



ROLE OF ASSISTIVE TECHNOLOGY IN TEACHING-LEARNING PROCESS OF THE STUDENTS WITH VISUAL IMPAIRMENT: AN INSIGHT STUDY

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Paper Received On: 25 JULY 2022

Peer Reviewed On: 31 JULY 2022

Published On: 1 AUGUST 2022

Abstract

Technology is a tool to unlock the learning and expand the horizon of the students with the disabilities. It has great potential in providing access for all learners especially the ones suffering with vision loss and is a great tool to remove the previously insurmountable barriers faced by the visually impaired students. The study aimed at investigating the role of assistive technology in teaching-learning process of the students with visual impairment. The research design employed was mixed research design. A Survey and a semi-structured interview were conducted with a noticeable percent of the students and teachers comprising of 62 students and 28 teachers of various inclusive and special schools for the visually impaired students of Amritsar district. The method of purposive sampling had been employed by the investigator and the percentage analysis and thematic analysis techniques had been used to analyse the data collected using the self-developed tools prepared by the investigator. The study found out that assistive technology facilitated the learning and teaching of the visually impaired students, encouraged independent learning as well as has enormous contribution towards curriculum coverage and served a great role in the building up of certain personality traits amongst the students. It was also explored out that in spite of playing a great role in effective teaching and learning process yet there are various barriers on its way like lack of training and aids in various schools of the district which must be eliminated by the support of national and state government authorities who should recognize the benefits of assistive technology in supporting educational independence and individualized achievement of the students with visual impairment.

Keywords: Assistive Technology, visual impairment and teaching- learning process.



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Introduction

Technology in the field of education has revolutionized the education of all students creating a space for an inclusive classroom. Used to support both teaching and learning, technology infuses classrooms with digital learning tools, such as computers and hand held devices; expands course offerings, experiences, and learning materials; supports learning 24 hours a day, 7 days a week; builds 21st century skills; increases student engagement and motivation; and accelerates learning (Krishna, n.d.; Mo, 2011; Schindler et al., 2017) . Technology has great potential in providing access for all learners, and the ability to access the general education curriculum. In schools around the world, computers, tablets, smart whiteboards and other technological devices are being used as part of the learning process. Technology is a tool to unlock the learning, expand the horizons of students with disability and act as a great equalizer (Olukotun, 2004).

According to WHO statistics, approximately 285 million people are visually impaired worldwide (WHO, 2019). India is a home to world's largest visually impaired population figuring to around 5,033,431 including 1.6 million children and 0.2% of the visually impaired population of India being residing in Punjab (NSS Report No.583: Persons with disability in India, 2018). According to Individual with disabilities Education Act, "Visual Impairment including blindness means impairment in vision that, even with correction, adversely affects a child's educational performance. The term includes both partial sight and blindness" (IEDA, 2004).

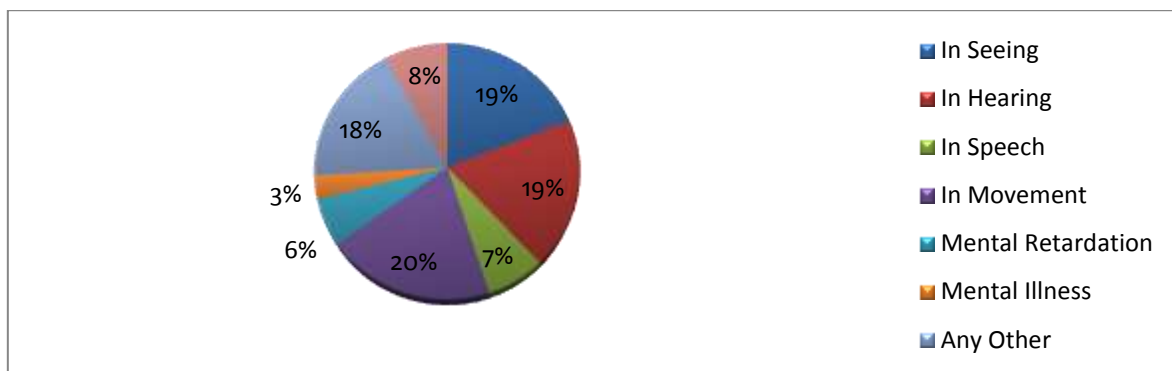


Figure: 1 (Total disability population by the type of disability in India as per census 2011)

