*Research Article*

# Awareness and Access to Assistive Technology among students with disabilities: Evidence from a special school

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**Abstract**

*Acknowledging the abilities of all learners with disabilities equitably is a very complex process and it also requires modern technology. Efficient exercise of assistive technologies can positively assist any country in realizing inclusive/special education by helping learners with disabilities in schools. Regardless of the significance and constructive influence of assistive technologies, awareness and access to assistive technology in special education particularly in developing nations is inadequate. This case study of a special school has tried to understand the extent of awareness and access to assistive technology among the learners with disabilities and it also uncovers the experiences of the special educators in using and implementing assistive technology for the learners with disabilities.*

**Keywords**: Assistive Technology, students with disabilities, special educators.

## Introduction

A nation will not be judged primarily by its success in the sciences, technological powers and economic power. A nation will be judged by the way it includes all categories of people in the development activities to enable everyone to contribute towards nation-building. When it comes to social exclusion, other deprived groups based on caste, gender, etc. gain importance. The inclusion of persons with a disability takes a backseat in India. People with disabilities are facing accessibility and awareness problems in all areas. Technology is evolving at a remarkably rapid pace and has offered many possibilities for its users. Assistive technologies offer a range of prospective opportunities for differently-abled learners by amplifying their learning opportunities (Jacobsena, 2012). Assistive Technology is being developed for people with disabilities to (1) make the learning atmosphere more accessible (2) support them in learning (3) facilitate them to excel in the organization/workplace or (4) promote their independence or else enrich their quality of life (Blackhurst,2005). Assistive technology can help learners with disabilities to learn in a better way.

Assistive technologies are still a novelty even among people with disabilities residing in urban areas. The few available technologies that are not easily affordable, nor are they widely sold and supported. But still, in India most of the learners with disabilities are lacking information regarding the importance of assistive technologies. The development of education of the learners with disabilities is not only based on the teacher's assistance but also on the effective utilization of assistive technology. Most of the ICT centres and disability services centres are not accessible to learners with disabilities. Educators need to challenge themselves to explore assistive technology that will enhance all-round development skills for differently-abled learners (Jacobsena, 2012).

## Operational Definition of Key Terms

Some of the key concepts as used in the present study have been operationally described as follows:

**Assistive Technology:** The term "assistive technology" means any device, software, or equipment that aids students with disabilities in learning, communicating, or functioning better. Assistive technology has the potential to be as high-tech as a computer or anything as simple as spectacles. Low tech devices for learners with disabilities are products that don't need much training, and are less expensive without any complex or mechanical characteristics. High tech assistive devices are the most multifaceted devices that have digital and may be computerized. It can be any object, piece of equipment, or product system. Assistive Technology helps students who experience issues with hearing, talking, composing, recalling, seeing, speaking, and numerous other things. Hearing aids, personal amplification systems, Braille displays, audiobooks, screen reading software, spectacles and memory aids are all examples of assistive technology products. The use and advantages of assistive technology differ from person to person based on their individual goals and characteristics. Therefore, different disabilities require diverse assistive technology.

**Students with disability:** It refers to learners who have long-term physical, intellectual, mental, or sensory impairments that, in interaction with barriers, hinder their full and effective participation in society equally with others.

**Special School:** It is a type of school that offers specially designed instruction, support, and services to suit the needs of students with special needs, such as those who have a variety of physical, behavioural, or cognitive issues. Special schools come in a variety of shapes and sizes, but they all serve the same purpose: to educate children whose needs cannot be satisfied in a mainstream setting.

## Rationale

According to World Bank data, India is categorized as a lower middle-income country. The country's socio-economic groups, healthcare systems, and cultures are diverse. Healthcare facilities and resources are dispersed unevenly, and services are concentrated mostly in urban areas (World Bank, 2018). Many people have the luxury of breezing through elementary, middle, and high school without much difficulty. Now, imagine having a disability that prevented you from reaching a goal as simple as communicating with your classmates. Assistive technology has come a long way in providing those with disabilities the chance to learn and receive an education in the most normal way possible. Assistive technology services enable people to live healthy, productive, independent, and dignified lives by allowing them to participate in school, employment, and civic life (Director General WHO, 2017, p. 1, 3; Smith et al, 2016, p. 7; Borg & Ostergren, 2015, p. 301).

