

Received: 08 January 2024, Accepted: 15 February 2024

DOI: 10.53555/ks.v12i1.3817

## Use of Artificial Intelligence and its Barriers Faced by Students with Visual Impairment

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### ABSTRACT

The study determined the use of artificial intelligence and its barriers faced by the students with visual impairment. The survey design was used to collect the facts of the study based descriptive methodology. All the students of universities/colleges/schools (ordinary/special education) of district Faisalabad were comprised of the population of the study. A sample of 50 students with visual impairment was selected for the study using convenient sampling technique. A structured questionnaire containing demography of respondents, nature of use of artificial intelligence apps/tools and barriers faced by the students with visual impairment. Researcher personally visited the schools/college and universities and collected the data by hand. It was inferred that a great number of students with visual impairment were always using the ChatGPT, Voice Activated Personal Assistant (VAPA), Text-to-Speech Engine Program and JAWS respectively. Less than half of the students with visual impairment were in little use of SeeingAI and Deep Learning technology. Majority of the students with visual impairment were never using the Ultrasonic Censor Cane, Finger Reader, AI-Glass technology and Orcam technology respectively. The major barrier faced by the students with visual impairment in use of artificial intelligence was the slow internet services in the country. Moreover, high cost of artificial intelligence and reluctant to innovation were also considered a moderate level of barriers in the use of artificial intelligence. The study was effective in supporting the quality use of artificial intelligence and highlighting its barriers to be eliminated.

**Keywords:** Artificial Intelligence, Barriers, Usage, Visual Impairment

### INTRODUCTION

Artificial intelligence (AI) technology has advanced quickly in recent years and is utilized in a wide range of applications, including banking, email management, and surgery, the majority of the enjoyable aspects of the Internet are inaccessible to individuals with visual impairment. A study determined how AI technology may assist those who are visually impaired. For the blind and visually challenged, a request is made. For instance, a unique software placed on your mobile phone will alert you by voice when a message comes (reading the sender's name, reading the content, and responding if required). When a visually impaired individual wishes to reply to a message, this application utilizes a specially designed Python algorithm to read text, convert speech to written text, and convert written text to voice. After then, a text message containing the response is sent. Programs for those who are visually impaired should use the program which facilitates the everyday lives of people with visual impairments by making mobile phones more comfortable and easier to use (Al-Otaibi & Almurayziq, 2024).

Depending on their illness and the way their sight is impacted, children with visual loss may have varying degrees of vision. There are several types of visual impairments (VI), including the following: blindness, poor eyesight, or limited sight. Some kids might have peripheral vision issues (they might see things as though they are looking through a tube), some might have central vision issues, some might see things blurry, some might see things close to them but have poor distance vision, and some might have enough vision to read but struggle with other things. In Ireland, very few kids are totally blind. Some children develop a visual impairment after birth, while others are born with sight loss. An injury or a childhood illness like measles or meningitis might be the cause of this (National Council of Special Education, 2024).

Based on the visual limitations, students with visual impairments have difficulties when attempting to investigate their surroundings. For visually impaired persons, the physical inaccessibility of academic institutions, rigid evaluation methods, and reliance on others to complete assignments are stressors related to their education. The lived experiences of visually impaired secondary school pupils utilizing Intelligent Virtual Assistants (IVAs) were investigated in one research. For data collecting, a phenomenological interpretative technique was suggested. Using a semi-structured guide, 15 individuals were chosen for in-

depth interviews for this purpose. Every interview was videotaped and then transcribed. Themes were identified and coding was done. The results of the data analysis showed that visually impaired students make use of a variety of IVA elements in both their everyday lives and their schooling. Their academics and daily lives have benefited from the increased accessibility, mobility, independence, motivation, confidence, autonomy, and social integration that comes with using IVAs. It is advised that educational institutions for individuals with special needs promote the use of technology. To educate students with exceptional needs, educational institutions can fully utilize technology (Hussain & Nabeel, 2023).