For humans, having sensory disabilities related to vision is a challenge, especially in a classroom setting where an instructor cannot rely on common classroom tools and study materials. While these challenges are real and cumbersome, digital education and assistive technology can bridge the gap and bring a new experience of immersive training to make

their day to day education easy. Assistive technology (AT) is any item, piece of equipment, or product system that is used to augment, maintain, or enhance the functional capabilities of persons with disabilities and can be of following types like low-tech such as communication boards; high tech, prosthetics, computer hardware and software and many more (Assistive Technology Industry Association[ATIA], n.d. ; IEDA, 2004). Brief description about the assistive technology in the field of education for the visually impaired students as per various resource guides to assistive technology for the students with visual impairment is as enlisted below:

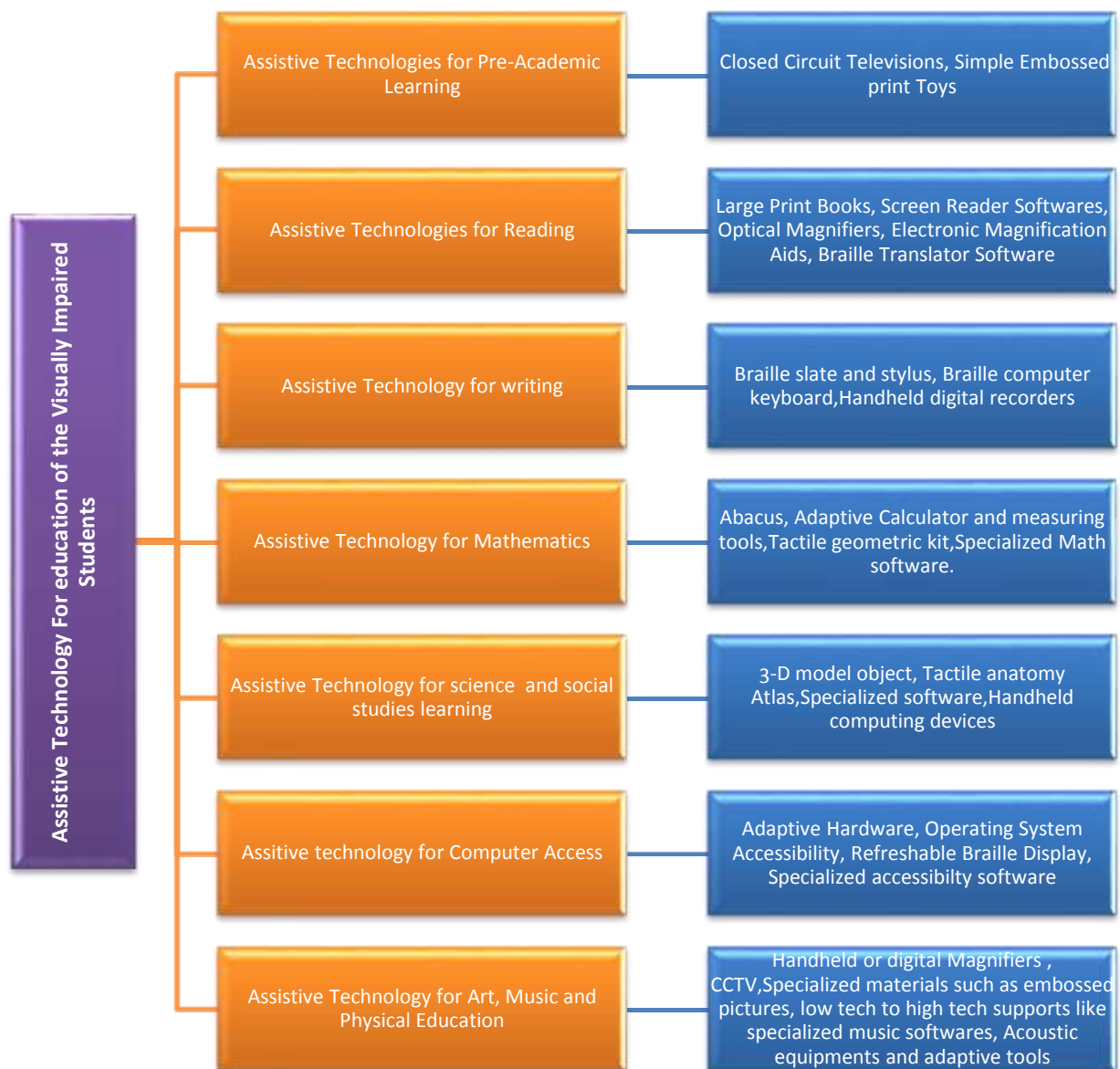


Figure: 2 (Different types of assistive technology for education of the visually impaired students)

