

IMPACT OF ARTIFICIAL INTELLIGENCE IN EDUCATIONAL ASSISTANCE: PERCEPTION OF STUDENTS WITH VISUAL IMPAIRMENT

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ABSTRACT

The study explored the perception of students with visual impairment towards the impact of artificial intelligence on their academic performance. The study used a quantitative approach based on descriptive methodology. The design of study was survey which utilized a self-made questionnaire for the purpose of data collection from the study participants. The population of the research comprised of all the students with visual impairment (low vision & blind) currently enrolled/studying in the ordinary/special education schools/colleges or universities of district Faisalabad. Researcher chooses fifty individuals with vision loss (blind and low vision) from various institutes of the District Faisalabad for data collection using convenient sampling technique. A structured questionnaire was designed for the students with vision loss for data collection comprising of 18 close ended questions. Researchers approached the students with visual impairment by visiting their educational institutes and obtaining the permission for data collection from the higher authorities. The data collected from the students with visual impairment was analyzed in terms of mean, standard error and two sample t-test. The most effective artificial intelligence tools found helpful in ameliorating the academic achievement of the students with visual impairment included the JAWS 2024-Beta for video calls and screening reading, BeMyAI to resolve the reading issues, Text-to-Speech Software for Braille note-taking, and Finger Reader AI for reading the normal 12-point printing. Similar perception of the blind and low vision was noted towards the impact of AI on their academic achievement. Likewise, same perception of the urban and rural students with visual impairment was inferred towards the impact of AI on their academic achievement as well. The study expressed that artificial intelligence was very effective in boosting up the educational outcomes of the students with visual impairment.

Keywords: Perception, Artificial Intelligence, Visual Impairment, Educational Assistance.

INTRODUCTION

In order for humans to see and perceive the environment and to carry out their jobs, their eyes are a necessary instrument. People who are vision impaired face several challenges in their daily lives. Consequently, attention must be paid to the requirements of the community of people who are blind or visually impaired. To assist visually impaired persons lead normal lives, researchers approach the problem from a variety of perspectives. The onset of the digital era has significantly altered the lives of those with visual impairments, making them more convenient. It is also anticipated that visually impaired people's life would be improved by deep learning, a promising technology. It is being utilized more and more in the creation of visual aids and the diagnosis of eye conditions. The sooner the patient receives the right therapy and the greater the likelihood of a cure, the sooner the doctor can make an accurate diagnosis of the eye condition. This article provides an overview of current studies on the creation of visual aids and artificial intelligence-based eye disease detection. According to the study's objectives, the

research is separated into two categories: smart gadgets that assist visually impaired individuals in their everyday lives and deep learning techniques used in the diagnosis of eye disorders. A synopsis of the potential future directions for artificial intelligence to help the blind and visually handicapped is provided at the end. Additionally, this introduction gives novices some information regarding deep learning. We hope that this study will stimulate more research on the topics (Wang et al., 2023).

One of our five senses is vision. Being able to see allows us to learn a great deal about the physical surroundings in which we live and move, including potential dangers, the faces of others and their nuances of emotion, and the size and appearance of various objects. A youngster who is visually impaired has to be attended to right away. This is due to the fact that a lot of learning usually happens visually. Undiagnosed vision loss causes children to lag behind in the development of many different abilities. Children who are visually impaired can perform almost all of the chores and activities that sighted children take for granted, but they frequently need to learn how to do them differently or with specialized equipment. Touching, hearing, smelling, tasting, moving, and engaging their visual senses will all be essential components of their education. In that process, the support of parents, relatives, friends, caretakers, and educators can be invaluable. In a minute, we shall discuss this more (American Foundation for the Blind, 2011).

One of the key issues in contemporary education is the education of people with visual impairments and how they adjust to society. The development of the Deep Learning Smart-system for People with Vision Loss really involves the application of AI techniques and an ontological approach. System data development has unique characteristics. Artificial intelligence, the cognitive approach, and the unified ontological model are the strategies utilized to solve this challenge. Ontology models enable the development of efficient intellectual information systems and facilitate the exchange of challenging organized and formalized data. The trained intellectual and personal qualities are detected using a cognitive technique. When developing the newest Deep Learning technologies, the utilization of intellectual systems is a point of view. Finding buried information and working with multidimensional, imprecise data are key components of the Deep Learning intellectual system. They must be vague, dispersed, and adaptable. By combining several statistical and intellectual techniques, good results may be achieved during the construction of Deep Learning intellectual systems. Principal component analysis (PCA) was used to allocate the informative aspects that were characteristic of each learner (Aivazyan et al., 1983).

