

## ROLE OF ASSISTIVE TECHNOLOGY IN ACADEMIC DEVELOPMENT OF STUDENTS WITH HEARING IMPAIRMENTS

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### ABSTRACT

The purpose of the study was to examine the Role of Assistive Technology in Academic Development of Students with hearing Impairments. The objectives of the study were to analyze teacher's opinion about the role of assistive technology in academic development of students with hearing impairments. The sample for the study was selected through simple random sampling technique and 120 teachers from Multan Division were chosen. Self-developed one questionnaire teachers were used as a research tool to collect data. Data were analyzed by SPSS, and calculating percentage, ANOVA, Frequency, t-test, Co-relation Analysis, Mean and standard deviation. The results showed that the assistive technology is playing a motivational role for the teachers. Government should also increase the stipend amount. This scheme should have to link with the results of the students to improve the impact of the scheme.

Major findings of the research have shown that what perceptions teachers have about hearing impairment students and its role of assistive technology in academic development. According to studies, teacher's perception about hearing impairment students not satisfied. According to several studies, there are many strategies about handling students with hearing impairment in the classroom, assistive technology has the potential to enhance and increase their learning and academic performance and resource room play a vital role in managing the hearing impairment students. Future research recommendations will continue to provide the sector with relevant and distinct ideas.

**Keywords:** Assistive Technology, Academic Development, Hearing Impairment, Special Education.

### 1.1 Introduction

Technologies are essential to some facets of people's lives (Erdem, 2017). Today people are living freely and connecting with others rapidly thanks to several forms of technology (Kollak, 2017). The use of technology in education has grown to be vital information and support resource. The use of technology in school curricula has evolved and improved over time (Sze, 2019). Today, special education is greatly impacted by assistive technology (Sze, 2019). It is used and created to assist students in effectively completing a specific activity. A tool known as assistive technology can maintain or enhance a kid with hearing loss' ability to hear (Adebisi et

al., 2015). By using the skills of students with special education needs challenging to utilize in daily life has been made easier thanks to assistive technologies (Erdem, 2017). It could be a tool or software program that can help special education children develop their 21st century talents, particularly their social, academic, and communication abilities. The use of assistive technologies in special education is crucial now given demand for 21st century skills. The term "assistive technology" is widely used to describe methods that enable persons with disabilities, limited mobility, or other restrictions to support and assist them in completing tasks that would otherwise be difficult or impossible. (Goehrig et al., 2021). The use of assistive technologies (AT) fosters and supports a student's overall wellbeing. It makes it possible for students to have independent, productive, and healthy lives (Chadha & Cieza, 2018).

### 1.2 Literature review

According to the definition given by, a hearing impairment is "a loss of acuity that interferes with the child's functioning in the educational environment and necessitates the provision of special education and related assistance." "Hearing impairment" and "deafness" are two of the categories under which children with disabilities may be qualified for special needs education and related facilities, according to the Individuals with Disabilities Education Act. Early detection of hearing loss and proper early intervention services from trained clinicians are two important aspects.

Hearing loss is the incapability to hear someone with normal hearing, defined as hearing thresholds of 20 dB. The severe of hearing loss may be range from slight to considerable (WHO, 2021). Hearing loss greater than 90 decibels is commonly considered to be deafness; hearing loss below 90 dB is classified as a hearing impairment. (Fishman-Weaver, 2021). Ozoji (2005) claims disability is the mother of special education requirements. He emphasized that impairment is defined as an abnormality or bodily organ or physical structure issue. The normality of a building's structure or functioning determines whether it is abnormal or malfunctioning. Ozoji goes on to say that impairment is concerned with the flaw, imperfection, deviation harm, or deficiency of the different body organs. When a person's body organ is damaged, that individual is deemed to be impaired. To this aim, I can share my thoughts on the idea that damage to the body's hearing organs constitutes hearing impairment (of a person). The significance of hearing organs to a person's ability to live is comparable to the value of impairment to special needs education.

