استراتيجيات الذكاء الاصطناعي لخلق بيئة تعليم عالي شاملة للطلاب ذوي الإعاقة

إعداد

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الملخص:

تستعرض هذه الدراسة الاستخدام الاستراتيجي للذكاء الاصطناعي (AI) لتوفير بيئة شاملة للطلاب ذوي الإعاقات في التعليم العالي. يناقش البحث المزايا والعيوب المحتملة للشمولة المعتمدة على الذكاء الاصطناعي من خلال فحص تطبيقات الذكاء الاصطناعي مثل أدوات الوصول التلقائي، ومنصات التعلم التكيفية، وأنظمة الدعم المخصصة. توفر النتائج أساسًا للمؤسسات لاستخدام الذكاء الاصطناعي لتحسين العدالة التعليمية من خلال تسليط الضوء على كل من النتائج المشجعة وفرص التطوير.

الكلمات المفتاحية: (الذكاء الاصطناعي ، التعلم، ذوي الإعاقة، الروبوتات الذكية، التعليم العالي، ليبيا)

Abstract:

This study investigates the strategic use of artificial intelligence (AI) to provide an inclusive environment for students with impairments in

higher education. The paper examines AI-driven inclusivity's possible advantages and disadvantages by examining AI applications including automatic accessibility tools, adaptive learning platforms, and customized support systems. The results provide a basis for institutions to use AI to improve educational fairness by highlighting both encouraging results and opportunities for development.

Keywords: (Artificial Intelligence, Learning, People with Disabilities, Smart robots, Higher Education. Libya).

Introduction

Artificial intelligence's (AI) quick progress has opened up revolutionary potential in a number of industries, most notably education, healthcare, finance, and transportation. AI's ability to enhance learning, expedite procedures, and promote inclusion is being investigated more and more by higher education institutions in particular. AI provides strong tools to break down long-standing obstacles and make learning more accessible and equitable for students with impairments. Higher education institutions may establish learning environments that suit a range of requirements and learning styles by carefully incorporating AI-driven solutions, eventually fostering inclusion and equitable opportunity (Miller, 2022).

Accessing educational materials, taking part in class activities, and interacting with classmates and teachers can present a number of difficulties for students with impairments. Although beneficial, traditional accommodation techniques may not be able to completely address these students' demands. Furthermore, financial constraints and a lack of knowledge or training among educators on inclusive best practices can restrict accessible resources. With its ability to automate tedious operations, offer real-time modifications, and customize learning experiences, artificial intelligence (AI) technology is a useful tool for getting around these restrictions (Leonard & Lee, 2021).

AI can help students with disabilities by automating captioning, translating spoken words into text, or converting written material into formats suitable for visually impaired students. Beyond accessibility tools, AI's data-driven insights enable educators to identify and address each student's unique learning requirements, fostering a truly inclusive learning environment. AI's

application in creating an inclusive educational environment includes a variety of tools and techniques, from speech-to-text and text-to-speech technologies to adaptive learning platforms that tailor content to individual needs (Edwardsm 2020).

By investigating how certain AI apps promote inclusion and the effects of these tools on students' educational experiences, this study seeks to understand how AI might improve accessibility for students with disabilities in higher education. The research will examine the advantages and difficulties of putting AI-driven initiatives into practice and offer suggestions for how educational institutions might use AI to advance an inclusive learning environment. In doing so, this study adds to the expanding corpus of research on inclusive education and emphasizes how important artificial intelligence will be in determining the direction of accessible education in the future (Smith & Green, 2019).

Problem Statement

Students with impairments face physical, social, and intellectual obstacles in higher education, which emphasizes the need for a more welcoming and encouraging atmosphere. Most schools' present frameworks are frequently too rigid to accommodate a range of learning demands, which leads to problems including inaccessible course materials, a lack of one-on-one assistance, and insufficient adjustments. Students with disabilities may find it challenging to access educational resources, participate fully in campus life, and reach their academic potential as a result of these obstacles. Students with disabilities are forced to use one-size-fits-all approaches since standard educational tools and systems lack customization, which may not be in line with their unique requirements and learning preferences. The research questions can be written as following:

1. How can AI strategies be effectively utilized to create an inclusive educational environment for students with disabilities in higher education?
2. What is the impact of AI-powered personalized learning systems on accessibility, engagement, and academic performance of students with disabilities?