Assistive technology is one way of supporting the students with visual impairment to fully access and participate in the curriculum, with the greatest possible level of independence. Even more important, use of assistive technology helps prepare students for independent living, vocational pursuits, or higher education. The importance of assistive technology in the teaching and learning process of the students with visual impairment is thoroughly examined in the current study by bringing about an in-depth analysis on the role it plays in providing holistic education of the students alongside revealing out different aspects and criteria taken into account while determining the teaching and learning process that visually impaired students and teachers must go through.

Review of Related Literature:

The Rights of Person with Disability Act (RPWD, 2016) mandates for the Assistive technology as one of the crucial part of visually impaired students. A study by Rhoads, Silverman and Rosenblum, (2022) brings to the forefront the relationship between the assistive technology and the education of the students with visual impairment. It emphasised on the fact that when the students don't have full skills and supports to use assistive technology there is high probability that their learning will suffer. Senjam, et.al, (2019) conducted a cross-sectional study to understand the awareness and use of assistive technology for students with visual disabilities in the blind schools of Delhi and it was being explored out that they require assistive technology to be able to interact with the teachers, students and the educational materials. Awujoola and Fadeyi, (2018) through their comprehensive study emphasised the importance of Assistive Technology devices in the university library for the teaching and learning of students with visual impairment. They also emphasised on the fact that academic achievement of students with visual impairments who chose to pursue for university education cannot be fully realized without adequate tools and professionals. In situation with limited resources, Foley and Masingila, (2015) explored the use of mobile devices as assistive technology for students with visual impairment. They looked at how using mobile devices affected visually impaired students and discovered that the gadgets gave the students access to education, the ability to engage in daily life and the chance to form a community of practice.

A substantial amount of research emphasise on the significance of the use of assistive technology in the training of students with visual impairment (Argyropoulos and Thymakis, 2014; Zou et al., 2012). Gronlund et al., (2010) and Borg (2011) supported the view that assistive technologies are the powerful tools for fostering the learning of the visually

impaired students worldwide through simplified access and retrieved information, contacting friends and sharing of information as sighted people do. Assistive technologies facilitate the access of the students with visual incompetence to reading text (Fruchterman, 2008).

The literature review has highlighted the potential of assistive technology in general and how technology can bridge the gap in quality learning among students. Assistive technology has been employed in the education sector to address the needs of students with visual impairments especially in the developed nations. There's been a little investigation on the use of assistive technology in inclusive schools and how teachers are using assistive technology to provide learning environments that are accessible to all the learners. This study breached this gap by focusing on usage of assistive technology and its role in the teaching- learning process of the students with visual impairment. The minimal study that has been conducted in our country especially in our region shows that, students with visual impairments use the old kind of technology which is slow and inefficient and depends heavily on sighted guide where one student reads while others listen. This study was however keen in establishing whether these have changed by identifying the type of assistive technology used in special schools as well as general schools for the visually impaired students at present along with the finding out the aspects of personality traits of visually impaired students being affected by assistive technology.

The study has been conducted to achieve the following research objectives:

- To identify how the assistive technology facilitate the learning and teaching of the visually impaired students in an easy way.
- To identify the various assistive technologies available for fully and partially visually challenged for an effective teaching learning process.
- To understand the extent of adoption of assistive technologies by various organizations under study for providing effective teaching and learning services to visually challenged.
- To identify and analyse the various problems while using assistive technologies for accessing information in the teaching- learning process.
- To understand the extent of the supply of Braille text-books for the visually impaired students.
- To comprehend the training needs of both visually challenged students and teachers.

Research Questions

The purpose of this study has been to investigate the following primary research questions:

- How does technology facilitate the learning and teaching of the visually impaired students?
- Which assistive technology is available for fully and partially visually challenged for an effective teaching learning process and the challenges faced while using the assistive technology?
- Which assistive technology is proved more effective in its use and implementation?
- Which assistive technology is proved out to be easily affordable?
- Which aspects of personality of visually impaired students are affected by assistive technology?