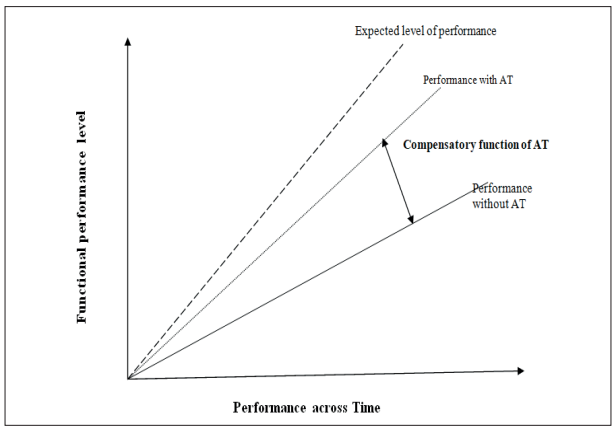
According to the 71st World Health Assembly, AT facilitates and encourages inclusion, participation, and engagement of people with disabilities, and the fact that 90 percent of those who need them don't have access to them has a significant negative impact on their education, employment, health, and mental wellbeing. Evidence shows that the awareness about Assistive technology is significantly low among professionals, disabled people, even students with disabilities in schools especially from low middle-income countries (Senjam, 2019). A lack of understanding and awareness

about the impact and possibilities of Assistive Technology for individuals with disabilities is a significant obstacle to accessing it. Parents also struggle to accept their children with disabilities because they have high expectations for regular development, which leads to a refusal to support Assistive Technology (Boot, 2021). This case study has been conducted in a special school to understand the level of awareness and access to assistive technology among students with disabilities and to explore the experiences of special educators in implementing and using assistive technology.

**Conceptual Framework**

According to the WHO's Third Committee Report (71st World Health Assembly, 26 May 2018), 90 percent of PWDs still lack access to ATs. Most PWDs and their families are thus left out, trapped in poverty and isolation. It makes PWDs more susceptible to increased disability. The stigma and dominance of negative outlook among parents, society and teachers, adds to the challenge not just of access, but also of retention and education of students with disabilities. Lack of financial resources is a significant barrier for many people who need assistive technologies (Zongjie, 2007). Boot et al. (2021) found that the abandonment of Assistive Technology was a barrier that negatively affected people with disabilities. Factors contributing to abandonment included inappropriate environments, inadequate customized Assistive Technologies, and insufficient training over time. Additionally, this study showed that people with disabilities often needed daily support from the caregivers to use the AT (or reminded to use it). Training that is adjusted to a person's disability level is needed when introducing AT. Furthermore, recurrent training is required to reinforce the user's ability to utilize AT independently. To meet this huge and unmet demand, WHO is leading the Global Cooperation on Assistive Technology (GATE) programme. Because of poor budget allocation, administrative inefficiency, stigma, and the intersegment of discrimination, India's legal framework for protecting PWDs' human rights is rendered mostly inaccessible (Ghosh, 2019). A majority of assistive devices are purchased directly by individuals with disabilities and their families (Albrecht, 2003). Approximately two-thirds of the users of assistive technology in India paid for their devices themselves, according to a national survey. Many technologies are prohibitively expensive for persons with disabilities, especially in low and middle-income nations. The expense of the computer, digital access, and assistive services, for example, was shown to be the most common reason for people with disabilities not utilising the resources effectively in a UK study (Piling, 2004). The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) was adopted by India in 2007, leading to the adoption of the Rights of Persons with Disabilities Act in 2016. A National Indicator Framework (NIF) has been designed to track and accomplish the SDGs and its linked targets like strengthening and extending rehabilitation including community-based rehabilitation, assistive technology, assistance and support services, and it acts as a critical tool for policymakers, resource allocation, researchers, and other concerned stakeholders (Government of India, 2015).

**Figure-1: Conceptual Framework (Performance gap exhibited by students with disabilities across time, with assistive technology compensating and reducing the gap)**




The conceptual framework for this case study has been illustrated based on the review of literature related to the concepts included in this paper. It represents the outline of the investigation for this study. This framework may help to comprehend how assistive technology impacts learners' development in learning. By enabling individuals to be productive and contribute in all aspects of life, assistive devices can considerably minimize inequities encountered by all persons with disability, including children and adults (Khasnabis, 2015).