The growing use of artificial intelligence (AI) in higher education emphasizes the need to investigate how it may affect the sector's social, ethical, and pedagogical dynamics. The research thoroughly examined how AI is affecting Saudi Arabian higher education, exploring the attitudes, beliefs, and expectations of stakeholders around its application. The study focuses on important aspects of AI in higher education, such as how it affects instruction and learning, its ethical and social ramifications, and its expected future role. Positive sentiments on AI in higher education are revealed by this study, which uses a quantitative methodology and an online survey questionnaire with a sample size of 1113. Stakeholders are aware of its capacity to improve instruction, expedite management, and stimulate creativity. Concerns including privacy, security, and prejudice must be addressed, and ethical concerns and norms for AI application are emphasized. In their ideal future, participants saw individualized education, morally sound AI, teamwork, and continuous encouragement of lifelong learning. The findings also shed light on the complex interactions among AI's applications, goals, challenges, and

effects on attitudes, perceptions, and potential ramifications. Thus, the study emphasizes the need for a thorough grasp of AI integration that takes into account not just its technological features but also its ethical, social, and pedagogical dimensions. Educational stakeholders may strive toward maximizing the advantages of AI while guaranteeing its responsible and efficient use in instruction by recognizing the role of AI uses, AI usage purposes, and resolving related challenges along with learning contexts (Al-Zahrani & Alasmari, 2024).

The use of assistive technology has become popular among students who are visually impaired. People with visual impairments now have more opportunities for both professional and personal development because to assistive technology (Sah, 2013). The capacities of students with impairments are improved by the use of assistive technology devices (Lee & Templeton, 2008). Unlike children with other impairments, the majority of visually impaired kids use their senses of touch and hearing to learn about their surroundings (Smith, 2008). These students could find it challenging to use technology and explore their surroundings if they are unable to use assistive technology. As a result, junior high school curricula now include assistive technology. In order to help visually impaired students acquire a proper comprehension of information technology applications, teachers have received comprehensive training. The fact that many visually impaired students are forced to use technology in order to further their professions and pursue independence is one of the common causes (Ampratwum, 2016).

A 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 (2006) data analysis approach, this study employed a qualitative case study research methodology to provide a detailed analysis of a case study involving five visually impaired students. 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 because to AI virtual support, they were able to realize their full potential and complete academic assignments that are typically challenging for them because of their visual impairment (Mina et al., 2023).

LITERATURE REVIEW

People who have visual impairment (VI) find it difficult or impossible to do daily tasks without specific adaptations due to the loss of visual acuity (VA) and/or visual field. VI is defined as a functional loss of vision. VI is often subdivided based on the degree of visual field defect and the individual's visual acuity following lens correction. VI is defined as follows by the International Classification of Diseases (ICD): Blindness: visual field no larger than 10 degrees around central fixation, or VA of 3/60 or worse VA from 6/60 to greater than 3/60 is considered severe VI. A VA of 6/60 indicates that the individual can only see at 6 meters what a normal sighted person can see at 60 meters. Moderate VI: VA from 6/18 to greater than 6/60 (Holbrook, 1996).

AIEd, or artificial intelligence in education, is one of the newest areas of educational technology, according to several worldwide studies. Even though AI has been available for almost 30 years, educators are still unsure about how to fully utilize its pedagogical potential

on a larger scale and how it may significantly affect teaching and learning in higher education. A research examined artificial intelligence in higher education, emphasizing both its advantages and disadvantages. Additionally, it examined how new technologies are affecting education and how schools are changing and teaching. In an effort to provide everyone with access to high-quality, egalitarian education, the research collected a few instances of the application of AI in education. In order to improve learning outcomes, the study first examined how AI technology may assist education institutions in using data to enhance fairness and quality in higher education. The research also discussed the possible hazards of implementing AI in educational settings, as well as its advantages and difficulties. Lastly, some suggestions for AI in education were offered, emphasizing the need to start a dialogue about the potential applications, dangers, and opportunities of AI in education for sustainable development. AI in education is still a sleeping giant as a consequence of this study. It is doubtful that "breakthrough" AI teaching and learning applications will come from traditional higher education. Examining the AI model above brings to light the crucial question of whether technology should be utilized to empower both teachers and students or to automate the replacement of educators (Akinwalere & Ivanov, 2022).