Sample Description

The method of purposive sampling has been employed by the investigator and is ideal for this study because it picks a small group with similar characteristics to describe the entire spectrum of students with visual impairment. The investigator has opted for purposive sampling because of its power to bring about in-depth analysis of central role of assistive technology for the visually impaired in the teaching and learning process. In this study, the target population was the visually impaired students and their teachers belonging from the various inclusive and special schools of the Amritsar and it comprised of the sample size of N=90(students=62; teachers=28).

Research Methodology

This study has been employing a mixed research design as the framework for collecting, processing and analysing data. Whereas the quantitative data was collected using survey design, the qualitative data used exploratory design via observational interview. Both quantitative and qualitative research methods have been applied not only because of the nature of the study but also because the generalizability of findings can be increased and more insights can be generated than when only a single approach is applied. The tools have been self-designed by the investigator and have been administered by the experts to increase the validity and credibility of the self-prepared tools. Initially, survey design have been used to collect information about individuals who use AT including age, gender, ethnicity, and types of AT in the inclusive and special schools in Amritsar. Semi structured interview have been used to describe procedures implemented in school districts to provide access to AT devices and services and to identify the impact the procedures have had on student use of AT.

Analysis and Interpretation of the Data

Demographic Information of the Respondents

The data used in this study have been drawn out from the sampled respondents of 62 learners (n=62) and 28 teachers (n=28). The demographic characteristics of the respondents have been summarized below.

Learner Respondents' details

Category of the Respondents		Frequency	Distribution (%)
Learner's Age Distribution	14 years and below	8	12.903%
	15-16	37	59.67%
	17-18	14	22.58%
	19 years and above	3	4.83%
Gender Distribution	Male	57	91.93%
	Female	5	8.06%
Learners Visual Disability Distribution	Low Vision	29	46.77%
	Totally Blind	33	53.22%

(Table 1: Learner Respondents Demographic details)

The age of the learners has been considered as an important aspect of learning process; hence its distribution among the respondents has been explored. The exploratory data analysis reveals that the majority (n=37) of the learner respondents were in the age group of 15-16 years, (n=3) of them were aged 19 years and above, (n=14) of learner respondents were 17-18 years old and the rest (n=8) of the learner respondents were 14 years and below. From the above findings, it can be deduced that the respondents are between the age group of 15-16 years. This can be attributed to late joining of school due to disability and lack of some sensory organs like senses concerned with vision. It has been also explored out that the majority of the students were from class-4 to 8 and class of a student advances with the advancement of level of education.

It has been also revealed that nearly all (n=58) of the learners suffering from visual impairment acquired them. Only (n=4) students which is negligible proportion have been born blind. This implies that most of visual impairments are acquired. On further inquiry, the findings of study show that majority (n=53) of the respondents whose sight has been lost after birth suffered the problem before the age of ten years. Only (n=7) of them said they lost their sight after ten years of age, but (n=2) of the respondents could not recall when they lost their

sight. These results can be attributed to many contributing factors to impairments after birth. These factors include diseases, nutrition or accidents.

Teacher Respondents' details

Category of the respondents		Frequency	Distribution (%)
Teacher's age distribution	21-30	7	25%
	31-40	10	35.71%
	41-50	8	28.57%
	50 years and above	3	10.71%
Gender Distribution	Male	10	35.71%
	Female	18	64.28%
Teacher's Qualifications	Diploma	10	35.71%
	Bachelors	17	60.71%
	Masters	1	3.57%
Training Distribution	Yes	8	28.57%
	No	20	71.42%
Teaching Experience distribution	Less than 1 year	2	7.1%
	1-5 years	7	25%
	More than 5 years	19	67.85%

(Table 2: Teacher respondents' demographic details)

From the above findings it can be deduced that majority of the teachers (n=35.71%) belonging from different schools of Amritsar teaching visually impaired students who responded to our study have been aged between 31-40 years. The teacher professional qualification distribution and training distribution shown in the table drawn reveals that majority (n=60.71%) of the teacher respondents who participated in the study had bachelor of education degree but are yet not adequately trained to be able to teach learners with visual impairment, a role which involves more of practical activities than theory.

Assistive Technology Engaged in the Teaching of Students with Visual Impairment

To address the objective of the study, the researcher designed a questionnaire and observational interview to collect views of the teacher and learner respondents on the assistive technology engaged in the teaching of students with visual impairment at different schools of Amritsar.

The items in the questionnaire and interview have been related to the facts/perceptions on assistive technology used in teaching and learning among students with visual impairments.