Research investigated the use of artificial intelligence (AI) in education to provide visually impaired students with virtual support. The investigation's main goals are to describe the difficulties and problems faced by visually impaired students, emphasize the use of AI virtual help, highlight the students' flexibility, and improve the curriculum. Using semi-structured interviews and Braun and Clarke's (2008) data analysis approach, this study employed a qualitative case study research design to offer a detailed examination of a case study involving five visually impaired learners. Five themes emerged from the findings: 1) obstacles to learning, 2) the value of AI virtual assistants, 3) using technology to become competent, and 4) inclusive teaching and learning environments. According to the findings, the epidemic has caused difficulties for visually impaired students in the classroom, including personal hardships, a lack of resources, and adjusting to new teaching methods. But thanks to AI virtual guidance, they were able to realize their full potential and complete academic assignments that are typically challenging for them because of their visual handicap. Researchers advise secondary schools to enhance their instruction and learning for visually impaired pupils (Mina et al., 2023).

The study investigated a number of topics pertaining to college instructors with visual impairments' use of assistive technologies and AI-based solutions for instructional and scholarly objectives. According to previous scholarly research, these technologies have improved and enhanced the lives of those with disabilities, especially those who are visually impaired, but they have also presented a number of difficulties and restrictions. A study looked at the problems that college teachers with visual impairments faced in real time when utilizing these technologies and suggested solutions for potential future developments. The study attempts to address broader issues of accessibility, inclusiveness, and consideration of local context for such technologies, with the goal of improving the agency of such users. It goes beyond simply outlining, evaluating, and theorizing the advantages and limitations of assistive technologies (AT) and AI-based solutions for college instructors with visual impairments. A qualitative study has been conducted in order to investigate the experiences, worries, and recommendations pertaining to the research problem. The influence of these technologies was examined using a semi-structured interview. The subject is at the nexus of disability studies and technology advancements. In addition to highlighting several problems with the use of AT and AI-based solutions for college instructors with visual impairments, the study offers some insightful recommendations that may have future ramifications for both researchers and the companies that supply these solutions. The main point it makes is that in order for such technical solutions to help everyone as much as possible, they must be inclusive of all groups, including those who are visually impaired. Above all, this study makes an effort to provide users of these technology solutions some degree of agency (Sharma, 2021).

People who are blind or have limited vision have a difficult time accessing virtual reality (VR) activities. People with visual impairments frequently cannot use VR technology since it primarily depends on visual elements. Due of its visual character, virtual reality poses challenges for people who are totally blind. Small print, low contrast, and intricate images are difficult for those with limited vision to understand. Accessibility is further complicated by head-mounted displays, which limit peripheral vision and present challenges for people who have central visual field loss. Additionally, utilizing these VR headsets may be hampered by the use of corrective glasses, which are prevalent for those with myopia. Making virtual reality inclusive, especially for those with visual impairments, has been the focus of recent developments. As artificial intelligence (AI) technology advances quickly, it is now feasible to incorporate AI into virtual reality (VR) systems to improve accessibility for those with visual impairments. There is a dearth of thorough research on AI's contribution to allowing blind and low vision people to enjoy virtual reality, despite increased interest in the topic (Liu et al., 2024).

## REVIEW OF RELATED LITERATURE

According to Edwards et al. (2019), artificial intelligence (AI) refers to computer systems that are able to carry out sophisticated activities like thinking, decision-making, and problem-solving that were previously limited to humans. Professionals use the phrase "visual impairment" to refer to any type of vision loss, including partial vision loss and blindness. While many individuals suffer from what is known as legal blindness, some persons are totally blind (Salvin, 2016).

Reduced visual performance that cannot be corrected by surgery, medical procedures, or refractive correction (contact lenses or glasses) is known as visual impairment (VI) (DeCarlo et al., 2006). According to Kavitha et al. (2015), it causes functional limitations of the visual system, which can include irreversible vision loss, a narrowed visual field, a decreased sensitivity to contrast, heightened sensitivity to glare, and a diminished capacity to carry out everyday tasks like writing or reading. Corn and Lusk (2010) confirm that even with refractive correction, people with VI have detectable vision but struggle to complete visual activities. Additionally, with compensatory low vision devices and/or contextual modifications, these people can occasionally improve their ability to do visual activities. Since changes in functional vision may not necessarily correspond to quantifiable changes in clinical findings, and since people with VI may not always exhibit predicted clinical changes in visual function, this explanation of VI is helpful (Corn & Lusk, 2010).