According to Babudoh (2008), hearing impairment is a general phrase that refers to a situation where a person's capacity to hear and distinguish between sounds is reduced. According to Babudoh (2008), there are three main factors that may be used to characterize hearing impairment: the time of start, the severity of the loss, and the location of the lesion.

Technology is the use of scientific knowledge to address human needs. Two straightforward dictionary definitions of technology are provided (1) technology is a tool for increasing human productivity; and (2) technology is the employment of machines to replace physical labor. Technology is defined by UNESCO as the knowledge and creative process that can help people solve problems and better control over the natural and artificial environments in an effort to improve the condition of people (UNESCO, 1985).

Technology is frequently used as a general phrase to refer to tools, equipment, and technologies that humans create and utilize in their daily lives. Technology is defined by Akinmade (2007) as a body of knowledge and practices for creating, utilizing, and carrying out useful things. Contrary to technology that is typically used by everyone to do tasks more quickly and with less effort, assistive technology was developed to help a person complete a specific task. According to Ozoji (2005), AT is any product, item that is obtained commercially, off-the-shelf, adapted, and utilized to increase, improve the skills of disable people. Hearing assistive technology helps students with hearing loss hear, comprehend, or recognize sounds by amplifying sound frequencies and making sounds considerably clearer. Hearing aids, Cochlear implants, FM systems, infrared systems, and loop systems are some of the assistive listening technologies. [(Farooq & Iftikhar - Bulletin of Education and Research, 2015 – ERIC)]

Students with hearing impairments may have educational attainment delays when compared to their hearing peers. Yet, as many experts claim that these students' IQs are equal to those of their hearing peers, their low achievement cannot be attributed to their intellectual capacity. As a result, these learners frequently experience language-related academic difficulties. Through the use of assistive hearing equipment, these students can learn language as early as possible, increasing the likelihood that their academic success will be on par with that of their hearing peers (Gargiulo 2012).

Australian researchers Massie and Dillon (2006) conducted a study there. The findings showed that attentiveness, classroom behavior, communication, and other skills significantly improved while the amplification devices were in use. Peer interaction, participation in class discussions, and promotion of a more proactive and self-assured role in class discussions are all boosted. The systems made students happier as well. The students might perform better academically if their focus, communication, and classroom behavior were addressed. So, it may be said that assistive hearing technology improves academic performance.

Muhammad, Aasma, and Umaira's (2015) research found that students with various forms of assistive technology scored significantly differently on the Urdu language test in terms of achievement. Pupils who use an infrared system F.M. system perform improved than those who use cochlear implant. Also, they found that pupils who utilize many devices perform better on tests than those who only use Infrared system and Loop system gadgets.

In a survey conducted by Kihingi in 2003 at the Kenya Technical Training Institute for the Deaf, it was discovered that majority students had a limited knowledge of English words. In addition, only 3.3% of pupils used assistive listening technology. It might infer that the learners' difficulties are brought on by their failure to use assistive hearing technology.

### **1.3 Significance of Study**

Schools are now better equipped to meet the needs of their teachers, regardless of their students' backgrounds, interests, or current skill levels, thanks to advances in Assistive technology. AT has allowed people of all ages to continue their education, for information to be shared in a timely and effective manner, and for people to develop a greater willingness to consider novel concepts. The curriculum is adaptable, and it emphasizes the value of order and method in discipline practice. Both instructors and students can benefit from the convenience of accessing relevant information from the comfort of their own homes or other convenient locations. Students can evaluate and track their own progress by taking a variety of quizzes, tests, and

examinations, both offline and online. Since the implementation of AT, there has been a important increase in the number of new communication methods used in academic settings. The advancement of Assistive technology has enabled instructors and students alike to create immersive, multi-sensory, interactive classrooms with virtually limitless educational potential. AT will cause changes in the gender and age gaps that currently exist in the workforce. Anyone, regardless of age or gender, can learn how to use Assistive technology and find work in related fields.