Both teachers and students respondents have been presented with statements or items on the use of assistive technology for the visually impaired school learners. The respondents have been asked to tick mark each statement based on their perception on the statement in regard to teaching and learning of visually impaired students. The researcher computed the below findings:

S. No.	Assistive technology engaged to facilitate teaching learning process of the VI students: emerged themes	Frequency
1.	Smartphones with speaking and recording software used for content dissemination	96.77%
2.	JAWS(Screen reader) used for seeing screen content	95.16%
3.	Braille tools & slate and stylus	93.54%
4.	Classroom equipped with Hardware like smart boards and software enriched listening labs for audio content based education system	17.77%

(Table 3: Assistive technology engaged to facilitate teaching learning process of the VI students)

Use of Assistive Technology

The study found that a number of assistive technologies have been used upto some extent during the teaching learning process in various special and inclusive schools of Amritsar. All the teacher respondents confirmed that the school had a computer laboratory. An overwhelming majority (n=19) of the teacher respondents believed that the technologies have been well-adapted to fit the needs of the visually impaired learners.

Items Used in Writing and Reading

To investigate the items used in writing and reading by the visually impaired learners, the responses of the learner respondents was computed and it was revealed by learners (n=62) in the process of learning, that smartphones with speaking and recording software, screen reader especially JAWS, braille machines and slate and stylus have been most frequently used. It was revealed out through the interview that audio format materials were preferred over braille reading materials by more than half of the students due to ease of understanding and playback. Given the fact that braille machine is a primary medium of reading and writing for people who are blind or have low vision, some students argued that they can access information more quickly and perform tasks that involve reading or writing more efficiently using braille than by listening to a personal reader or using alternative technologies such as

audio recordings, talking computer, or other electronic devices. Some student respondents also observed that experienced users of braille are often able to read or take notes in braille much more quickly than the use of other methods. In addition, an interview with learners indicated that a significant proportion of the student respondents who preferred the use of braille as a teaching and learning aid said that braille makes it possible for blind people to read and take notes independently, and at the same time increases the amount of written material that is accessible to them. On the same note, majority proportion of the learner respondents who recommended use of computers in education argued that computers when fitted with JAWS, optical character readers, speech output, refreshable braille screen displays, and braille printers allow visually impaired learners to participate in computer exercises and on-line research for effective teaching services to the visually impaired students. In addition, web pages used in various courses of some schools are designed so that they are accessible to those using braille and speech readers promote computer research among the visually impaired learners at individual levels without assistance. Use of slate and stylus has been also recommended by sizeable proportion of the learner respondents. This can be attributed to the fact the slate and stylus are exceedingly flexible and can be used under many circumstances because they're very portable and there is also no maintenance on them and the slates are very durable. Instructional media like talking calculators; 3D objects have been incorporated to facilitate student's achievement of instructional objectives. They also include classes equipped with hardware like smart boards, television, tape recorders, video tapes and recorders and projectors and, software enriched listening labs. However, this study shows that for the visually impaired learners, their instructional media differ depending on the nature of the eye disability.

The Kind of Assistive Technology available and effectively used in Schools

The findings of the study show that the most frequently used assistive technology is the Smartphones with speaking and recording software used for content dissemination along with the screen reader –JAWS (Job Access with Speech) which have been the most popular assistive technology used in teaching / learning process in School for the VI students. (N=59) of the students who participated in the study through interview confirmed that JAWS programme and smartphones enriched software available in the school but in limited amount and were frequently used in special and Inclusive Schools of Amritsar for effective teaching and learning of the VI students.

Criteria Used to Select the Best Assistive technology that Suit Student’s Individual Needs

S. No.	Criteria used to select the best assistive technology for effective teaching learning process : emerged themes	Frequency
1.	Functional vision of the student	100%
2.	Easy operational Assistive technologies	82.14%
3.	Age of Onset of the impairment of the individual	53.57%
4.	Objectives of the lesson to be taught	17.85%
5.	Experience of the learner to use assistive technology	7.14%

(Table 4: Criteria used to select the best assistive technology for effective teaching learning process)

To examine the criteria used to select the best assistive technology that suits the individual needs of students with visual impairment at different schools in Amritsar it has been revealed out on being asked from the teachers (n=28) that the selection of appropriate assistive technology that suits individual needs of learners with visual impairments is based on various criteria. The findings demonstrate that functional vision of the learners was chosen by all (n=100%) of the teacher respondents as a priority factor. Another very important factor considered when selecting the assistive technology, was the availability of easy operational instructional assistive materials supported by (n=82.14%) of the teachers. In addition,(n=25%) teacher respondents also felt that age of onset of the impairment of an individual learner was a very important consideration to be made when selecting suitable assistive technology to be used for the purposes of advancing educational pursuit of a visually impaired learner. It has been interpreted that due to lack of standardized functional vision assessment the professionals have used self-developed techniques for direct and indirect observation and also as in assessments of the visual acuity and visual field use of age and ability appropriate assessment procedures can improve the validity of the results which can help to select the best assistive technology for effective teaching learning process.

