosphere was also a facilitator for children with special needs and the social environment was a facilitator for all classes with those children. The findings of this research have been helpful in presenting input to AT and designing the academic experience of special schools about the diverse traits of children with special needs.

III. OBJECTIVE OF THE RESEARCH

The main objective of the Research Study is to analyze the effectiveness and perceptions of parents of children with hearing impairment about benefits of the assistive devices.

IV. RESEARCH METHODOLOGY

The research was mostly analytical of nature. The aim of this research was to look at the learning environments of hearing-impaired children who used assistive technology. A total of 100 Grade 4 students from seven hearing-impaired schools were included in the study. The sample was chosen with care, with high-tech and low-tech assistive devices being used to test pupils. A questionnaire focused on a Likert style scale was also created to gather information about the experiences with parents of children with hearing impairments about the usage of assistive technology. A total of 60 students were chosen from the community for the pilot testing. The test was found to

be accurate, with a coefficient of reliability of =0.838 for the writing portion and =0.755 for the reading section. The analysis instruments were reviewed by specialists in the sector and pilot tested before being used to gather data. The questionnaire was also found to be trustworthy, with a coefficient of reliability of 0.899.

The results where evaluated using parametric statistical methods in order to meet the study's objectives. The impact of assistive devices on the learning of students with hearing disability were studied using an experimental study t-test. Pearson's product moment connection was used to discover a connection between parents' perceptions of their children's learning and their own. ANOVA was used to determine which technology was the most usable and reliable of all the assistive technologies.

V. ANALYSIS AND INTERPRETATIONS

Figure 1 shows that the majority of the survey students with hearing disability used hearing aids (60 percent), about 10% had a cochlear implant, while all other forms of assistive equipment were used by a few students (i.e., less than 10% of the study). The percentage of students who used more than one computer at the same time was 15%.

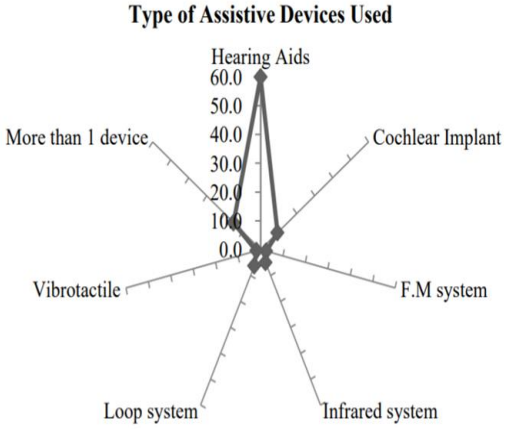


Figure 1: Assistive devices Types used by the hearing-impaired students

It can be concluded from the above graph that the most commonly used assistive device is 'hearing aid'. Low tech. devices like Closed captioning, Amplifiers, signaling devices, Real time captioning, alerting devices, TDD/TTY and high tech. devices like Computer aided note taking, and Screen flash for computers are not used by any of the sample students.

Table 1: Comparison of students' test scores using different types of assistive technologies

Scores	Squares Sum	Mean Scores	df	F
Within groups	334694.614	2189.546	153	3.671
Between groups	48187.761	8031.293	7	
Total	382882.375	160		

* p< 0.05

Table 1 indicates that there is a statistically important gap in results on the Urdu language exam of students utilizing various forms of low-tech and high-tech equipment (F=3.671, P=.001) at the p.05 level of importance for students with hearing disability. Hearing aids, cochlear implants, vibrotactile, F.M systems, Infrared and loop systems were all used by the students in the study, with some having more than one unit. It may be inferred that students with hearing impairments profit from the usage of assistive devices and perform differently based on the type of equipment they have. LSD Post Hoc experiments will be used to investigate their further similarities.

Table 2: Performance comparison of students using High-tech and Low- tech devices

Variable	Technology Nature	N	Mean	Std. Deviation	t
Test Total score	High-tech	80	198.83	28.785	-17.38*
	Low-tech	80	119.55	28.914	

* p< 0.05

There is a statistically significant difference in the scores of students using low tech and high tech (t=-17.38, p= .000) devices at p<.05 level of significance. The difference in the mean values shows that students with High-tech devices (M = 198.82, S.D = 28.78) perform better than the students using Low-tech (M = 119.55, SD = 28.91) devices on a same test. It can be concluded that the nature of technology used by the students with hearing impairment contributes towards their betterment in academic achievement.

Table 3: Parents' opinion about the effectiveness of Assistive Technologies (N=60, Max.=5, Min=1)

Statements	Mean	Std. Deviation
Increases the goal attainment of my child	4.28	0.958

Enhances communication between hearing impaired children and family	4.28	1.027
Increases learning opportunities of the child	4.20	0.898
Changes in the quality of life of my child	4.22	0.865
Helps in adaptation to the learning needs of the child	4.05	0.811
Increases the child participation in community	4.05	0.982
Lessens dependency of child on others	3.97	1.073
Awareness of the need of assistive technologies is more today than past	4.00	1.302
Affordability of needed Assistive Technologies	1.88	1.027
Assistive technologies in according to school environment	3.88	0.885

(Strongly disagree=1, Disagree=2, Undecided=3, Agree=4, Strongly agree=5)

Table 3 shows that parents of students with hearing impairments are assured of the need for, utility of, and advantages of assistive devices based on their children's academic and social success. They agree that assistive devices allow children to work independently on a daily basis. They appear dissatisfied with the affordability of assistive devices. It may be argued that, in comparison to previous years, parents of children with hearing disability are more comfortable with and educated regarding the usage and importance of assistive devices for their children, but compatibility and availability remain problems to be addressed.