## Availability and Usage of Assistive Technology in the selected Special School

Assistive technology ranges from low-tech to high-tech, and they serve many different needs (Borg et al, 2015, p.14). The assistive technology devices utilized individually by students with varied visual impairments are mostly Braille slate & stylus (excluding Braille Embossers, Braille Display, Braille Printers, and Braille Translators), and Audio Recorders. Very few students who have access to personal computers at their homes are found to have NVDA software as it is a free and open-source portable screen reader for Microsoft Windows. The unavailability of some crucial software restricts the special educators from using Screen Magnification Software, screen readers like Jaws, Open Book OCR Scanning/ Reading Software for English & Hindi Languages.

The assistive devices utilized individually by students with varied hearing impairments are mostly analogue hearing aids and FM systems for partially impaired ones. The special educators are trained in Indian Sign Language. There is a lack of Assistive Listening Devices, tactile aids, digital hearing aids, etc. The appropriate services should accompany the Assistive devices, including recommendation, appraisal, financial support, ordering, suitability of the device, training of the user or caregivers, follow-up, and maintenance (Borg et al, 2015, p. 14). Appropriate services can make a big difference in how well assistive technology works (Borg et al, 2015, p. 14).

## Research Objectives

This research intends to:

1. To find out the extent of awareness and access to assistive technology

among students with disabilities with relation to gender and residence type.

2. To explore the experience of special educators in implementing and using assistive technology for students with disabilities.

**Research Questions**

1. To what extent do students with disabilities are having awareness and access to assistive technology?

2. What are the perceptions and experiences of special educators in implementing assistive technology?

**Methodology**

The methodological overview will be discussed systematically across the following subsections: description of the design, sample selection, details of tools used, procedure followed for data collection.

**Research design**

The present study is a case study and it has been done in a special school where co-education is being provided to students with visual, hearing, and learning disabilities. The study utilized survey and focus group discussion with the students and special educators respectively. In the present study, the investigator studied the students' awareness and accessibility of assistive technology and experiences of Special Educators' in implementing and using Assistive Technology for the students with different disabilities.

**Sample**

The type of institution selected purposively for the case study includes the special school serving students with disabilities in the Bilaspur region of Chhattisgarh. The school is a Non-government (Aided) secondary school with residential facilities. A total eight teachers are working in the school including five trained subject teachers (trained in VI & HI), and one each for learning disability, Language & Communication disorder (speech therapist), and ICT respectively. The selection of the school was done on the basis of certain criteria which include: type of students with diverse disabilities served by the school, type of ICT infrastructure and services available and type of the teacher community involved. The age group of the sample students mostly ranges from 14 to 22 years. The special school selected for the case study is serving 120 students with visual and hearing disabilities.

**Table-1: Participants' Characteristics on the basis of demographic variables**

| Locality | Category of Disability | Gender | Total Number of students |
|---|---|---|---|
| Rural (55) | Visually Impaired (41) | Female (13) | 120 (Male-73, Female-43) |
| | | Male (28) | |
| | Hearing Impaired (14) | Female (06) | |
| | | Male (08) | |
| Urban (43) | Visually Impaired (28) | Female (13) | |
| | | Male (15) | |
| | Hearing Impaired (15) | Female (07) | |
| | | Male (08) | |
| Semi-urban (22) | Visually Impaired (19) | Female (07) | |
| | | Male (12) | |
| | Hearing Impaired (03) | Female (01) | |
| | | Male (02) | |

The present study also included six (06) special educators rendering their services to the special school. A focus group discussion has been conducted with the special educators. It involved organized discussion with the individuals to gain information about their views and experiences in implementing and using Assistive Technology for the students with different disabilities.

**Table-2: Characteristics of the Research Respondents (Special Educators)**

| Name* | Gender | Age | Specialization in |
|---|---|---|---|
| SE1 | Male | 43 | Visual Impairment |
| SE2 | Male | 36 | Language & Communication disorder |
| SE3 | Female | 52 | Visual Impairment |
| SE4 | Female | 41 | Hearing Impairment |
| SE5 | Male | 29 | Learning Disorder |
| SE6 | Female | 38 | Hearing Impairment |

*the names of all special educators have been coded (SE for Special Educator) to uphold anonymity

**Tools Used**

The tools used to measure the dimensions and to collect the data are presented in table number 2.