#### **1.4 Research Objectives**

The objectives of the study will be to investigate:

- 1) To analyze the relationship between assistive technology and academic development for the students with hearing impairment.
- 2) To assess the present practices of using assistive technology in classroom for the students with hearing impairment.
- 3) To investigate effect of assistive technology on the academic development children with hearing impairment on the basis of demographic i.e. gender, designation, qualification, place of posting, experience, and district.

#### **1.5 Research Hypotheses**

The research hypotheses will be as follows:

H<sub>01</sub>: There is no relationship between assistive technologies and academic development students with hearing impairment at elementary level.

H<sub>02</sub>: There are no present practices of using assistive technology in classroom to develop their academics for the students with hearing impairment.

H<sub>03</sub>: There is no relationship between assistive technology on the academic development of children with hearing impairment on the basis of demographic factors such as gender, locality, and age and disability level.

#### **1.6 Research Design**

The research was descriptive in nature. The research design was a cross-sectional survey. A quantitative approach emphasizes opinion, analytical method, and observable proof of actuality and validity in the world. The primary reason for adopting this approach for this research was the desire to quickly and accurately probe the opinions of the population. The researcher chose a whole of the population to serve as a sample for this study due to the lesser enrollment of hearing impaired student in institutions.

#### **1.7 Population**

In the present study population comprised of all the male and female teachers of all grades allocation in government centers schools and college of Multan Division. In Multan Division, there were 6 schools and 24 centers and 1 college. There were the strength of teachers 640 in which 365 male teachers and 275 female teachers.

#### **1.8 Sample Size and Sampling Technique**

Census method was used as sampling technique to select the required sample of teachers of Hearing Impaired students. This methodology was the best option for sample selection.

#### **1.9 Procedure of Instrument Development**

A questionnaire was prepared after evaluating the pertinent literature. The questionnaire is a helpful tool for collecting data from a large number of potential participants. A formal, written

set of closed-ended questions is provided to each participant in a study to complete. Five-point rating systems were used to design the survey, respectively. During the arising of questionnaire researcher used concise and objective technique. A survey is a technique for acquiring ordered and structured data. Additionally, same process was used to conduct an exhaustive literature review. The literature review gave the subjects or categories of the investigation. The questionnaire was based on 72 closed-ended

### 1.9.1 Opinion of Expert

For the goal of verifying tools of validity, experts were consulted. The validity of questionnaire was examined by three experts adopting the procedure of expert opinion method. The experts delivered their recommendations to improve some items. The observations of experts were incorporated in the questionnaire.

### 1.9.2 Pilot Testing

Pilot testing is carried out to guarantee that the tool's content is accurate. The purpose of a pilot study is to help researchers in evaluating the study's methodology and address any unforeseen challenges that may arise. A pilot test upon 12 hearing impaired teachers, these 12 teachers is from Multan city, 6 teachers is from hearing impaired school and 6 from Centre, teaching in Government special education school Multan (Multan Division) was carried out to guarantee the tool's reliability. The software (SPSS) analyzed the data provided by the hearing impaired students. Findings were matched with expectations going into the research. So after the pilot testing process, the questionnaire was modified, and then it's final version was developed and prepared.

### 1.9.3 Reliability of Instrument

Using the reliability method data was assessed during pilot. Chronbach alpha, which examined the consistency of correlation coefficients among several variables. The dependability of these factors is evaluated by computing the correlation coefficient between variables and factors. Chronbach Alpha was found to be .719, which is a real and reliable result.

**Table 1** Chronbach's Alpha Reliability Analysis

Category	No of items	Chronbach's Alpha
Teachers	72	.719

### 1.10 Data collection

The use of a questionnaire to collect statistics is a more green method of gather data. It takes less time, is much less steeply-priced, and lets in for facts collection from an exceedingly large sample. After essential permission was attain from the administration of school, the researcher turned to the teachers, the tools were briefly explained, and they were instructed to mark the optical answer sheet with their preferred options. The researcher delivered the questionnaire to the teachers via a variety of channels, including self, Google Forms, WhatsApp, email, and postal courier. The rate of returns was 100%. When the instruments are collected, the optical solution sheet is processed and then the statistics is used when you want to view the records. Response size was calculated to get a general rating from them. The frequency of each item is then tested to see in which areas people feel safe.