3. How do AI-enhanced assistive technologies improve the ability of students with disabilities to access learning materials and participate in classroom activities?
4. What are the barriers faced in implementing AI-driven accessibility tools in higher education institutions?
5. How do AI-based virtual learning environments contribute to enhancing inclusivity and equitable educational experiences for students with disabilities?
6. What challenges do higher education institutions face when incorporating AI applications to support students with disabilities?

Research Importance:

1. This study highlights how AI can create a more inclusive educational environment by removing barriers for students with disabilities.
2. Investigating AI-driven tools and systems that improve students' access to educational resources, thus promoting equity in education.
3. Understanding the role of AI in education can help institutions enhance their strategies, leading to more effective learning and teaching environments.
4. The study can help policymakers design strategies to integrate AI tools for students with disabilities, making education more inclusive at all levels.

Research Objectives

1. To investigate how AI strategies can be utilized to improve accessibility and inclusivity for students with disabilities in higher education.
2. To assess the impact of AI-powered personalized learning systems on student engagement, accessibility, and academic performance in higher education.
3. To analyze the role of AI-enhanced assistive technologies in improving the learning experience for students with disabilities.
4. To identify the barriers that hinder the implementation of AI-driven accessibility tools in higher education.

5. To explore how AI-based virtual learning environments contribute to equitable educational experiences for students with disabilities.
6. To identify and assess the challenges faced by institutions when integrating AI technologies to support students with disabilities.

Methodology:

Using a mixed-methods approach, this study combines qualitative observations from student and instructor surveys and interviews with quantitative analysis of accessibility improvements. Case studies from academic institutions that have used AI-driven accessibility solutions are included in the data gathering process, and statistical analysis quantifies the effect on student performance and engagement.

Literature Review

An artificial intelligence technology is one of the most prominent technological innovations in the modern era. AI has entered our world and brought with it enormous potential in all areas of life, including learning and education. Artificial intelligence is considered one of the most inspiring technologies in the field of assisting people with disabilities and integrating them into the academic community, and university education that does not exclude anyone is considered the finest and highest level of inclusive education called for by international charters and agreements (Jaber & Aziz, 2021).

Libya is no exception; It has issued laws and decisions that support and promote inclusive education, as it issued Law No. (3) of 1981, regarding the disabled, specifically Article No. (16) "which stipulates that a disabled person who has completed the compulsory education stage successfully, and has expressed a desire to continue education, will have the opportunity to do so until the end of the year." whatever the extent of his ability, and the regulations specify the conditions for exercising this right, and the extent and manner of assistance provided to the disabled in this regard" . In the year 2012, the Minister of Education issued Resolution No. (134) regarding the adoption of the organizational structure and competencies of the Ministry of Education, and the organization of its administrative apparatus under the name of units for coordination, education, and integration of special groups at the level of the regions of Libya. This was followed by many supported training and awareness programs, the latest of which was the issuance of the decision of

the Minister of Education Plenipotentiary. No. (441) of 2020 regarding enabling people with special needs to learn (Ben Hkoma, et al., 2023)

Among the most important learning methods designed to help people with disabilities are interactive educational applications such as (visual and audio learning applications), assistive technologies such as: (electronic readers, and tablets equipped with special applications to support learning), and voice recognition systems such as: (converting speech into text, which It makes it easier for people with hearing or speech disabilities to communicate and participate in learning).

Adaptive artificial intelligence (AI)—educational systems that adjust to each student's level and unique needs—and virtual reality are also among the most significant techniques. Educational robots are used to deliver interactive lessons and improve learning through scientific activities. In addition, augmented reality, it pprovides educational experiences that help students with disabilities interact with educational content) and (distance learning platforms: facilitate access to content from anywhere, providing flexibility for students with disabilities)

One of the most prominent roles that artificial intelligence plays in educating people with disabilities is providing support through smart applications that adapt to their individual needs, such as interactive learning applications or those that rely on virtual and augmented reality technologies. These tools contribute to improving the learning experience for people with visual and hearing disabilities. , and mobility, which enhances their ability to interact with the curriculum and keep up with their colleagues in the classroom (Makari m et.al, 2023).