**Table-3: Table showing tools used for collection of data with respect to the variables of the study**

| Variables | Tools used | Dimensions of the Tools used/Discussant points | Constructed by |
|---|---|---|---|
| Awareness and Access to Assistive Technology | Questionnaire for students' Awareness and Access to Assistive Technology | **1.** Awareness about:<br>**i.** Availability of AT in school lab<br>**ii.** Taking assistance during AT glitches<br>**iii.** Utility of new AT services other than used ones<br>**2.** Ability to use AT independently<br>**3.** Problems in using AT | Investigator |
| Special Educators' experiences in implementing and using Assistive Technology | Focus group Discussion for Special Educators | **1.** Assistive technology and students' performance<br>**2.** Selection of Assistive Technology<br>**3.** Assistive technology and Curriculum<br>**4.** Low tech and high-tech assistive technology devices | Investigator |

**Procedure of data collection**

**i) From Students with disabilities:** The tool namely, Questionnaire for students' Awareness and Access to Assistive Technology was administered to the sample. There were many students who had troubles with communication while surveying and therefore, their teachers and peers acted as interpreters for those learners. While collecting information from the students with hearing disabilities, the teachers helped the researchers to collect exact data from the students by using Indian sign language. Questions regarding the respondent's awareness of assistive technology and access to assistive technology have been analyzed using percentage comparison. The frequency of the respondents is also presented in percentages.

**ii) From Special Educators:** The investigators also conducted a Focus group Discussion for Special Educators and noted down their experiences regarding implementing and using Assistive Technology.

**Results and Discussion**

All questions regarding the respondent's awareness of assistive technology and access to assistive technology are analyzed using percentage comparison. The frequency of the respondents is also presented in percentages.

**RQ1. To what extent differently-abled students are having awareness and access to assistive technology (AT)?**

All the items of the questionnaire have been analyzed and interpreted individually. Awareness and access to assistive technology have been understood by using percentage comparison through background variables as follows:

**Figure-2: Distribution of respondents based on their awareness about assistive technology available for their use in school lab**

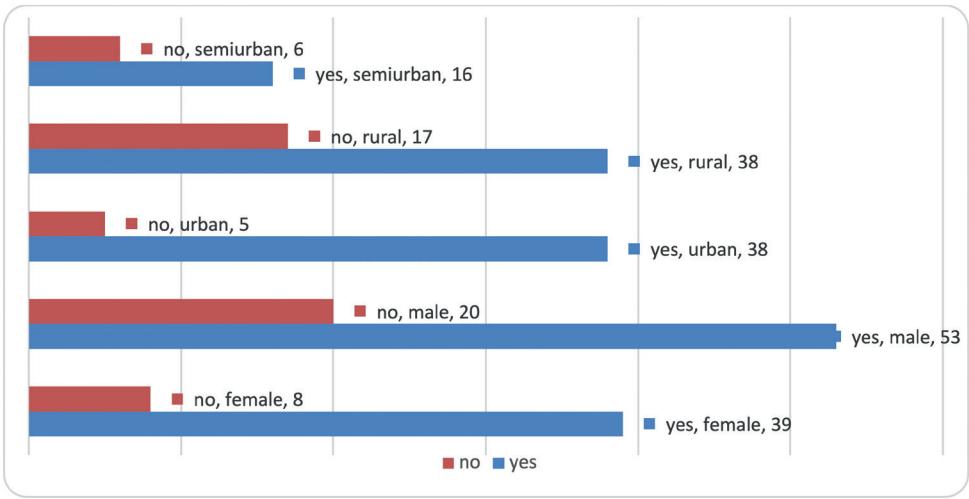
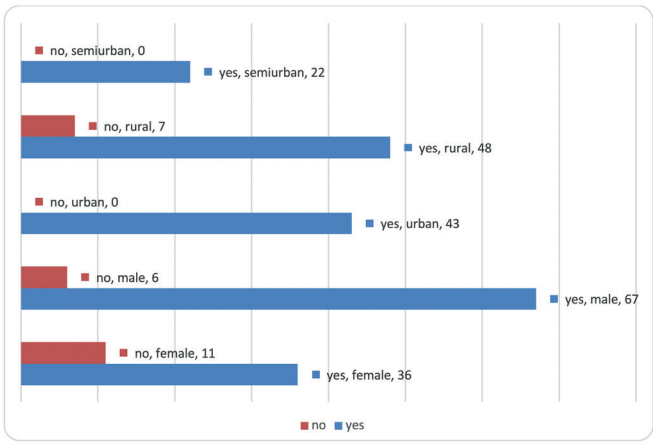