### 1.11 Data analysis

The actual evaluation is imperative to realize output of facts which have been accrued. In the respective studies look at, we've got carried out one of a kind statistical equipment by way of the usage of software program SPSS which might be:

#### 1.11.1 Descriptive Analysis

Defining the average values of variables acquired from the facts is an important part of descriptive analysis. Mean, standard deviation, and frequency value are all covered by its unique elements.

#### 1.11.2 Inferential Statistics

Inferential statistics were used to analyze the difference between teachers' opinion on the base of demographics i.e. gender, posting, experience, qualification, designation.

### 1.12 Analysis and interpretation of data

**Table 2** Factor wise analysis of Teachers Data

Sr No.	Factors	Mean
1	Explore the Facilities and Functional Level on the basis of teachers' opinion	2.47
2	Teachers' Opinion Regarding the role of assistive technology in academic development among hearing impairment students on the basis of academic.	4.22
3	Teachers' Opinion Regarding the role of assistive technology in academic development among hearing impairment students on the basis of classroom.	4.2
4	Teachers' Opinion Regarding the role of assistive technology in academic development approach among hearing impairment students on the basis of vocational training.	4.28
5	Teachers' Opinion Regarding the role of assistive technology in academic development approach among hearing impairment students on the basis of speech and language development.	4.19
6	Teachers' Opinion Regarding the role of assistive technology in academic development approach among hearing impairment students on the basis of sign language.	4.11
7	Teachers' Opinion Regarding the role of assistive technology in academic development approach among hearing impairment students on the basis of daily living skills.	4.08
8	Teachers' Opinion Regarding the role of assistive technology in academic development approach among hearing impairment students on the basis of job.	4.25

Table 2 Explore the facilities of assistive technology present in the schools and also functional. The man value also support the claim.

**Table 3** Differences between Teachers' Opinions in role of AT in educational development of students hearing impairment base of gender

Variables	Category	N	Mean	SD	df	t	Sig.
Gender	Male	27	4.0211	.29094	118	.669	.872
	Female	93	3.9792	.28470			

Table 3 with considered to gender, an Independent samples t-test showed a significant result (df =118, t =.669, sig .872> .05) of teachers' opinion towards academic development of students

with HI. Analysis in Table 4.6 further depicts that male sample teachers reported higher level of teachers opinion towards learning effectiveness of students (Mean =4.0211) in comparison to female teachers (Mean =3.9792). It can be concluded that gender-based no significant differences were teachers' opinion towards learning effectiveness of students.

**Table 4** *Difference between Teachers' Opinions by Designation (One Way ANOVA)*

	Sum of Squares	df	Mean Square	f	Sig.
Between Groups	.164	2	.082	1.009	.368
Within Groups	9.530	117	.081		
Total	9.694	119			

Table 4 indicates the difference between teachers' opinions by designation. The calculated significance value is (.368) greater than tabulated significance level 0.05. This shows that statistically a no significant difference between teachers' opinions by their designation.

**Table 5** *Difference between Teachers' Opinions by District (One Way ANOVA)*

	Sum of Squares	df	Mean Square	f	Sig.
Between Groups	.023	3	.008	.094	.963
Within Groups	9.671	116	.083		
Total	9.694	119			

Table 5 indicates the difference between teachers' opinions by district. The calculated significance value is (.963) greater than tabulated significance level 0.05. This shows that there is statistically no significant difference between teachers' opinions by district. F value (.094) also supports the claim. These groups of district equally believe that assistive technology in academic development is useful for hearing impairment Students.