People have been concerned about blind people since the beginning of time and have attempted to assist them in a variety of ways, which laid the groundwork for assistive technology and solutions. We are moving toward the time when artificial intelligence (AI) and machine learning (ML) tools will be used as personal assistants. These tools will be able to read text, identify objects, environments, and people, comprehend situations, and provide complex real-time assistance. Examples of these tools include white canes, guide dogs, the Braille alphabet, and mobile apps that give access to digital information in a

recognizable format (Walle et al., 2022; de-Freitas et al., 2022). According to this viewpoint, it is crucial to make sure that technological advancements satisfy the requirements and well-being of everyone in society, including those who are severely visually impaired, in a world that is becoming more and more reliant on innovation and technology.

Simultaneously, a lot of gadgets made to help VIPs may be linked to a smartphone to be controlled, or even the other way around to operate the phone, like certain smart canes that combine touchpads and keypad. WeWalk Smart Cane is one such example (WeWalk Smart Cane, 2024). The gadget may be linked to a smartphone to provide detailed navigation directions and accurate position recognition. For those who are blind or visually challenged, Seeing AI is an excellent resource. Every participant in my survey expressed that they enjoy this app and value the work that Microsoft staff members have put into it. They acknowledge that it's challenging to become proficient with every feature of the program, but they also think recognizing that AI has merit and that mastery is worthwhile (Dost, 2021). Text-to-speech (TTS) technology improves accessibility, learning, and productivity by translating text into voice that sounds natural. TTS has changed dramatically from early rule-based systems to AI-powered neural networks. Emotional and singing TTS are examples of future advancements (Ramesh, 2025).

A free screen reader program called NVDA (NonVisual Desktop Access) assists children with special needs who are visually impaired in using computers. There are variations between these two apps in terms of settings, operations, rates, features, languages utilized, and other aspects (Ersanty et al., 2020). By contacting a live agent, a subscription-based service via the Aira app (Aira Tech Corporation, 2025) offers help with object detection and navigation. Through a smartphone audio/video link, Aira assistants may interact with the user and give directions. For visually impaired or partly sighted individuals, OrCam MyEye 3 Pro (OrCam MyEye 3 Pro, 2025) is a portable device that can assist the VIP in moving around in dynamic or strange environments (such as workplaces, buildings, or busy areas). Optelec ClearReader+ (Optelec ClearReader+, 2025) is a system that uses optical character recognition (OCR) to scan printed text and transform it into a readable format. The application's ability to summon Be My Eyes (Be My Eyes, 2025), which pairs a sighted volunteer with a blind user, is another intriguing feature. On iOS and Android devices, this is another free software that may function on its own.

The literature suggests a number of methods and approaches that use Raspberry Pi, microcontrollers, and sensors in conjunction with other software programs, such as MATLAB and Python, to create reading aids for the blind and visually handicapped. Numerous methods in the literature use the idea of OCR to capture images and text-to-speech synthesis to convert them into vocal signals. In their research, Rosebrock (2018) suggested using OCR with the Tesseract toolkit and OpenCV for text detection in order to create an assisted reading system for those with visual impairments. In their study work, they suggested a text-to-speech module for conversion into voice signals (Kumari & Sangeetha, 2015). In their research work, they suggested a system that makes use of two modules: one for image processing and the other for audio processing. Additionally, he has used Tesseract in the speech synthesizer and image processing module. This suggested methodology's primary drawback was that it only recognized font sizes up to 18 (Subbiah et al., 2016).

"Smart" glasses, which can extract and interpret text from an image and turn it into voice, are an example of a technology that uses computer vision to help persons with visual impairments. This helps pupils who are blind or visually handicapped "read" pictures. OpenCV software, Tesseract, Efficient and Accurate Scene Text Detector (EAST), and Deep Learning-based Visual Character Recognition (OCR) technologies are used to recognize text. Google's Text to Speech software is used to further process the identified text and turn it into an audio signal that the user may listen to (AlSaid et al., 2019). An experimental system that transforms pictures into sounds in order to acoustically portray them was introduced in prior years. It was a step toward creating a system to replace blind people's vision (Meijer, 1992).