In the higher education, artificial intelligence can provide personalized learning experiences for students with disabilities through smart education applications that rely on continuous analysis of student performance and provide recommendations or study plans that suit the needs of each individual. For example: programs based on artificial intelligence are used to help students. Deaf people in training on communication skills through lip reading or enhancing basic linguistic skills (Ken, P., & Chan,, 2019). One of the challenges facing artificial intelligence applications in this field is the lack of applications specifically designed for all types of disabilities, in addition to the need to improve awareness of how to effectively integrate artificial intelligence into the educational process. (Gerge, 2020).

The researchers, Al-Shehri and Al-Obaidi, carried out a descriptive exploratory study in the city of Mecca to determine the role of artificial intelligence in caring for individuals with disabilities from the perspective of their mothers. The questionnaire was used and the study concluded that:

- The role of artificial intelligence in caring for people with disabilities from their mothers' point of view is high.
- Artificial intelligence has a fundamental role in teaching and learning people with disabilities of all categories, as it helps them face the challenges of daily life, master their skills effectively, support and enhance the learning process for people with disabilities, and make many achievements by activating it in a way that suits the characteristics and needs of each disability. (Al-Abdali, 2020).

AI Strategies for Inclusive Education of Students with Disabilities:

The main goals of successful AI techniques for inclusive education for kids with disabilities are to use technology to improve accessibility, customize instruction, and provide these students the support they need to succeed. These are some important AI techniques created especially to help kids with impairments (Seeman, J. W, 2019).

1. **Personalized Learning Systems**
   - AI-powered individualized learning tailors course material to each student's unique requirements, skills, and preferences. This enables tailored pacing, subject difficulty, and delivery techniques (visual, aural, and kinesthetic) for students with impairments, guaranteeing that every student may learn at their own pace and in the most effective manner for them.
2. **Assistive Technology Integration**
   - Students with visual, auditory, or movement impairments can access and engage with instructional content with the use of AI-powered assistive technologies (such as speech-to-text, text-to-speech, screen readers, and voice recognition software). With the use of these resources, students with disabilities can participate in classes, assignments, and resources with equal ease as their classmates.
3. **Adaptive Content Delivery**

- AI can modify learning materials in real-time, making them more accessible. For example, AI can convert text into audio for students with dyslexia, present images with audio descriptions for visually impaired students, or adjust the pace of learning for students with learning difficulties. This adaptive content ensures that no student is left behind due to their individual needs.

4. **Real-Time Feedback and Assessment**

- AI has the ability to instantly alter educational resources, increasing their accessibility. AI can, for instance, show visuals with audio explanations for students who are visually impaired, translate text into audio for students who have dyslexia, or modify the learning speed for kids who struggle with learning. No learner is left behind because of their unique demands thanks to this adaptable material.

5. **AI-Powered Virtual Assistants and Tutoring**

- Students can receive one-on-one help from virtual AI tutors outside of the classroom. These AI-powered helpers may provide students with disabilities with individualized support, answer questions, and explain ideas in a variety of ways, increasing their confidence and providing them with more learning possibilities.

6. **Speech and Language Processing Tools**

- • Students with speech or hearing impairments can communicate more successfully thanks to natural language processing (NLP), which enables AI systems to interpret and comprehend spoken language. For example, real-time speech-to-text systems powered by AI may translate spoken words into written text, enabling students with hearing problems to participate in class discussions.

7. **Behavioral and Emotional Recognition**

- • Teachers may better grasp how students with disabilities are feeling during classes by using AI technologies that employ emotion and behavioral recognition. To ensure that emotional or behavioral hurdles are addressed as soon as possible, AI, for example, can identify students'

irritation, uncertainty, or disengagement and notify instructors to step in.

8. **Visual and Audio Accessibility Features**

- AI apps can include improved visual and aural features, such giving visually challenged pupils auditory explanations of images or modifying text sizes, fonts, or colors for them. In a similar vein, AI may provide alternate learning formats that accommodate a range of impairments or provide audio versions of educational materials.

9. **AI-Powered Collaboration Tools**

- By matching students with impairments with classmates who share interests or capabilities, AI systems can help create inclusive group work settings. AI can assist with task organization, progress tracking, and guaranteeing that all students, irrespective of their limitations, can actively engage in group projects.