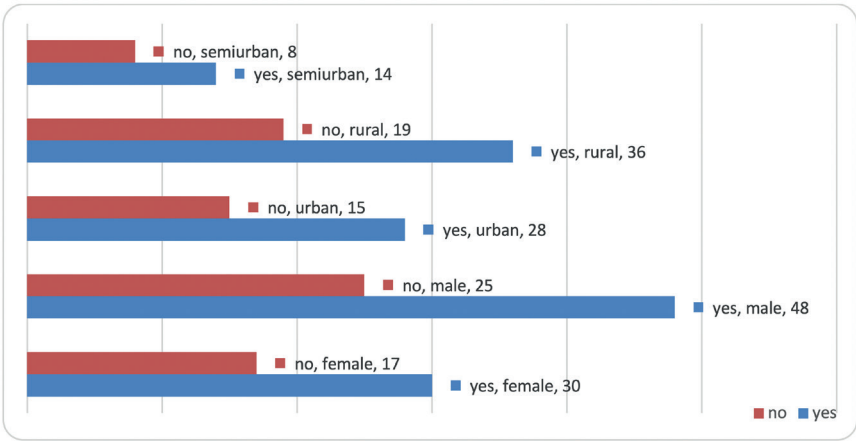

Figure 2 clearly shows that 39 (82.97 percent of the total female population) of the female respondents have awareness of the assistive technologies available for their use in the school computer lab as compared to 53 (72.60 percent of the total male population) of the male respondents. Further, 38 (88.37 percent of the total urban population) of the Urban respondents are more familiar with the assistive technologies than 38 rural (69.09 percent of the total rural population) and Semi-Urban students (72.27 percent of the total semi urban population).

**Figure-3: Distribution of respondents based on their awareness to contact experts related to assistive technology glitches/concerns**



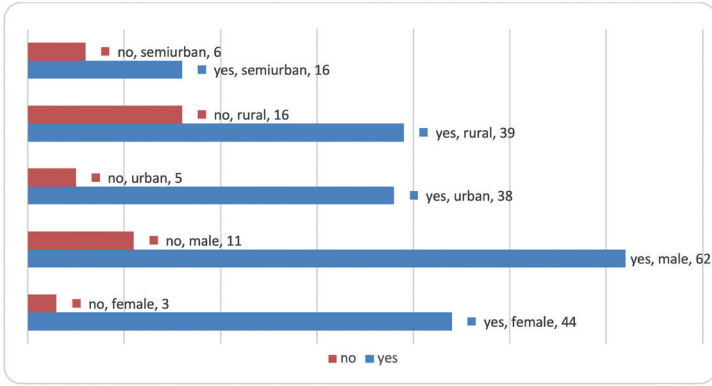
Respondents are much aware of their need to contact people, if they have any glitches related to assistive technology. According to Figure-3, 67 (91.78 percent) of the male respondents are aware of the resourceful persons who can help them in fixing their technological concerns as compared to 36 (76.59 percent) of the female respondents. All urban and semi-urban respondents know those who need to be contacted if they have any assistive technology concerns.

**Figure-4: Distribution of respondents based on their awareness about the new assistive technology services that are more useful than the devices that they are using now**