TapTapSee is another common application that recognizes surroundings and items including animals, colors, plants, and text using AI algorithms. Users may identify items by using their mobile phone's camera to take a picture or record a video. The Voice-Over reader then delivers information in the form of voice messages in a matter of seconds among the benefits of TapTapSee include its simple layout and lack of advertisements, which don't affect users' ability to utilize the app. A further benefit is its extremely precise computations. Its need on phone accessibility settings, such as VoiceOver for Apple mobile users or TalkBack for Android users, to get audio information is one issue, though. Users who require haptic or auditory feedback to comprehend their activities on a smartphone may become confused if they are unable to quickly traverse the phone settings to adjust the accessibility settings because they do not have phones with these settings (Awad, 2018).

Sensory substitution systems that translate visuals into sound were covered by Proulx (2010). In a different study (Banf & Blanz, 2019), 13 blind individuals were fitted with a device that translated pictures into sound. They were able to find visual stimuli (LEDs and objects) and then use sound to determine the location of items. Additionally, there are a number of assistive programs that enable those who are visually impaired identify items by using the sound and cameras on mobile phones. For instance, VisualPal is a smartphone application designed for those with vision impairments. It makes use of Euclidean distance measurements in conjunction with artificial neural network technology. This technique enables VisualPal to categorize video frames into distinct groups according to prior frames and identify the direction of the image's primary colors and maximum brightness. VisualPal's usefulness is enhanced by this artificial intelligence program, which enables object recognition and answer generation based on stored data (Bagwan & Sankpal, 2015).

Lack of appropriate assisting tools, negative effects of technology on the learning process, no provision for supporting individual learning styles, lack of options to simplify concepts to meet the special needs of the students, lack of braille versioned online instructions, poor internet access, problems with assistive technology compatibility with learning platforms, etc. are some of the challenges faced by visually impaired students in higher education systems or in school when learning online (Khalid & Malik, 2021).

In addition to these technological difficulties, teachers who demand visually impaired pupils to achieve better and quicker without taking into account their limited or nonexistent vision can cause them to struggle with attitude. The visually challenged pupils could not see what was displayed on the screen in the online classes. Due to the fact that these students with disabilities

had little to no additional time, the virtual test evaluation also negatively impacted their performance (Khalid & Malik, 2021). When learning digitally, the visually challenged pupils also struggle to read the instructor's handwriting. Although they have certain inaccessibility problems, online and mobile-based technologies have been created to help them technically overcome these obstacles. Since the accessibility features of iPhones and iPads are easier for the blind to operate, the majority of apps are compatible with iOS. However, the cost of iOS-enabled smartphones is prohibitive, making them unaffordable for those from lower socioeconomic classes. So that everyone may utilize the assistive aids regardless of their financial situation, more accessible Android applications should be created.

According to another study (Kori & Mulla, 2022), the majority of persons with visual impairments were reliant on library facilities and needed assistance from library professionals in order to access and use library resources for their academic requirements. However, the majority of academic libraries lack the necessary technology, qualified library staff, and a format for information resources that would effectively assist those who are visually impaired. As a result, there was a significant disconnect between making material accessible to those with visual impairments and making it available in the public realm. To help VIPs access and utilize library materials effectively, this research recommended that current academic library facilities be updated with the newest assistive technology (Dhara, 2015).

### **Statement of the Problem**

Artificial intelligence contains the use of various technologies in improving the status of mankind. Artificial intelligence technologies enhance the learning experience and academic success of students with visual impairment in higher education settings. Students with visual impairment had to deal with various issues in effective use artificial intelligence. Therefore, researcher aimed to explore the use of artificial intelligence and its barriers faced by the students with visual impairment.

### **Objectives of the study**

Following were the objectives of the study:

1. To pinpoint the nature of artificial intelligence used by the students with visual impairment.
2. To ascertain the barriers faced by the students with visual impairment while using the artificial intelligence for educational purposes.