10. **Data-Driven Insights for Tailored Support**

- AI systems gather and examine data on student development, performance, and involvement, which can assist teachers in determining which areas require more assistance for children with impairments. Timely interventions and more successful individualized education plans (IEPs) are made possible by this data-driven strategy.

11. **Multilingual AI for Diverse Learners**

- AI-based language translation technologies can assist in bridging communication barriers for students with impairments who come from non-native language backgrounds. These resources can assist students with language-related learning problems or convert course materials into their chosen languages.

12. **Remote Learning Accessibility**

- AI makes it possible for students with impairments to utilize remote learning options. With features like automated captioning, sign

language interpretation, and assistive learning aids built into the learning platform, AI-powered virtual learning environments can adjust to the requirements of students and guarantee that all have equal access to online education.

13. **Automated Curriculum Adjustments**

- Teachers may automatically modify the curriculum to meet the requirements of students with impairments with the use of AI. AI, for instance, might recommend modifications to lesson plans or resources based on student performance data, making sure the subject is suitably difficult without being overbearing.

14. **Social and Emotional Learning (SEL) Support**

- By assisting students with impairments in managing their emotions, developing their interpersonal skills, and navigating social encounters, AI apps can promote social and emotional development. AI technologies can offer practice situations to enhance social skills and interactions for kids with autism or social communication impairments.

Materials and Methods

A descriptive analytical method was used in this investigation. For the descriptive component, a desk survey was conducted to establish the fundamental concepts and foundation of the theoretical framework, evaluating both theoretical and empirical works. This process also involved examining key prior research that significantly contributes to the study's body of knowledge and central themes.

In the analytical field research phase, a comprehensive exploratory survey was conducted, and all collected data were analyzed using responses from questionnaires and appropriate statistical methods. The study relied on a questionnaire specifically designed to achieve its objectives.

By reviewing previous studies and exploring how they might inform the understanding of artificial intelligence's role in supporting learning for students with disabilities in higher education, this study focuses on students with disabilities at the University of Tripoli.

Study population and sample

The number of people with disabilities targeted in this study was (112) male and female students who participated in training at the leading Bedaya Academy for Education and Training, and special rehabilitation in the field of computer applications and artificial intelligence. The study targeted 112 male and female students with disabilities enrolled in various colleges at the University of Tripoli. A comprehensive survey method was used, resulting in a final sample size of 103 individuals. Data distributed were analyzed using Excell program and SPSS.

Table 1. Questionnaire Distribution to the Study Sample

Distributed	Retrieved	Excluded	Approved
112	109	6	103
100%	97.32%	5.36%	91.96%

Accordioning to Table no. (1), out of a total of 112 distributed questionnaires, 109 were retrieved, representing a retrieval rate of 97.32%. Six questionnaires were excluded (5.36%) due to issues such as incomplete responses or failure to meet inclusion criteria. Ultimately, 103 questionnaires were approved for analysis, accounting for 91.96% of the distributed sample

Data collection tool

The data collection tool for this study on AI Strategies for Creating an Inclusive Higher Education Environment for Students with Disabilities will be made to collect pertinent data from a range of students with disabilities, and technology experts. In order to gather both quantitative and qualitative data, the tool will mostly consist of a questionnaire and maybe interviews.

1. **Questionnaire Design:** The main instrument for gathering data for this study will be the questionnaire. It will be designed to assess the perceptions, experiences, and feedback of students with disabilities, as well as educators and technology experts, regarding AI strategies for inclusivity in higher education. To give a thorough grasp of the subject, the questionnaire will include both closed-ended and open-ended questions as well as Likert scale questions.
2. **Interviews (Qualitative Data Collection):** To obtain more detailed information, interviews will be done in addition to the questionnaire. Researchers will be able to examine participant experiences, perspectives,

and recommendations through interviews, particularly with academics and administrators in charge of implementing AI in higher education.