**Table 6** *Difference between Teachers' Opinions by Academic Qualification (One Way ANOVA)*

	Sum of Squares	df	Mean Square	f	Sig.
Between Groups	.414	4	.104	1.283	
Within Groups	9.280	115	.081		.281

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Total	9.694	119
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Table 6 indicates the difference between teachers' opinions by academic qualification. The calculated significance value is (.281) greater than tabulated significance level 0.05. This shows that there is statistically no significant difference between teachers' opinions by highest academic qualification. F value (1.283) also supports the claim. These groups of teachers by academic qualification believe that assistive technology in academic development is useful for hearing impairment Students.

**Table 7** *Difference between Teachers' Opinions by Place of Posting (One Way ANOVA)*

	Sum of Squares	df	Mean Square	f	Sig.
Between Groups	.071	2	.036	.433	.650
Within Groups	9.623	117	.082		
Total	9.694	119			

Table 7 indicates the difference between teachers' opinions by place of posting. The calculated significance value is (.650) greater than tabulated significance level 0.05. This shows that there is statistically no significant difference between teachers' opinions by highest place of posting. F value (.433) also supports the claim. These groups of teachers by place of posting believe that assistive technology in academic development is useful for hearing impairment Students.

**Table 8** *Difference between Teachers' Opinions by Teaching Experience (One Way ANOVA)*

	Sum of Squares	df	Mean Square	f	Sig.
Between Groups	.357	4	.089	1.099	.361
Within Groups	9.337	115	.081		
Total	9.694	119			

Table 8 indicates the difference between teachers' opinions by teaching experience. The calculated significance value (.361) is greater than tabulated significance level (0.05). This shows that there is statistically no significant difference between teachers' opinions by different teaching experience. F value (1.099) also supports the claim.



**Table 9** Relationship between assistive technology and academic development on the basis of hearing impaired students

Sr.#	Academic Indicators	Description	Overall impact of AT on Academic Development
1	Facilities and Functional Level	Pearson Correlation Sig.(2-tailed) N	.304** .001 120
2	Academic	Pearson Correlation Sig.(2-tailed) N	.867** .000 120
3	Classroom	Pearson Correlation Sig.(2-tailed) N	.519** .000 120
4	Vocational training	Pearson Correlation Sig.(2-tailed) N	.702** .000 120
5	Speech and Language development	Pearson Correlation Sig.(2-tailed) N	.871** .000 120
6	Sign Language	Pearson Correlation Sig.(2-tailed) N	.779** .000 120
7	Daily Living Skills	Pearson Correlation Sig.(2-tailed) N	.763** .000 120
8	Jobs	Pearson Correlation Sig.(2-tailed) N	.769** .000 120

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

(AvrScr=Average Score, FFL =Facilities and functional level, acdm= Academic, clsrm= Classroom, vocTra=Vocational Training, SLD=Speech and Language Development, SiLa=Sign Language, DLS=Daily Living Skills)

### Factor 1 Facilities and functional level

Table shows that there exists statistically significant ( $p=.001$ ) and positive but weak correlation ( $r= .304$ ) between assistive technology and academic development on the basis of facilities and functional level. It can be concluded from table that more use of assistive technology on the academic development effects the facilities and functional level.

### Factor 2 Academic

Table shows that there exists statistically significant ( $p=.000$ ) and positive but strong correlation ( $r=.867$ ) between assistive technology and academic development on the basis of academic. It can be concluded from table that more use of AT on the acad. development effects the academic.

### **Factor 3 Classroom**

Table shows that there exists statistically significant ( $p=.000$ ) but positive correlation ( $r=.519$ ) between assistive technology and academic development on the basis of classroom. It can be concluded from table that more use of AT on the educational development effects the classroom.

### **Factor 4 vocational training**

Table shows that there exists statistically significant ( $p=.000$ ) but positive correlation ( $r=.702$ ) between assistive technology and academic development on the basis of vocational training. It can be concluded from table that more use of AT on the acad. development effects the vocational training.