### **Research Questions**

Following were the research questions:

1. What is the nature of artificial intelligence used by the students with visual impairment?
2. What kind of barriers faced by the students with visual impairment while using the artificial intelligence for educational purposes?

### **Significance of the study**

The study will help to create awareness among the students with visual impairment about the usage and barriers of artificial intelligence faced by the students with visual impairment. AI will help to promote inclusivity and equal opportunities in higher education for the students with visual impairment. AI also is revolutionizing educational support through artificial intelligence technologies and improving independence of visually impaired students. The study will help to understand the various kinds of barriers being faced by the students with visual impairment in the use of artificial intelligence which will further be given special consideration to be addressed. The study will help the educational administration of special education to realize the importance of artificial intelligence in supporting and bringing ease in the lives of students with visual impairment.

## **RESEARCH METHODOLOGY**

This chapter deals with the procedure of study and methodology adopted by researcher for the collection of data. This methodology deals with the current study that is described in the following.

### **Nature of Study**

The research was descriptive in nature. Descriptive research aims to accurately and systematically describe a population, situation or phenomenon. It can answer *what*, *where*, *when*, and *how* questions, but not *why* questions. A descriptive research design can use a wide variety of research methods to investigate one or more variables. Unlike in experimental research, the researcher does not control or manipulate any of the variables, but only observes and measures (McCombes, 2019).

### **Research Design**

The survey design was used to collect the facts of the study regarding use of artificial intelligence and its barriers faced by the students with visual impairment.

### Population and Sampling

All the students of universities/colleges/schools (ordinary/special education) of district Faisalabad were comprised of the population of the study. A population is the entire group that you want to draw conclusions about it. In research, a population doesn't always refer to people. It can mean a group containing elements of anything you want to study (Bhandari, 2023).

Sampling is choosing a smaller group from the population to conduct the research. When sampling, the researcher must follow certain methods to ensure that the sample study serves the purpose of the research (Nuzha, 2023). A sample of 50 students with visual impairment was selected for the study from following institutes of district Faisalabad.

1. University of Education Lahore, Faisalabad campus.
2. Govt. College University Faisalabad.
3. Govt. Special Education College Madina town Faisalabad.
4. Al-Faisal Markaz Nabina Faisalabad.
5. Al-Bashir School for Blind, Faisalabad.

### Sampling Technique

The sampling technique, or the sampling method, is a statistical approach used for selecting a representative sample from a population. It involves rigorous analysis of the data gathered about population and selecting an appropriate sample on the basis of data (Gulzar, 2022).

Convenient sampling technique was used by researcher to select a group of individuals from a large population based on ease of the researcher and availability of the less number of the individuals with visual impairment in given stipulated time for the study.

### Tool of Research

A structured questionnaire for the students was designed for the collection of data for study. All the questions of the questionnaire were close ended. The questionnaire contained following detail: The demographic information of the questionnaire contained the information of respondents regarding their type of gender, type of disability (blind/low vision), class of the student, type of educational institute and sector of the educational institution, as well the name of the educational institute.

The respondents of the study were asked about the use of various artificial tools such as Optical Character Recognition (OCR), Voice Activated Personal Assistant (VAPA), Applied Deep Learning (ADL), Seeing-AI, AI-Glass Technology, Finger Reader, Ultrasonic Censor Cane, OrCam, Low Vision Apps (TapTapSee, BeMyEyes, Supercensors etc.), Chat GPT, Text-to-Speech Engine program, BeMyAI, and JAWS 2024-Beta. The section of barriers faced by the students with visual impairment in use of artificial intelligence tools contained 10 questions. It comprised of questions such as lack of awareness about artificial intelligence, language barrier, low confidence and high cost.

### Validity and reliability

The validity of the questionnaire was obtained through valuable guidance of the researcher supervisor including the review literature of the study. All the statements of the questionnaire were aligned with the objectives of the study. Chronbach alpha statistics were applied through SPSS software to assess the reliability of the questionnaire. The reliability index of the questionnaire was  $r=0.64$  which indicated that questionnaire was reliable and suitable for the study use.