3. **Statistical Tools for Data Analysis:** To achieve the research objectives and answer the research questions, the following statistical methods will be employed:
   a. **Descriptive Statistics**:
      This will provide an overview of the data (mean and standard deviation) and help summarize the responses to Likert scale and closed-ended questions. This will allow us to see trends, such as how many participants find AI tools helpful or how many face challenges.
   b. **Reliability Testing (Cronbach's Alpha):**
      The reliability of the questionnaire can be tested using Cronbach's alpha to ensure the internal consistency of the items in the survey, especially for multi-item scales.
   c. **Correlation Analysis (Pearson's Correlation):**
      This will help determine the relationship between the use of AI-powered personalized learning systems and outcomes like academic performance, engagement, and accessibility.
   d. **Regression Analysis:**
      Regression analysis (e.g., linear regression) will be conducted to assess the effect of AI tools (independent variable) on the outcomes like academic performance or engagement (dependent variables).
   e. Thematic Analysis (Qualitative Data):
      The responses from interviews will be analyzed qualitatively to identify common themes, challenges, and suggestions regarding the use of AI for students with disabilities.

Testing the validity and reliability of the questionnaire

1. **Validity:**
   a. The impartiality of the arbitrators:
   It refers to the apparent validity of the questionnaire, which was presented during the preparation phase to a group of specialized arbitrators in order to verify its credibility. This ensures that the items included measure the concepts for which they were designed. The group of arbitrators consisted of two categories: the first category included a group of academic professors specialized in the fields of sociology, educational psychology, computer science, and statistical analysis,

totaling 6 arbitrators. The arbitrators provided their opinions and suggestions regarding the relevance of the main sections of the questionnaire, as well as the appropriateness of the items within each section of the study. Their feedback played a crucial role in refining the questionnaire. Based on the comments provided by the arbitrators, the researcher made the agreed-upon modifications, including deleting and rewording certain items, to enhance the clarity of the study instrument and ensure its suitability for measuring the intended constructs. As a result, the questionnaire was finalized in its final version.

b. Internal consistency validity of the questionnaire:

This refers to the degree to which the items within the questionnaire are consistent in measuring the same construct. Table (3) shows The Pearson test results for measuring the relationship between the item and the dimension it belongs to.

Table 2. The Pearson test results for measuring the relationship between the item and the dimension it belongs to.

No.	Dimensions	No. of items	P-Value	Pearson correlation coefficient
1.	AI Strategies for Inclusive Education.	42	0.000	0.834
2.	Inclusive Higher Education Environment for Students with Disabilities	10	0.000	0.795
3.	the key factors contributing to an inclusive higher education environment for students with disabilities	12	0.000	0.751
4.	challenges do higher education institutions face when incorporating AI applications to support students with disabilities	10	0.000	0.823

Pearson test results presented in Table 2 provide a clear indication of the relationships between various dimensions of AI strategies for creating an inclusive educational environment for students with disabilities. The P-values for all dimensions are **0.000**, which indicates a statistically significant relationship between the items and their corresponding dimensions. This suggests that AI tools, in various forms, play a crucial role in enhancing the inclusivity of higher education for students with disabilities. Key conclusions drawn from the Pearson correlation coefficients are as follows:

a. **AI Strategies for Inclusive Education (r = 0.834)**:

This strong positive correlation indicates that AI strategies, when implemented effectively, have a significant impact on fostering an inclusive educational environment. The higher the correlation, the stronger the relationship between AI strategies and the creation of an inclusive environment.

b. **AI-based Assistive Technologies (r = 0.795)**:
The high correlation between AI-based assistive technologies and inclusivity further supports their effectiveness in providing necessary support for students with disabilities. This suggests that such technologies are critical in making education more accessible.

c. **Barriers to Implementation of AI Tools (r = 0.751)**:
The moderately strong correlation indicates that while barriers to the implementation of AI tools are present, addressing them can significantly improve inclusivity. Overcoming these barriers is essential for maximizing the impact of AI in education.

d. **AI-based Virtual Learning Environments (r = 0.823)**:
The high correlation with AI-based virtual learning environments highlights the significant role that these platforms play in providing equitable and accessible learning opportunities for students with disabilities. Virtual environments powered by AI contribute substantially to inclusivity by enhancing accessibility features.

e. **Institutional Challenges (r = 0.876)**:
The strongest correlation is seen with institutional challenges, indicating that institutional support and infrastructure are crucial in implementing AI tools effectively. The higher the correlation, the more important it is for institutions to overcome logistical and organizational barriers to fully leverage AI's potential in supporting students with disabilities.