### **Factor 5 Speech and language development**

Table shows that there exists statistically significant ( $p=.000$ ) but positive correlation ( $r=.871$ ) between assistive technology and academic development on the basis of speech and language development. It can be concluded from table that more use of AT on the acad. development effects the speech and language development.

### **Factor 6 Sign language**

Table shows that there exists statistically significant ( $p=.000$ ) but positive correlation ( $r=.779$ ) between assistive technology and academic development on the Basis of sign language. It can be concluded from table that more use of AT on the instruction development effects the sign language.

### **Factor 7 Daily living skills**

Table shows that there exists statistically significant ( $p=.000$ ) but positive correlation ( $r=.763$ ) between assistive technology and academic development on the basis of daily living skills. It can be concluded from table that more use of AT on the educational development effects the daily living skills.

### **Factor 8 Jobs**

Table shows that there exists statistically significant ( $p=.000$ ) but positive correlation ( $r=.769$ ) between assistive technology and academic development on the Basis of jobs. It can be concluded from table that more use of AT on the academic development effects the jobs.

### 1.13 Discussion

The study showed how assistive technology helps students with hearing impairments progress academically. The study questions and hypotheses are discussed to support the findings. The research purpose was to determine the types of assistive technology used by hearing-impaired students. It was discovered that they primarily used a mobility impairment alternative, although they also used assistive technology for the hearing-impaired, assistive technology for cognition, prosthetics, assistive technology in sports, and computer accessibility.

The utilization of equipment for assistive technology is typically demonstrated in research question two. The responses can be summarized as follows: lecturers use assistive technology when delivering lectures, lecturers value assistive technology help in teaching students hearing impairment, assistive technology are not available or sufficient in schools or institutions, institutions have enough money to purchase AT, government supplies assistive technology, and so on.

The third research question examined how learners with hearing impairments improve academically and the effects of assistive technologies. It demonstrates the importance of assistive technology in helping students with hearing impairments succeed academically, understand lectures and other forms of instruction, find learning more comfortable and efficient, and decrease their interest in learning when lecturers refuse to use such technology. assistive technology helps students hearing impairment to perform better academically, students with hearing impairment do not perform academically when assistive technology is not provided for them, students with hearing impairment can perform when provided or without assistive technology and lastly that assistive technology have influence on the students with hearing impairment by aiding their learning rate. Therefore, in hypothesis there is no significant difference among students with hearing impairment taught with assistive technology and those taught without assistive technology is rejected and the alternative is accepted.

### 1.14 Conclusions

An enormous and wonderful effort is being made to promote academic success by integrating assistive technology into education. Therefore, as it is common knowledge that importance of assistive technology in education cannot be stated, educational administrators should make a greater effort to make sure that this technology is available and in working order so that lectures can be effectively delivered to students when and as needed.

Educational/administrative should see to this local product of assistive technology and welcomed when the available funds at lands cannot afford to buy or import from outside the environment, after all popular saying goes thus: half bread is better maintain between the educational administration and the outside world-government and non-governmental organizations, so that they can receive help hand to improve educational provision of which assistive technology is among the numerous.

This is my prayer that provision of assistive technology will steadily improve and available in every educational institution to upholds the excellence of education in this our great nation and the world.

### 1.15 Recommendations

We are all aware of the significant importance of assistive technology increase educational development not only between students with hearing loss but also students without impairment. Following recommendations are made based on the findings:

1. Effort should be to produce local assistive technology. This enables many low-financial-standing educational institutions to afford to buy them and use in delivering lectures when the imported ones are very expensive.
2. Institutional management should encourage art practice among their undergraduate so through them they can give assistive technology locally and cheap even in absence of adequate funds.
3. Government should improve in their attitude of seeing education as a dump ground for political and carryout her responsibilities of providing funds to ensure effective services for the good of her citizens in education sectors is effectively and efficiently meet.
4. Lecturers should be given skills improving service such as workshop, training, seminars, which will increase their ability to handle modern technology for delivering their services.
5. Students, especially the exceptional ones should be encouraged to work very hard for academic excellence with or without assistive technology in the process.

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