### Collection of Data

Researcher obtained the requisite copies of the questionnaire according to the sample of the research. Researcher visited the selected educational institutes and approached the students with visual impairment personally for the data collection. Researcher informed the students about the purpose and nature of the study and filling procedure of the questionnaire. While filling questionnaire, researcher also elaborated different questions in detail. The completed questionnaires were kept in record for further processing.

### Data Analysis

Data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data and various analytic procedures "provide a way of drawing inductive inferences from data and distinguishing the signal (the phenomenon of interest) from the noise (statistical fluctuations) present in the data (Shamoo & Resnik, 2009).

The collected data organized in a proper way to get further instructions regarding the data analysis. After having proper meeting with other research experts, researchers designed the data in tabular form and analyzed in terms of frequency and percentage, mean and standard deviation/error.

### RESULTS

The study aimed to explore the usage and barriers of artificial intelligence in a perspective of students with visual impairment. The data analysis of the study has been given below:

**Table 1:** *Demography of Respondents*

| Variables                  | f  | %    |
|----------------------------|----|------|
| <b>Gender</b>              |    |      |
| Male Students              | 34 | 68.0 |
| Female Students            | 16 | 32.0 |
| <b>Disability Category</b> |    |      |
| Low Vision                 | 20 | 40.0 |
| Blind                      | 30 | 60.0 |
| <b>Class Level</b>         |    |      |
| Matric                     | 7  | 14.0 |
| Intermediate               | 16 | 32.0 |
| Bachelor                   | 18 | 36.0 |
| Masters                    | 7  | 14.0 |
| Master of Philosophy       | 2  | 4.0  |
| <b>Institute Level</b>     |    |      |
| School/College             | 9  | 18.0 |
| University                 | 41 | 82.0 |
| <b>Educational Sector</b>  |    |      |
| Public                     | 47 | 94.0 |
| Private                    | 3  | 6.0  |

Table 1 covered the demography variables of the students with visual impairment. It indicated that male students with visual impairment were two third (68%) whereby one third (32%) female students with visual impairment were the part of the study. More than half of the study respondents (60%) were blind whereas less than half (40%) belonged to low vision disability category. The class base classification of the respondents depicted that most of them were studying in class Bachelor (36%) and Intermediate (32%), a very few were studying in matric and master level classes, whereby only 4% were studying in M.Phil class. Almost all (94%) respondents belonged to public educational institutes whereas only 6% respondents belonged to private educational institutes.

**Table 2:** *Nature of artificial intelligence*

| Statements                                                  | NU |    | ALU |    | AU |    |
|-------------------------------------------------------------|----|----|-----|----|----|----|
|                                                             | f  | %  | f   | %  | f  | %  |
| 1) Optical Character Recognition (OCR)                      | 18 | 36 | 13  | 26 | 19 | 38 |
| 2) Voice Activated Personal Assistant (VAPA)                | 10 | 20 | 15  | 30 | 25 | 50 |
| 3) Applied Deep Learning (ADL)                              | 30 | 60 | 16  | 32 | 4  | 8  |
| 4) Seeing-AI                                                | 18 | 36 | 21  | 42 | 11 | 22 |
| 5) AI-Glass Technology                                      | 44 | 88 | 4   | 8  | 2  | 4  |
| 6) Finger Reader                                            | 45 | 90 | 3   | 6  | 2  | 4  |
| 7) Ultrasonic Sensor Cane                                   | 48 | 96 | 2   | 4  | 0  | 0  |
| 8) OrCam                                                    | 41 | 82 | 6   | 12 | 3  | 6  |
| 9) Low Vision Apps (TapTapSee, BeMyEyes, Supercensors etc.) | 25 | 50 | 11  | 22 | 14 | 28 |
| 10) Chat GPT                                                | 5  | 10 | 11  | 22 | 34 | 68 |
| 11) Text-to-Speech Engine program                           | 23 | 46 | 10  | 20 | 17 | 34 |
| 12) BeMyAI                                                  | 31 | 62 | 10  | 20 | 9  | 18 |
| 13) JAWS 2024-Beta                                          | 28 | 56 | 6   | 12 | 16 | 32 |