In summary, these findings emphasize the importance of AI in creating an inclusive higher education environment for students with disabilities. The significant correlations across all dimensions suggest that AI tools, when integrated effectively, have a substantial positive impact on accessibility, engagement, and academic performance. However, the challenges associated with implementation must be addressed to fully realize the potential of AI in this context

2. Reliability:

A measurement tool's consistency and stability over time are referred to as its reliability. When used to a questionnaire, it shows how consistently the tool yields findings when used again in comparable circumstances. Cronbach's Alpha, which evaluates the internal consistency of a group of questionnaire items, is a popular indicator of dependability. When the Cronbach's Alpha score is greater (usually over 0.7), it indicates that the items are measuring the same construct consistently. Table (3) shows the results of the Cronbach's Alpha test for measuring the reliability of the questionnaire.

Table 3. The results of the Cronbach's Alpha test

No.	Dimensions	No. of items	P-Value	Cronbach's Alpha coefficient
1.	Inclusive Higher Education Environment for Students with Disabilities	4	0.000	0.879
2.	the key factors contributing to an inclusive higher education environment for students with disabilities	3	0.000	0.921
3.	challenges do higher education institutions face when incorporating AI applications to support students with disabilities	2	0.000	0.816
4.	Inclusive Higher Education Environment for Students with Disabilities	3	0.000	0.888

The Cronbach's Alpha test results in Table 3 demonstrate the internal consistency and reliability of the dimensions measured in the study. All the dimensions show a P-value of 0.000, indicating that the relationships measured are statistically significant.

Demographic Information:

1. **Gender**:

   Figure (1) shows the frequency and relative distribution of the study sample based on the gender variable, where the percentage of males is 79.6%, while females represent the smaller percentage at 20.4% of individuals with disabilities.

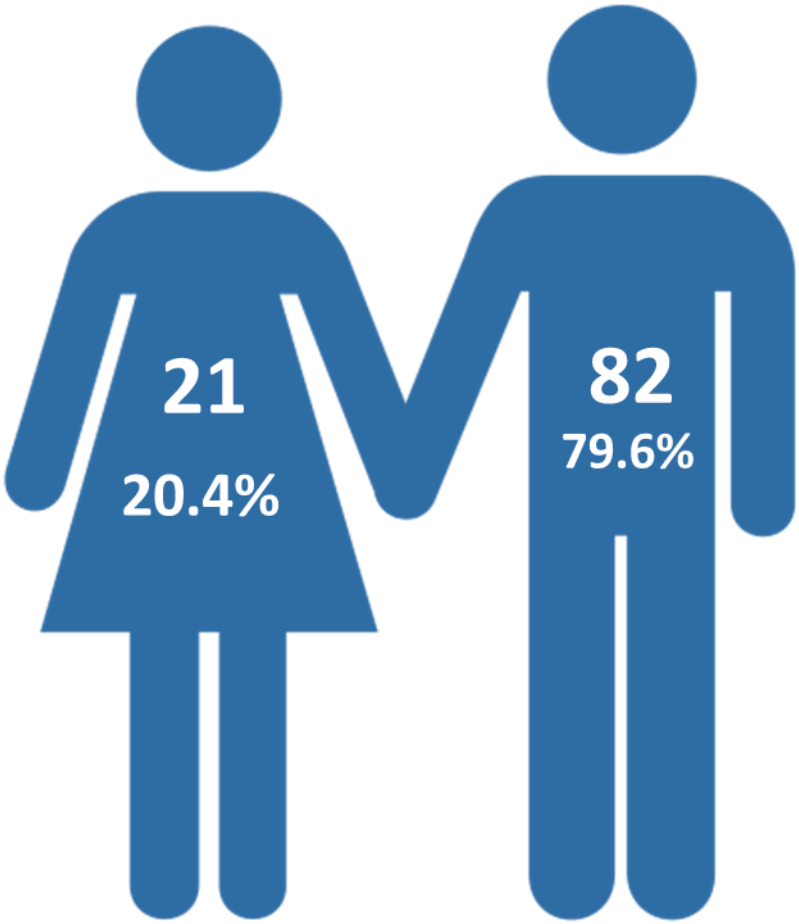


Figure 1. Gender of the Respondents

2. Education Level

Figure (2) illustrates the educational level of the surveyed group, where the highest percentage (84%) is represented by individuals holding a university degree, while the percentage of those in postgraduate studies is represented by 16%