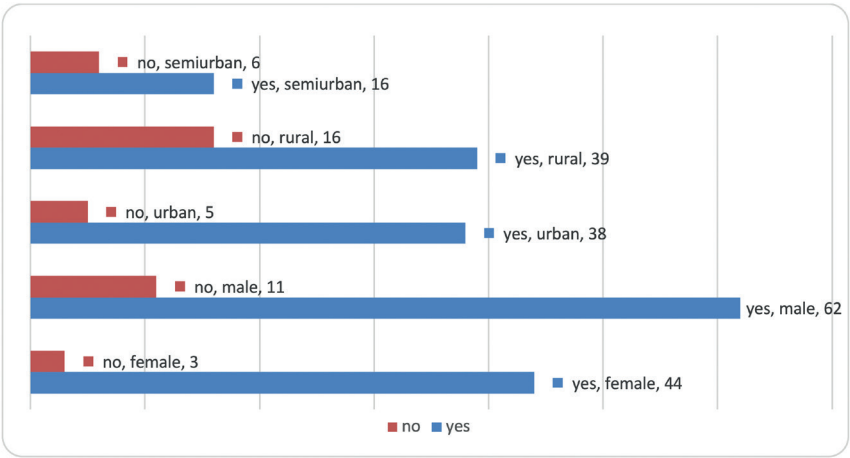

It is evident from Figure-4 that there is not much difference between 48 (65.75 percent) of the male respondents and 30 (63.82 percent) of the female respondents regarding awareness of new assistive technology services, which are more useful than the devices that they are using right now. Further, 28 (65.11 percent) of the urban respondents, 36 (65.45 percent) of the urban respondents and 14 (63.63 percent) of the semi-urban respondents are aware of new assistive devices other than those which are being used by them.

**Figure-5: Distribution of respondents based on their ability to use assistive technology devices independently**



The data in Figure-5 shows that 44 (93.61 percent) of the female respondents are better at using assistive technology devices independently than 62 (84.93 percent) of the male respondents. Furthermore, 38 (88.37 percent) of urban respondents can use assistive technology devices independently in comparison to 39 (70.90 percent) of the rural respondents and 16 (72.72 percent) of the semi-urban respondents.

**Figure-6: Distribution of respondents based on their problems in using assistive technology**




Data in Figure-6 shows that 41 (56.16 percent) of the male respondents experience problems in using assistive technology as compared to 22 (46.80 percent) of the female respondents. It is evident that most of the students are encountering problems while using AT. Nearly half of the students are having problems using assistive technology. However, 30 (54.54 percent) of the rural respondents encounter problems while using assistive technology as compared to 22 (48.83 percent) of the female respondents and 12 (54.54 percent) of the semi-urban respondents.

### RQ2: What are the perceptions and experiences of Special Educators in implementing Assistive Technology?

A focus group discussion assists in gaining insights into people's collective understanding of daily life and how persons are influenced by others in a group situation. A focus group discussion has been conducted with the special educators of the same school to know their understanding of assistive technology and to explore their experiences in using and implementing assistive technology.

### Assistive technology and students' performance

Hopkins (2016) noted that there is a wide scope of assistive technology that can open numerous avenues for learners with disabilities. Most of the teachers keep an eye on the progress of their learners before and after implementing assistive technology and they are witnessing a reasonable change. For differently-abled students, assistive technology is a boon.

Most of the students perform exceptionally well with assistive technology. Assistive technology acts as a catalyst in the process of learning. Other than increasing students' performance, it also enhances the level of independence (Sabana, Special Educator).

To the maximum extent they do not have to depend on others and their social interaction increases. A number of assistive devices are accessible to help teachers improve their learners' functional abilities by providing learning opportunities and active involvement in events (Starcic & Istenic, 2010).

**Need of Collaboration in selecting Assistive Technology**

The students may encounter trouble completing every assignment at home if the parents are not skilled in assistive technology (Judge, 2000; Messinger-Willman & Marino, 2010). Especially in rural areas, parents cannot contribute much because of the unawareness of new assistive technology.

We cannot select an assistive device for a student if it cannot be handled by the student and his family. So, many things are to be kept in mind during the selection of technology starting from its cost, complexity, accessibility, and so on (Tarun, special educator).

There should be an understanding and purposeful sharing of ideas between teachers and parents in selecting assistive technology. To make it successful the teacher, students, and parents have to contribute equally (Sarath, special educator).

**Assistive technology and Curriculum**

Alkahtani (2013) noted that assistive technology assists differently-abled learners to enhance their ease of access to the curriculum and quality of the learning experience. Because of this technology only, students can cope easily with the curriculum in the long run.