Note: AU-Always use, ALU-A little use, NU-Never Use

Table 2 indicated the nature of artificial intelligence used by the students with visual impairment. It was revealed that 38% respondents always used OCR, 26% were using it 'a little' whereby 36% never used it. 50% respondents always used (VAPA), 30% were using it 'a little' whereby 20% never used it. 8% respondents always used (ADL), 32% were using it 'a little' whereby 60% never used it. 22% respondents always used Seeing-AI, 42% were using it 'a little' whereby 36% never used it. 4% respondents always used AI-Glass Technology, 8% were using it 'a little' whereby 88% never used it. 4% respondents always used Finger Reader, 6% were using it 'a little' whereby 90% never used it. 0% respondents always used Ultrasonic Sensor Cane, 4% were using it 'a little' whereby 96% never used it. 6% respondents always used OrCam, 12% were using it 'a little' whereby 82% never used it. 28% respondents always used Low Vision Apps (TapTapSee, BeMyEyes, Supercensors etc.), 22% were using it 'a little' whereby 50% never used it. 68% respondents always used Chat GPT, 22% were using it 'a little' whereby 10% never used it. 34% respondents always used Text-to-Speech Engine Program, 20% were using it 'a little' whereby 46% never used it. 18% respondents always used BeMyAI, 20% were using it 'a little' whereby 62% never used it. 32% respondents always used JAWS 2024-Beta, 12% were using it 'a little' whereby 56% never used it.

It indicated that a great number of students with visual impairment were always using the ChatGPT, Voice Activated Personal Assistant (VAPA), Text-to-Speech Engine Program and JAWS respectively. Less than half of the students with visual

impairment were in little use of SeeingAI and Deep Learning technology. Majority of the students with visual impairment were never using the Ultrasonic Censor Cane, Finger Reader, AI-Glass technology and OrCam technology respectively.

**Table 3:** Barriers faced by students with visual impairment in use of artificial technology

| Statements                                                                         | N  | M    | S.E   |
|------------------------------------------------------------------------------------|----|------|-------|
| 1. Lack of awareness about the available artificial intelligence-based technology. | 50 | 2.14 | 0.125 |
| 2. Lack of understanding and expertise to use the artificial technology.           | 50 | 1.90 | 0.144 |
| 3. High cost of artificial intelligence.                                           | 50 | 3.26 | 0.210 |
| 4. Inability to integrate the artificial intelligence in educational tasks.        | 50 | 2.38 | 0.189 |
| 5. Reluctance to innovation.                                                       | 50 | 2.62 | 0.206 |
| 6. Language barriers.                                                              | 50 | 2.54 | 0.165 |
| 7. Lack of clear use and instructions.                                             | 50 | 2.46 | 0.202 |
| 8. Low confidence.                                                                 | 50 | 2.52 | 0.186 |
| 9. Slow internet services.                                                         | 50 | 4.50 | 0.149 |
| 10. Inaccessibility to artificial intelligence.                                    | 50 | 2.50 | 0.196 |

Note: N=Number, M=Mean, S.E=Standard Error

Table 3 expressed the barriers faced by the students with visual impairment in the use of artificial intelligence. It was noted that slow internet services was the major barrier (M=4.50, SE=0.149) in the use of artificial intelligence faced by the students with visual impairment. Most of the students with visual impairment (M=3.26, SE=0.210) considered the high cost of artificial intelligence a major in its use. Almost half of the respondents explained that various barriers in the use of artificial intelligence such as reluctant to innovation (M=2.62, SE=0.206), language barrier (M=2.54, SE=0.165), low confidence (M=2.52, SE=0.186), inaccessibility to artificial intelligence (M=2.50, SE=0.196), lack of clear use and instructions (M=2.46, SE=0.202), and inability to integrate the AI in educational tasks (M=2.38, SE=0.189). A few of the students with visual impairment were facing the barriers such as lack of awareness about the available artificial intelligence based technology (M=2.14, SE=0.125), and lack of understanding and expertise to use the artificial technology (M=1.90, SE=0.144).