The study and development of computer systems that exhibit intelligence is the focus of artificial intelligence, a subfield of computer science, according to Patterson (1990). These systems are capable of learning new ideas, reasoning and making insightful inferences about the environment, comprehending spoken language or a visual picture, and carrying out other tasks that call for intelligence comparable to that of humans. Thinking, knowing, planning, learning, communicating, seeing, and the capacity to move and manipulate objects are some of these traits (Norvig & Intelligence, 2002).

Unquestionably, teaching and learning are transformed when AI is included into the classroom. AI not only personalizes learning but also provides appropriate feedback, which promotes a more effective and inclusive learning environment. Because integrating all children into the mainstream system necessitates sufficient care, attention, and potential curriculum changes, inclusive education is important but also challenging. Some of these changes pertain to organizational, methodological, moral, psychological, technical, and other aspects (Holmes et al., 2019).

Any degree of vision loss resulted in functional impairments that limited and restricted the people's ability to participate and perform in everyday activities, hence interfering with their autonomy, independence, and quality of life. Nonetheless, the utilization of non-optical assistance, optical resources, and environmental modifications were advantageous for enhancing functioning, demonstrating the impact of outside variables on an individual's performance (Silva et al., 2014). According to the Centers for Disease Control and Prevention (CDC), it is impossible to restore a visually impaired person's vision to a "normal level" (Mandal, 2024).

Students with visual impairments struggle to understand pictorial information. They typically get information from their surroundings by using their senses of touch and hearing. Numerous methods and solutions that might help people enhance their learning abilities have been offered with the aid of technology innovation. Both computer-based and smartphone-based solutions are popular options for persons with visual impairments and effectively help them access information. Students with visual impairments can benefit greatly from these solutions' artificial intelligence-based methods (Felix et al., 2018).

AI may now be used in many areas of life because to the growing availability of AI and associated tools and technology. AI is also being used more and more in the sphere of education, albeit its application and associated difficulties are still unknown. The study's researchers provide a summary of the use of AI in education, along with its associated difficulties and prospects, by drawing on earlier empirical and theoretical research. As a result, researchers observed that international programs like UNESCO demonstrate the application of AI in the field of education. Additionally, it was mentioned that AI applications in education include making it possible to prepare assignments and content, grade them automatically, and help students. Increased time and location flexibility as well as a shift in the tutor's function as a facilitator are two advantages of AI in education. Important topics were also covered, such as the absence of personal contact, the lack of inclusion and equity for students from all backgrounds, and ethical concerns like data privacy. These themes led to the conclusion that while AI will play a bigger role in education in the future, there are still issues that must be resolved if the full potential of AI in education is to be realized (Tahir, Hassan, & Shagoo, 2024).

A personal aid that made use of artificial intelligence to provide visually impaired persons more access to their surroundings is very effective. They created a smartphone application by combining machine learning, word recognition, and picture recognition algorithms. This tool assisted users with visual impairments with activities including picture recognition, cash, and electronic book access. For those who are visually challenged, there are now tutoring programs that offer improved methods of accessing and modifying material as they are learning. For Thai blind persons, the i-Math is an automated math reader program that is very helpful in providing them with access to mathematical resources. With the aid of a screen reader, it is able to interpret mathematical material from audio documents. Additionally, teachers can create audio exams for their pupils (Wongkia et al., 2018).

A novel method of accessing information through touch, sound, and vision was made possible by computer haptics. In this method, students digitally explored the 3D forms using a computer and a haptic feedback controller (M. D.J. 2013). In the field of education, interactive learning platforms are also growing in popularity, particularly among students who are visually impaired. They make studying maths easier for kids with visual impairments. These platforms presented mathematical ideas in a way that visually challenged students could understand by utilizing a variety of technology, including screen readers, braille displays, and audio lessons.