Table 4 Relationship of students' test scores and parents' opinion about the use of assistive technologies (N=60)

Variable		Parents' Perceptions
Students' achievement scores	Sig. (2-tailed)	0.001
	Pearson Correlation	0.435**

There is a strong positive association regarding parents' views of helping technologies and their children's learning performance utilizing hearing disability technology (r = .435, N=60, P=.000). Parents felt that the usage of assistive devices had a significant impact on their children's success. It can be inferred that the awareness of parents regarding their children using assistive devices has a positive impact on children's success. This will add to the conclusion that helping devices are excellent resources for students with hearing loss and they improve children's overall learning chances and independence to make them successful learners (Table 4).

High-tech (M = 198.82, S.D = 28.78) students are substantially stronger (t = 17.38, p= .000) than low-tech hearing systems (M = 119.52, SD = 28.91). ‘‘Parents' views on usage of assistive technology and academic success of students with hearing disorder was significantly favorable (r=435, P=001).” Parents of children with hearing disability agree that using assistive technology improves communications (M=4.28), improves goals for achievement (M=4.28), raises quality of living for the students who have additional hearing conditions (M=4.22) and increases learning opportunity (M=4.20). The suitability and availability of the support equipment according to school requirements (M=3.88) remains a parent challenge.

VI. CONCLUSION

For those with hearing aids, people with hearing aids but no telecoil and people without earing aids, both supporting listening systems must be available. Assistive technology has taken families with such disabilities to the brink of survival for their infant. The problem that hinders the usage of assistive devices for most children with hearing disorder is equipment availability. However, most families strive to fulfill their children's needs at all expense. The objective of this thesis was to assess the efficiency of assistive devices among learning students with hearing disability. It is assumed that students are more autonomous students and good workers, regardless of the type of type of support devices they use. This report has acknowledged that the academic performance of pupils with hearing disorder utilizing high-tech support technologies is clearly different from the low-tech support technologies. The views of parents regarding support devices have often shown that the usage of assistive technology increases the literacy, coordination and independence of their children.

REFERENCES

[1] Elizabeth A. Walker, Lenore Holte, Ryan W. McCreery, Meredith Spratford, Thomas Page, and

Mary Pat Moeller (2015) 'The Influence of Hearing Aid Use on Outcomes of Children with Mild Hearing Loss'J Speech Lang Hear Res. 2015 Oct; 58(5): 1611–1625. doi: 10.1044/ 2015_JSLHR-H-15-0043

[2] Gitlow, L., Dininno, D., Choate, L., Luce, R.A., &Flecky.K. (2011). The provision of assistive technology by occupational therapists who practice in mental health. Occupational Therapy in Mental Health, 27(2), 178-190. DOI: 10.1080/0164212X.2011.567352

[3] H Pelin Karasu (2017) 'Writing Skills of Hearing-Impaired Students Who Benefit from Support Services at Public Schools in Turkey' World Journal of Education Vol. 7, No. 4; 2017. http://wje.sciedupress.com

[4] Hasselbring, T. S., & Williams, G. (2000). Use of computer technology to help students with special needs. The Future of Children, 10(2), 102-122. Retrieved from http://www.ncbi.nlm.nih.gov/ pubmed/11255702

[5] Maor, D., Currie, J., &Drewry, R. (2011). The effectiveness of assistive technologies: a review of research-based studies. European Journal of Special Needs Education, 26(3), 283-298. DOI: 10.1080/08856257.2011.593821

[6] Olaussen, I. (2010). Disability, technology & politics: The entangled experience of being hard of hearing. No. 208 (Doctoral thesis). University of Oslo, Oslo, Norway.

[7] Peter J Blamey, Lois FA Martin and Elaine Saunders (2010) 'Hearing aid benefit as a function of hearing loss' 14-16 December 2010, Melbourne, Australia. ISBN 978-0-9581946-3-1 © 2010 ASSTA.

[8] Polgar, J. (2010). The myth of neutral technology. In M. M.K. Oishi, I. M. Mitchell, & F. H. M. Van der Loos (Eds.), Design and use of assistive technology (pp. 17–23). New York, NY: Springer.

[9] Strange, A., Johnson, A., Ryan, B., &Yonovitz, A. (2008). The stigma of wearing hearing aids in an adolescent Aboriginal population. Australian and New Zealand Journal of Audiology, 30, 19–37. doi:10.1375audi.30.1.19

[10] SuchitpornLersilp, SupawadeePutthinoi, and TheeratornLersilp (2018) 'Facilitators and Barriers of Assistive Technology and Learning Environment for Children with Special Needs' Hindawi Occupational therapy International Volume 2018, Article ID 3705946, 9 pages https://doi.org/10.1155/2018/3705946

[11] Tharpe, A. M. (2007). Minimal hearing loss in children: The facts and the fiction. Sound Foundation Through Early Amplification. Retrieved from http://www.phonak.com/ content/dam/phonak/b2b/Pediatrics/webcasts/ped iatric/com_31_p61899_pho_kapitel_18.pdf

[12] Wennergren, A. (2008). The best listening environment in school according to hard-of-hearing pupils. Scandinavian Journal of Disability Research, 10(1), 29–48. doi:10.1080/15017410701504870