Assistive technology gives different avenues to students' development. Assistive technology assists the students with disability to get the best out of the curriculum by making them independent to a larger extent. The success of assistive technology is evaluated based on how it goes hand in hand with curriculum and methods of instruction (Alaknanda, Special Educator).

Without AT, it is a tough task to explore and transact the curriculum flexibly. Special educators have a common view that each element has its own and equal importance and all are interlinked.

**Low-tech and high-tech assistive technology devices**

Special educators opined that low tech devices are more successful than high tech devices. Because students are more confident and comfortable in using low tech devices and proper training of low-tech devices is given to the learners. However, all teachers know the importance of high-tech devices, and how much it is beneficial if used efficiently.

High-tech assistive technology devices are somewhat more sophisticated and because of their complexity, they are less successful than low-tech assistive technology devices. All students can use low-tech assistive technology devices, but few are there who can use high-tech devices efficiently (Mousami, Special Educator).

Inadequate training and support services within classrooms and at home can also be an obstacle to implementing assistive technology (Judge, 2000, p. 128). All teachers have a similar opinion that both high and low-tech devices can be successful only when implemented properly.

**Table-4: Selected data, Special educators understanding of Assistive Technology**

| Perception towards Assistive Technology | Yes | Not sure | No |
|---|---|---|---|
| Question1: Does the performance of students' increases with the proper implementation of assistive technology? | ✓✓✓ ✓✓✓ | | |
| Question2: Is assistive technology more significant than the curriculum and method of instruction for the success of special education students? | ✓✓ | ✓✓✓ | ✓ |
| Question3: Have you seen any differences in the success rate between high and low-tech assistive devices? | ✓✓ | ✓✓✓ | ✓ |
| Question4: Do you feel teacher/ student/parent collaboration in the selection of assistive technology is important for its success? | ✓✓✓ ✓✓✓ | | |
| Question 5: Do you have assistive technology available in your classroom for students that can also be used outside of their individualized educational programme? | ✓✓ | ✓ | ✓✓✓ |
| Question 6: Does the implementation of high-tech assistive devices include adequate training? | ✓✓✓ ✓✓✓ | | |

## Discussion

This study presented the awareness and accessibility of Students with diverse disabilities quantitatively. It is evident from the study that the female students are more aware of the facilities available in their school laboratory and using them independently than the male respondents because of the curiosity shown by the female students towards ATs and are acquainted with the existing software which they also used in their previous schools. However, there are still many students including both males and females who are ignorant of the facilities available in their school laboratory. It is found that almost all students from urban and semi-urban localities are much aware of their need to contact people if they have any glitches related to assistive technology because of their accessibility to the services provider situated in nearby towns. There is not much difference among male and female students regarding new assistive technology services other than those which are being used by them. Urban respondents are found comfortable in using assistive technology devices independently with fewer difficulties as compared to the rural and semi-urban respondents. It is because of the support from their caregivers who are quite more aware of the Assistive services.

The experiences gathered from the Special Educators using Focus group discussion helps in understanding the use of Assistive Technology qualitatively. Regarding the collaboration in selecting

ATs for students, they collectively opined that students with varied disabilities want to be empowered to individually choose and use Assistive Technology, but they cannot do this in a setting that is not supportive of such choices. Parents also have problems in accepting their child with a disability, as they had expectations for usual development, which in turn leads to a non-acceptance of supporting ATs. There is a lack of high tech Assistive devices in their schools like Digital Hearing Aids, Perkins Braille Assisting Listening devices because of their complexity they are less successful than low-tech assistive technology devices.

## Conclusion

Students' awareness and access to assistive technologies are not sufficient. For example, students do not have much access to assistive technology but are well aware of its importance in their lives. They know that it enhances their academic performances and makes them independent. After analyzing the different views of special educators, it can be concluded that if assistive technologies are implemented properly, it can certainly provide fruitful outcomes and also promote independence among learners. Collaboration between parents and teachers is important and information should be shared between parents and teachers about the means and methods of children's development. Appropriate training should be provided by the government disability service centres in implementing new assistive technology devices. Special educators should be provided with orientations and workshops regarding the use of new assistive technologies. Therefore, quality research should be promoted, especially in the field of assistive technology.

Countries like India that have ratified the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) and agreed to work towards the SDGs will ensure that all people with intellectual disabilities who need Assistive Technology have access to high quality and affordable products.

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