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).

First off, assistive AI technology presents opportunities to enhance the educational experience and living situations for students with visual impairments, hence decreasing the gaps between them and sighted people (Morina, 2022). AI technologies provide supportive usage for people with visual difficulties by enabling tasks that are difficult for them owing to their unique demands. Therefore, society has a responsibility to increase the autonomy of

people who face such problems and to work toward achieving an equitable quality of life for all. Students, instructors, families, and other important stakeholders must work together to accomplish this (Sax et al., 2005).

Statement of the problem

Vision loss brings many challenges in the life. Poor vision not only affects the daily life functioning but also educational and learning domain at par. Artificial intelligence is greatly changing the current scenario and bringing very effective development to support the learning and routine life of the students with visual impairment. The current was carried out to explore the perception of students with visual impairment in their educational assistance in district Faisalabad.

Objectives of the study

Following were the objectives of the study:

1. To determine the perception of the students with visual impairment about the impact of artificial intelligence on their academic achievement.
2. To compare the perception of low vision and blind students towards the impact of artificial intelligence on their academic achievement.
3. To compare the perception of students with visual impairment towards the impact of artificial intelligence on their academic achievement on the basis of their locality.

Research Questions

Following were the research questions:

1. What is the perception of the students with visual impairment about the impact of artificial intelligence on their academic achievement?
2. What is the perception of low vision and blind students towards the impact of artificial intelligence on their academic achievement?
3. What is the perception of students with visual impairment towards the impact of artificial intelligence on their academic achievement on the basis of their locality?

Significance of the study

Artificial intelligence is a game changer for student with visual impairment in higher education. It promotes inclusivity, equal access to education, and social participation. Artificial intelligence provides strength to these students to achieve academic and career goals, leading to increased employability and economic self-sufficiency. Artificial intelligence improves academic performance, engagement, and motivation. It supports personalized learning experiences, making education more effective by advancing AI research and development in accessibility.

METHODOLOGY

A research methodology describes the techniques and procedures used to identify and analyze information regarding a specific research topic. It is a process by which researchers design their study so that they can achieve their objectives using the selected research instruments. It includes all the important aspects of research, including research design, data collection methods, data analysis methods, and the overall framework within which the research is conducted (Sreekumar, 2023). Following methodology was applied for the study.

Nature of Study

The study used a quantitative approach based on descriptive methodology to ascertain the perception of students with visual impairment towards the impact of artificial intelligence on their academic performance in district Faisalabad, Pakistan.

Research Design

The design of study was survey which utilized a self-made questionnaire for the purpose of data collection from the study participants.

Population and Sampling

The population of the research comprised of all the students with visual impairment (low vision & blind) currently enrolled/studying in the ordinary/special education schools/colleges or universities of district Faisalabad.

Sampling can be defined as the process through which individuals or sampling units are selected from the sample frame. The sampling strategy needs to be specified in advance, given that the sampling method may affect the sample size estimation (Martinez-Mesa et al., 2014; Krause et al., 2011). Researcher chooses fifty individuals with vision loss (blind and low vision) from various institutes of the District Faisalabad including Al-Faisal Markaz Nabina Faisalabad, Govt. College University Faisalabad, University of Education Lahore, Faisalabad campus, Al-Bashir School for Blind, Faisalabad, and Govt. Special Education College Madina town Faisalabad.

Sampling Technique

The researcher used a convenient sampling technique to select individuals based on ease and availability. This method was chosen due to the limited number of individuals with visual impairment available within the study's timeframe.

Tool of Research

A structured questionnaire for the students with vision loss was framed for the collection of data for study. The demography of respondents in the questionnaire incorporated the information regarding gender, age, marital status, job status, and locality of the individuals.

The segment of impact of artificial intelligence in educational assistance of students with visual impairment contained 18 questions. The impact of artificial intelligence on student assistance included the questions such as object recognition, print reading, route planning and navigation etc.