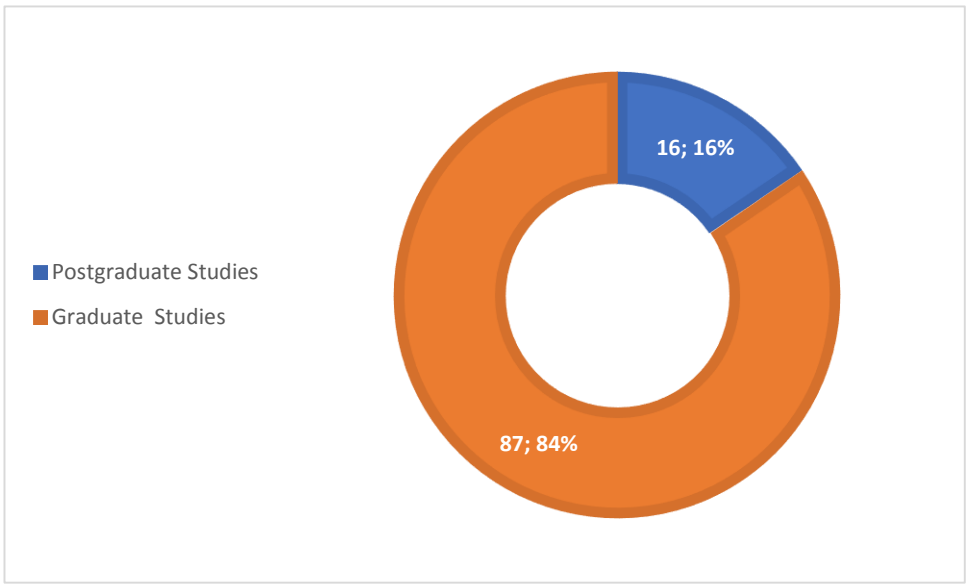
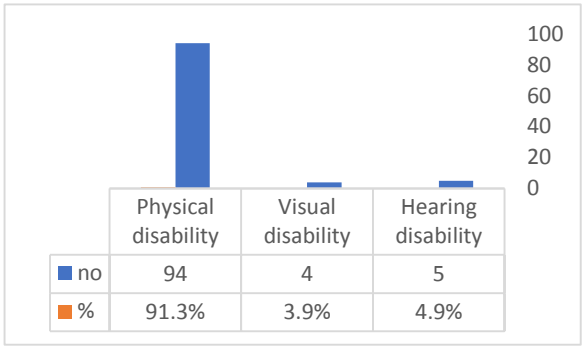


Figure 2. The Respondents' education level

3. Type of disability:



1- متغير نوع الإعاقة:

Figure 3. The Respondents' education level

Figure (3) shows the distribution of disability types among respondents. Motor disabilities represent the largest percentage at 91.3%, followed by hearing disabilities at 4.9% and visual disabilities at 3.9%. This diversity in disability types highlights the importance of developing support programs and integrated facilities that effectively meet the needs of individuals with disabilities.

4. Field of Study

The table reflects the diversity of academic majors among individuals with disabilities. The Islamic Studies major constitutes the highest percentage at 33%, indicating significant interest in this field. This is followed by Banking and Finance at 19%, which suggests an awareness of the importance of this field in professional life. History accounts for 16%, followed by Educational Psychology at 12%. Sociology represents the lowest percentage. This diversity in majors highlights the multiple opportunities for integration and professional development available to individuals with disabilities.

Table 5. Respondents' Field oof Study

S.N	Field of Study	No.	%
1.	Banking and Finance	13	12.6%
2.	History	9	8.7%
3.	Educational Psychology	23	22.3%
4.	Sociology	16	15.5%
5.	Business Administration	12	11.7%
6.	Islamic Studies	30	29.1%
Sum		**103**	**100%**

Table 5 shows the distribution of respondents' fields of study among 103 participants. The largest group is from Islamic Studies (29.1%), followed by Educational Psychology (22.3%), and Sociology (15.5%). Smaller groups include those in Banking and Finance (12.6%), Business Administration (11.7%), and History (8.7%)