Tasks performed by the learners while using assistive technology:

Through the interview of the learners it has been found out that learners were able to do varied educational activities and tasks independently. While being in the computer

laboratory, the majority of the learner respondents (n=61.29%) were able to work on Microsoft office suite and can access information on World Wide Web using JAWS. It has been also revealed out that through various speech recognition devices and instructional Medias the students are able to do their academic subjects independently such as submitting their assignments and class works in audio format. The results above indicate that assistive technology can move a long way in making students with visual impairment more independent and enjoy life like any other student in regular school.

Challenges Faced by Teachers and students

The research question attempts to identify the challenges to the use of assistive technologies in the schools of visually impaired students. In this regard the question has been asked and the data collected reveals out the major emerged themes described below:

S. No.	Challenges faced on using assistive technology: emerged themes	Frequency (%)
1.	Lack of care and maintenance of assistive technology devices	89.28%
2.	Lack of adequate knowledge and skills	
3.	Limited ICT infrastructure	75%
4.	High cost associated to assistive technology tools	64.28% 57.14%
5.	Challenge to select appropriate assistive technology according to the goals and needs of the learners	32.1%

(Table 5: Challenges faced on using assistive technology)

The findings of the study reveal that lack of adequate resources is a great obstacle towards acquisition and provision of assistive technology. Many schools in Amritsar providing education to the Visually Impaired have assistive technologies which are not available in quantities desirable for the visually impaired students. It was also revealed out that lack of appropriate and adequate knowledge and skills in software devices causes a great challenge to teachers in acquisition and use of Assistive Technology. An ample amount of the teacher respondents (n=75%) held the view that most teachers do not have adequate knowledge and skills to use the relevant visually impaired programmes or teach the learners. The implication

of this is that effective use of AT as tools or equipment of curriculum delivery in terms of teaching and learning is interfered.

Another major challenge faced by teachers, as established by this study, is that care and maintenance of the equipment and software which is essential is always inappropriate or insufficient. These equipments are delicate and require good care and regular servicing by trained personnel, which again could not be employed by most of the schools due to insufficient resources. Along with that limited ICT infrastructure and high cost associated to some of the assistive technology devices is also the key challenge faced to facilitate effective teaching learning process with the inclusion of assistive technology devices.

The study findings show that another challenge faced by visually impaired teachers is difficulty in correctly identifying the specific needs of visually impaired learners. No single solution for access to technology is appropriate for every student with a visual impairment. Even students with the same visual loss may require instruction in different types of assistive technology based upon their unique needs. In particular, students with visual impairments may require assistive technology which may focus upon speech access, braille access, print access, or any combination of these access modes which is a challenging aspect for the students as they may suffer challenges to use appropriate Assistive technology for effective learning.

Reflections from the interview of visually impaired learners

It has been explored out that assistive technology has a great role in the building up of certain personality traits amongst the students. On being provided up with sufficient training from their teachers they are able to do independent academic activities. It had motivated them to access computers, open up socially with other regular students. During the interview one of the respondent stated that *assistive technology with verbal description of the visual elements displayed on the screen enables them to automatically hear the description of all the visual elements providing them an opportunity for better socialization and knowledge building.* Assistive Technology has enabled personal learning and self –learning for students with visual impairment and has enabled them to submit their assignment and class works much more independently. Most of the students reinforced the view that they *aimed to opt for various vocations and fields in the future which were once confined to only normal people but because of their gain in confidence in using the assistive technology they feel that it has widen up their scope of opting career choices in nearby future.* A student named **Aashish** stated that he aspires to become an officer. Assistive technology has proved to be a great

boon for the students like Aashish as he has been able to operate the Microsoft office tool through assistive technology very efficiently.



Figure: 3 (A glimpse of the visually impaired child named Aashish operating the Microsoft office suite through the aid of assistive technology).