Five points Likert scale with following options were used in the questionnaire for the data collection of the study:

- | | | |
|--|---|---|
| ➤ Extremely Unsatisfied (EU) | - | 1 |
| ➤ Somewhat Unsatisfied (SU) | - | 2 |
| ➤ Neither Satisfied Nor Unsatisfied (NSNU) | - | 3 |
| ➤ Somewhat Satisfied (SS) | - | 4 |
| ➤ Extremely Satisfied (ES) | - | 5 |

The validity of the questionnaire was ensured by designing the questions according to the study objectives and eliminating the unnecessary statements accordingly. The reliability coefficient of the study was determined which comes to the value of $r=0.64$ indicating its suitability for the study.

Collection of Data

Researchers approached the students with visual impairment by visiting their educational institutes and obtaining the permission for data collection from the higher authorities. Only the respondents who showed their willingness for data collection of the study were involved and given the questionnaire for completion. The basic theme, research objectives

and procedure of the completion of questionnaire was also shared with the students with visual impairment. Both the blind and low vision students were approached for the data collection. The completed sets of the questionnaires were numbered, arranged and entered in the SPSS software for its analysis.

Data Analysis

The data collected from the students with visual impairment was analyzed in terms of mean and standard error to assess the perception of students towards the impact of artificial intelligence on the academic performance. Two sample t-test was used to compared the perception of students based on their gender and locality. Analysis of variance was applied to compare the perception of the students with visual impairment based on their age.

RESULTS

The study ascertained the perception of students with visual impairment towards the impact of artificial intelligence on the academic performance in district Faisalabad. The analysis of the study has been presented as under:

Table 1

Demographic attributes

Study Variables	f	%
Respondents' gender		
Male Respondent	34	68.0
Female Respondents	16	32.0
Marital Status		
Single	44	88.0
Married	6	12.0
Job Status		
Jobian	21	42.0
Jobless	29	58.0
Locality		
Urban	35	70.0
Rural	15	30.0
Age of Respondents		
11-20 Years	21	42.0
21-30 Years	14	28.0
31-40 Years	4	8.0
41-50 Years	1	2.0

Table 1 expressed the demographic attributes of the students with visual impairment. The data revealed that there were two third (68%) students with visual impairment however one third (32%) were female participants of the study. Majority (88%) participants were single whereby a very few (12%) were married. The job status indicated that less than (42%) students with visual impairment were doing jobs whereas more than (58%) were jobless. The locality statistics of the respondents indicated that a large number of (70%) participants were from Urban locality however 30% belonged to Rural areas. The age statistics showed that most of the respondents (42%) were falling in age range of 11-20 years, few (28%) were falling in age range of 21-30 years, a very few (8%) were falling in age range of 31-40 years, however a meager number of participants (2%) were falling in age range of 41-50 years.

Table 2

Perception of the students with visual impairment towards the impact of artificial intelligence on the academic achievement

Statements	N	M	S.E
1. OCR assists to change the printed documents into speech and readable format.	50	4.46	.096
2. Deep Learning technology helps in object recognition and navigation in the educational institute.	50	4.28	.159
3. Artificial intelligence helps to plan the routes for classrooms, cafeteria and library.	50	4.14	.159
4. Uses Seeing-AI software to get information about the surroundings.	50	4.16	.116
5. AI-Glass technology installed in glasses helps to recognize the colours and read signs etc.	50	4.02	.165
6. Wear and use Finger Reader AI technology to read a 12-point printed text.	50	4.54	.082
7. Use Ultrasonic Censor Cane to measure the distance of obstacle in front.	50	4.00	.206
8. Use OrCam device to place camera on glasses using Optical Character Recognition (OCR) to change the printed text to voice.	50	4.20	.171
9. Use low vision apps for reading the text.	50	4.40	.143
10. Use ChatGPT for content development.	50	4.36	.113
11. Applied Deep Learning (APL) helps to recognize the handwritten text.	50	4.32	.097
12. Artificial intelligence tools provide reliable data for the studies.	50	4.22	.119
13. Artificial intelligence provides immediate problems to the educational problems.	50	4.34	.097
14. Getting information from the artificial intelligence is very flexible.	50	4.26	.085
15. Artificial intelligence provides cost effective solution to educational problems.	50	4.28	.095
16. Text-to-Speech Engine program provides efficient Braille note-taking for blind.	50	4.76	.067
17. BeMyAI provides good solutions to reading problems of the blind people.	50	4.78	.066
18. Use JAWS 2024-Beta software for video calls and screen reading.	50	4.86	.057