The major barrier faced by the students with visual impairment in use of artificial intelligence was the slow internet services in the country. Moreover, high cost of artificial intelligence and reluctant to innovation were also considered a moderate level of barriers in the use of artificial intelligence.

### Findings of the study

The study explored the use of artificial intelligence (AI) and the barriers faced by students with visual impairment. These students used various AI apps and software depending on ease and availability. Results showed that 38% always used OCR, 50% used Virtual Assistant Personal Apps (VAPA), and only 8% used Applied Deep Learning (ADL), while 60% never used it. Seeing-AI was used regularly by 22%, with 42% using it occasionally and 36% never. AI-Glass Technology and Finger Reader were used by only 4% regularly, while most never used them. The Ultrasonic Sensor Cane had no regular users, with 96% never using it. OrCam was used by 6% regularly, Low Vision Apps (e.g., TapTapSee, BeMyEyes) by 28%, and ChatGPT by 68% — the highest usage among tools. Text-to-Speech Engine Programs were used by 34%, BeMyAI by 18%, and JAWS 2024-Beta by 32%. Many tools also had notable percentages of respondents who used them "a little" or not at all. Barriers to AI usage included slow internet (M=4.50, SE=0.149), which was the most significant issue. High cost (M=3.26, SE=0.210) was another major challenge. Other commonly reported barriers included reluctance to adopt new technology (M=2.62), language issues (M=2.54), low confidence (M=2.52), lack of access (M=2.50), unclear usage instructions (M=2.46), and difficulty integrating AI in educational tasks (M=2.38). Some students also cited lack of awareness (M=2.14) and insufficient expertise (M=1.90) as obstacles.

### Conclusions of the study

The study was conducted to assess the usage of artificial intelligence and its barriers faced by students with visual impairment. It was inferred that a great number of students with visual impairment were always using the ChatGPT, Voice Activated Personal Assistant (VAPA), Text-to-Speech Engine Program and JAWS respectively. Less than half of the students with visual impairment were in little use of SeeingAI and Deep Learning technology. Majority of the students with visual impairment were never using the Ultrasonic Censor Cane, Finger Reader, AI-Glass technology and OrCam technology respectively. The major barrier faced by the students with visual impairment in use of artificial intelligence was the slow internet services in the country. Moreover, high cost of artificial intelligence and reluctant to innovation were also considered a moderate level of barriers in the use of artificial intelligence.

### Recommendations of the study

1. The internet is the basic source of effective communication among the stakeholders as well as among the students with visual impairment. However, it is a great dilemma that there is a very low speed of internet services in the country which is highly affecting the communication of the people. Similarly, a fast and good quality internet is the key to information technology, education, business and various all fields. So, govt. should provide a fast speed internet so that students with visual impairment may affectively use the artificial intelligence and other technological tools.
2. A high cost of artificial intelligence is also a great barrier in its affective usage. Students with visual impairment were also facing this issue and require a low / no cost artificial intelligence softwares/apps to adequately fulfill their life achievements.

Govt. alongwith consultation with the technical experts must ensure the provision of free of cost artificial intelligence services for the students with visual impairment.

3. Future research may be conducted to find out the effectiveness of artificial intelligence in education, community and home living of the students with visual impairment.

### Limitations of the study

The study was confined to the self-made questionnaire A self-made questionnaire was designed by the researchers in order to determine the usage and barriers of artificial intelligence faced by student with visual impairment. The study's findings may be limited by the size and the sample of the population. If the study includes small group of visually impaired students, the generalizability of the results to a broader population was restricted. The effectiveness of AI tools in educational assistance depends on technological access and proficiency. Limitation in using AI technologies or differences in student comfort and familiarity with using these tools is difficult which could affect the outcomes.

### Ethical Consideration

Ethical principles were keenly observed such as permission before participation in the study was taken in time and confidentiality of the collection of data was also ensured to make the study aligned with observation of ethical codes.

### Acknowledgement

The principles and heads of the educational institutes were very cooperative who allowed the researchers to approach the requisite respondents. Researchers were also very grateful to the students with visual impairment especially blind students for their support and data provision.

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