Impact of Assistive Technology on the holistic Education of Students with Visual Impairment

To investigate this impact, the researcher has developed a questionnaire designed to determine the impact of assistive technology in the education of the visually impaired learner. In exploring the impact of assistive technology constructs, items have been drawn relating to concepts which are important components of the impacts of assistive technology measurements. They are Likert-scaled item type questions, in which teacher respondents choose from 4-point score; strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD). Their responses were summarized as in Table given below

Items	Distribution (%)
Through Assistive Technology, the Visually Impaired students are able to gather information in the curriculum independently?	46.42% (Strongly Agreed) 42.85%(Agreed) 10.71% (Disagree)
The use of Assistive technology has increased Visually impaired students confidence and self-esteem and has helped in making them self-reliant	96.42%(Strongly agreed) 3.57%(Agreed)
AT use is enabling the students with VI to enjoy and exercise human rights on equal basis with other individuals	53.57% (Strongly Agreed) 46.42%(Agreed)
There is high level interaction between the learning material, learners themselves and the teachers through assistance of assistive technology in expanding possibilities in practical subjects	64.28% (Agreed) 25% (Strongly Agreed) 10.71% (Disagree)
There is high selection of practical subjects by VI students in higher classes through the use of AT	60.71% (Agreed) 39.28% (Strongly agreed)

(Table 6: Impact of Assistive Technology on the holistic education of students with visual impairment)

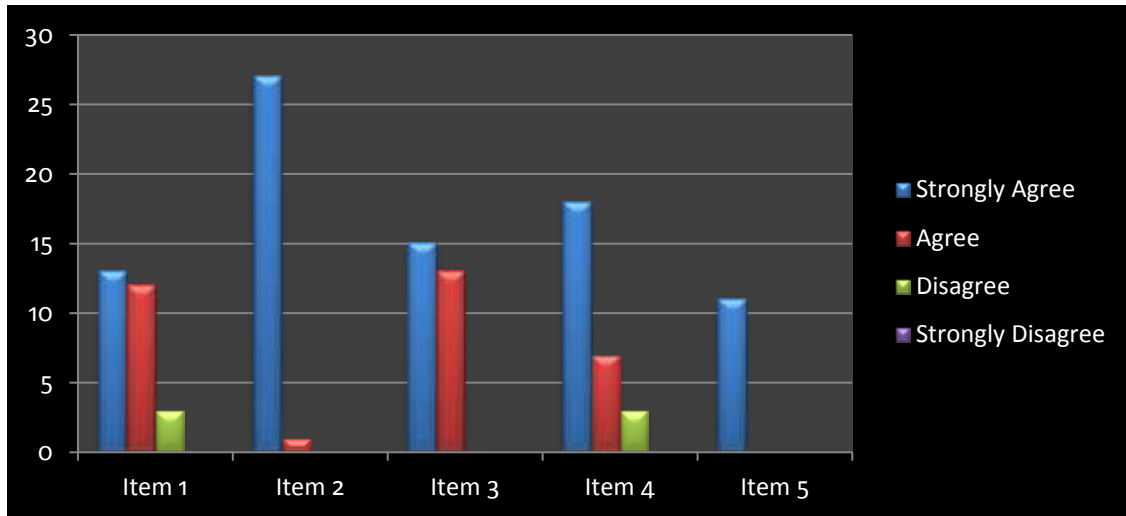


Figure: 4 (Graphical interpretations of the questions asked about the Impact of Assistive Technology on the holistic Education of Students with Visual Impairment)

The findings of the study show that a large majority of the teacher respondents strongly held the opinion that through the use of assistive technology students are able to gather information in the curriculum independently. It emerged from the finding of the study that the use of assistive technology has great contribution to the curriculum coverage and completion; hence, it positively influences the educational achievement of students with visual impairment. Nearly 96.42% of the respondents strongly agreed with the statement that AT has helped in to inculcate confidence and self -esteem amongst the VI students thus it has helped to acquire different personality traits. 53.57% of the respondents strongly agreed that AT use had enabled the students with Visual impairment to enjoy and exercise human rights on equal basis with other individuals. 64.28% generally agreed that there is high level interaction between the learning material, learners themselves and the teacher through the assistance of assistive technology. This, they added, helps in expanding possibilities of quality performance in practical subjects using computers. Only 10.71% of the respondents negated the statement. The findings of the study also showed that, assistive technology motivates students with visual impairment to select practical subjects and perform them well. This is illustrated in the table above where majority of the respondents i.e. 60.71% indicated that assistive technology motivates students to select practical subjects and perform well in them. It has been interpreted that in order to make Visual Impaired students self-reliant they should have access to the instructions, assignments, self-learning and various e-resources.