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

Table 2 expressed the perception of the students with visual impairment towards the impact of artificial intelligence on their academic achievement. It was inferred that use of JAWS 2024-Beta software (M=4.86, SE=0.057) for video calls and screening reading, BeMyAI (M=4.78, SE=0.066) solution to reading problem, Text-to-Speech Engine program (M=4.76, SE=0.67) helpful for Braille note-taking, Finger Reader AI (M=4.54, SE=0.82) helpful for reading normal 12-point print; were greatly helpful for learning of students with visual impairment.

A moderate level of perception of the students with visual impairment towards the impact of artificial intelligence on the academic achievement depicted that OCR assists to change the printed documents into speech and readable format (M=4.46, SE=0.096), Use low vision apps for reading the text (M=4.40, SE=0.143), use ChatGPT for content development (M=4.36, SE=0.113), Artificial intelligence provides immediate problems to the educational problems (M=4.34, SE=0.097), Applied Deep Learning (APL) helps to recognize the handwritten text (M=4.32, SE=0.097), Deep Learning technology helps in object recognition and navigation in the educational institute (M=4.28, SE=0.159), Artificial intelligence provides cost effective solution to educational problems (M=4.28, SE=0.095).

A low level rating depicted that getting information from the artificial intelligence is very flexible (M=4.26, SE=0.085), artificial intelligence tools provide reliable data for the studies (M=4.22, SE=0.119), they use OrCam device to place camera on glasses using Optical Character Recognition (OCR) to change the printed text to voice (M=4.20, SE=0.071), they use Seeing-AI software to get information about the surroundings (M=4.16, SE=0.116), artificial intelligence helps to plan the routes for classrooms, cafeteria and library (M=4.14, SE=0.159), AI-Glass technology installed in glasses helps to recognize the colours and read signs etc. (M=4.02, SE=0.165), and they use Ultrasonic Sensor Cane to measure the distance of obstacle in front (M=4.0, SE=0.206).

The most effective artificial intelligence tools found effective in ameliorating the academic achievement of the students with visual impairment included the JAWS 2024-Beta for video calls and screening reading, BeMyAI to resolve the reading issues, Text-to-Speech Software for Braille note-taking, and Finger Reader AI for reading the normal 12-point printing.

Students with visual impairment showed moderate inclination towards the OCR use to convert printed documents into readable format, low vision apps for effective reading of text, ChatGPT for content development, AI for immediate problem solving, Deep learning for recognizing handwritten text and object recognition, and use of AI in providing cost effective solution to educational problems respectively.

The low level inclination was shown by the students with visual impairment towards the use of AI for getting information in flexible way, reliable data provision, OrCam AI provide text audio, Seeing-AI provide surrounding information, AI provide routes to classrooms and

other venues, AI-Glass technology recognize colours and read signs, and use of Ultrasonic Sensor cane help to measure the distance of front obstacles.

Table 3

Compare the perception of low vision and blind students towards the impact of artificial intelligence on their academic achievement

Sector	N	Mean	Std. Dev	df	t	p
Low Vision	20	4.30	0.497	48	-0.777	0.441
Blind	30	4.39	0.329			

$P > 0.05$

Table 3 depicted the comparison between the low vision and blind towards the impact of artificial intelligence on their academic achievement. No any significant variation in the perception of students with visual impairment towards the impact of artificial intelligence on academic achievement was noted, with low vision values (M=4.30, SD=0.430) and Blind score (M=4.39, SD=0.329) and t (48)=-0.777, p=0.441. It expressed similar perception of the blind and low vision towards the impact of AI on their academic achievement.

Table 4

Compare the perception of students with visual impairment towards the impact of artificial intelligence on their academic achievement on the basis of their locality

Locality	N	Mean	Std. Dev	df	t	p
Urban	35	4.30	0.460	48	-1.431	0.159
Rural	15	4.47	0.175			

$P > 0.05$

Table 4 represented the comparison of the perception of students with visual impairment towards the impact of artificial intelligence on their academic achievement on the basis of their locality. No any significant difference in the perception of students with visual impairment was found on the basis of locality towards the impact of artificial intelligence on academic achievement, with Urban locality values (M=4.30, SD=0.460) and Rural score (M=4.47, SD=0.175) and t (48)=-1.431, p=0.159. It showed similar perception of the urban and rural students with visual impairment towards the impact of AI on their academic achievement.