One of the various ways to support them is providing all the assistive technologies to improve their performance in educational endeavour.

Findings and Discussion

The findings reveal out that the assistive technology can reduce student's dependence on others to read, write and access to the internet and operate various applications of Microsoft office suit on their own which is in tune with the results of Siu & Presley (2020). The findings of the study show that the most frequently used assistive technology is the Smartphones with speaking and recording software used for content dissemination (96.77%) along with the screen reader –JAWS (Job Access with Speech) which have been the most popular assistive technology used in teaching-learning process in the Schools for the Visually impaired students. The findings of the study reveals out that assistive technology can improve the reading and writing skills for students with visual impairment and increase their ability to communicate equally with others which is in tune with the result of Alves et al.,(2009). According to the students and teachers involved in the study, the technology provides a better alternative way of students accessing information and knowledge independently, easily, quickly and frequently without bothering any other person as it has been the case in the past. It further emerged that the use of assistive technology has enormous contribution toward curriculum coverage. Smart phones and tablets enriched with screen reading software like that used in computers allows the students to use these devices independently because they serve many of the purposes for which standalone devices and software were previously developed because of the differently available apps. Hence smartphones were proved more effective in its use and implementation and they are also proved out to be affordable in comparison to the other assistive technological devices present out for the visually impaired students. It has been explored out through the observational interview with the students that audio format materials were preferred over braille reading materials by more than half of the students due to ease of understanding and playback. It has been also explored out qualitatively that assistive technology has a great role in the building up of certain positive personality traits amongst the students. On being provided up with sufficient training from their teachers they are able to do independent academic activities. It had motivated them to access computers, open up socially with other regular students. Most of the students also aimed to opt for various vocations and fields in the future which were once confined to only normal people but because of their gain in confidence in using the assistive technology they feel that it has widen up their scope of opting career choices in nearby future.

It was also revealed out that lack of care and maintenance of assistive technologies along with appropriate and adequate knowledge and skills in software devices causes a great challenge to teachers in acquisition and use of Assistive Technology. Majority of the teacher respondents (n=75%) held the view that most teachers did not have adequate knowledge and skills to use the relevant visually impaired programmes or teach the learners and hence acknowledged to build their skillsets which is in tune with the study of Ajuwon.et.al (2016).

Implications and Conclusion

The urge for the global community to go digital and introduction of technology in many facets of life has made technology crucial in our time and more urgent to students with visual impairment who risk being left. In this aspect various barriers in its ways of incorporating it in each and every classroom of the visually impaired students must be tried to be removed. Various stakeholders along with teachers and parents must encourage the use of modern assistive technology as an aid in the teaching and learning process of the visually impaired students. The National and state government should recognize the benefits of assistive technology in supporting educational independence and individualized achievement for students with visual impairment and must provide aids and financial support to the institutions being run for the welfare of the Visually Impaired Students. Training should be provided for the students, teachers as well as parents to be competent with the assistive technology in order to make the students have a positive environment embracing assistive technology to excel in his academics as well as for holistic development of the child. Special Attention should be made out in training of the special educators as well as general educators during their pre-service education in order to make them efficient enough to use and understand the assistive technology for the visually impaired children. Professionals may be able to decrease the likelihood of assistive technology abandonment by making efforts during assessment, selection and phases of teaching and supporting assistive technology use. The complementarity of assistive technology selected for a student can be improved by including professionals from multiple disciplines. The stakeholders should encourage the staff to find out free or low cost educational solutions to help the students meet their curricular expectations rather than relying on other authorities. Assistive technology usage must be encouraged for which professionals, parents and other caregivers should use evidence based methods to teach and support skills for assistive technology use and include goals and objectives for assistive technology use in the students' IEP's to support inclusive learning environment.

Assistive Technology facilitate the learning of school subjects and digital proficiency as well as basic skills needed for the meaningful living among the students with visual impairment which have been figured out in our present study. It can be a great source for Punjab's education system driving towards inclusion and contribute significantly to education for all. To conclude, assistive technology has helped the students to develop the strategies to improve their functioning and minimize the impact of environmental barriers to their participation in everyday life activities and can be a great contributing factor in the development of the society and hence must be an integral part in the teaching and learning process in the educational institutions for the visually impaired students..

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