Findings of the study

The study determined the perceptions of students with visual impairment regarding AI's impact on academic achievement. Students found JAWS 2024-Beta (M=4.86), BeMyAI (M=4.78), Text-to-Speech Engine (M=4.76), and Finger Reader AI (M=4.54) highly effective for learning. Moderate perceptions were noted for tools like OCR for converting print to speech (M=4.46), low vision apps (M=4.40), ChatGPT for content (M=4.36), and AI's role in solving educational problems and recognizing handwritten text and objects (M=4.28–4.34). Lower ratings were given to AI's flexibility (M=4.26), data reliability (M=4.22), and tools like OrCam, Seeing-AI, AI-Glass, and Ultrasonic Sensor Cane (M=4.0–4.20), which assist with navigation and environmental awareness.

No any significant variation in the perception of students with visual impairment towards the impact of artificial intelligence on academic achievement was noted, with low vision values (M=4.30, SD=0.430) and Blind score (M=4.39, SD=0.329) and t (48)=-0.777,

$p=0.441$. Similarly no any significant difference in the perception of students with visual impairment was found on the basis of locality towards the impact of artificial intelligence on academic achievement, with Urban locality values ($M=4.30$, $SD=0.460$) and Rural score ($M=4.47$, $SD=0.175$) and $t(48)=-1.431$, $p=0.159$.

Conclusions of the study

The most effective artificial intelligence tools found effective in ameliorating the academic achievement of the students with visual impairment included the JAWS 2024-Beta for video calls and screening reading, BeMyAI to resolve the reading issues, Text-to-Speech Software for Braille note-taking, and Finger Reader AI for reading the normal 12-point printing. Students with visual impairment showed moderate inclination towards the OCR use to convert printed documents into readable format, low vision apps for effective reading of text, ChatGPT for content development, AI for immediate problem solving, Deep learning for recognizing handwritten text and object recognition, and use of AI in providing cost effective solution to educational problems respectively. The low level inclination was shown by the students with visual impairment towards the use of AI for getting information in flexible way, reliable data provision, OrCam AI provide text audio, Seeing-AI provide surrounding information, AI provide routes to classrooms and other venues, AI-Glass technology recognize colours and read signs, and use of Ultrasonic Sensor can help to measure the distance of front obstacles.

Similar perception of the blind and low vision was noted towards the impact of AI on their academic achievement. Similar perception of the urban and rural students with visual impairment was inferred towards the impact of AI on their academic achievement as well.

Recommendations of the study

Researcher recommends the following:

1. The use of artificial intelligence was highly effective in ameliorating the educational performance of the students with visual impairment. Therefore, it is highly recommended to ensure the provision of quality based cost effective artificial intelligence apps/software for the students with visual impairment to boost up their educational performance.
2. Teachers should emphasize the use of artificial intelligence during the classroom sessions to provide more ease and effectiveness in educational activities to the students with visual impairment.
3. Future research may be conducted on experimental measures to identify the effectiveness of artificial intelligence on educational performance of the students with visual impairment.

Ethical Considerations

Ethical principles and code of conduct was given special consideration in order to ensure the confidentiality, respect, self-esteem and safety of the study participants.

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Delimitations of the study

The study aimed to explore the impact of artificial intelligence in educational assistance for student with visual impairment student. The study focuses on student with visual impairment from educational institutions in (University of Education Lahore Faisalabad campus, Govt. Special Education College Faisalabad, Govt. Higher Secondary Schools for Blind, Madina Town Faisalabad, Al-Faisal Markaz Nabia Faisalabad, Al-Bashir School for Bind, Seyda Khatoon-e-Jannat Trust and Special Education Center Faisalabad). The study included only students using AI-assisted tools and excludes those with other disabilities. These limitations could involve specifying certain AI technologies studied, restricting the geographical scope, setting a particular time frame for analysis, concentrating on higher education setting, and outlining the chosen research method.

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