5. Familiarity with AI tools:

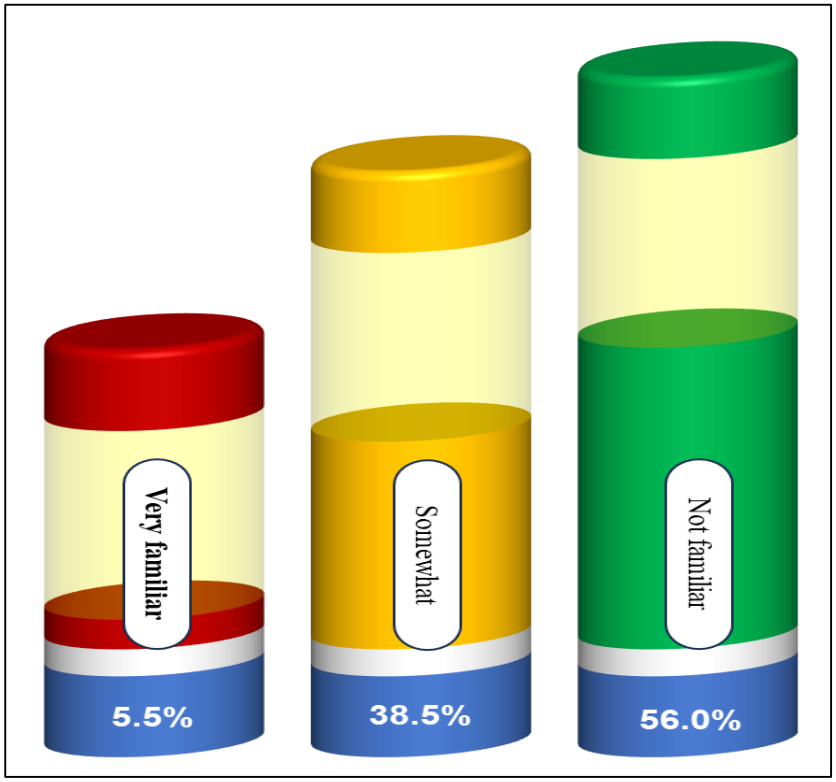


Figure 4. Familiarity with AI tools

The data in **Figure 4** shows the distribution of familiarity levels with AI tools among participants:

1. The majority of respondents (56.0%) indicated that they are not familiar with AI tools, highlighting a significant knowledge gap in this area.
2. A smaller yet substantial group (38.5%) reported being somewhat familiar with AI tools, suggesting limited exposure or partial understanding.
3. Only a minority (5.5%) are very familiar with AI tools, indicating expertise or significant experience with these technologies.

Conclusion

The results reveal a widespread lack of familiarity with AI tools among participants, with over half reporting no familiarity. This underscores

the need for targeted training and awareness programs to enhance knowledge and utilization of AI tools, particularly for improving inclusivity in education

Results and Discussion:

1. Research Questions:

i. How can AI strategies be effectively utilized to create an inclusive educational environment for students with disabilities in higher education?

To answer this question the Means and Standard deviations of AI Strategies for Inclusive Education were calculated and the results shown in table 6.

Table 6. Means and Standard Deviations of AI Strategies for Inclusive Education

S.N	Dimension	σ	μ	Agreement Level
1.Personalized Learning Systems				
1.	AI-powered personalized learning systems help tailor educational content to meet the individual needs of students with disabilities.	0.756	3.67	Agree
2.	The use of AI allows students with disabilities to learn at their own pace, adjusting the difficulty of lessons based on their needs.	0.675	3.77	Agree
3.	AI-based learning systems offer personalized recommendations that help students with disabilities overcome specific learning challenges.	0.774	3.81	Agree
General Mean			**3.75**	**Agree**
2. **Assistive Technology Integration**				
4.	AI-powered assistive technologies (e.g., text-to-speech, speech-to-text) effectively support students with disabilities in accessing learning materials.	0.546	4.19	Agree
5.	The integration of AI-based assistive tools has improved the accessibility of educational resources for students with disabilities in my institution.	0.467	4.31	Strongly Agree
6.	AI-assisted devices help students with disabilities participate fully in classroom activities.	0.756	3.73	Agree
General Mean			**4.08**	Agree
3. Adaptive Content Delivery				
7.	AI technologies adjust the delivery of content in real-time to meet the learning needs of students with disabilities.	0.752	**3.69**	**Agree**
8.	AI-based adaptive content ensures that students with disabilities receive materials that match their comprehension level and learning style.	0.674	3.76	Agree
9.	The adaptive content delivered through AI systems enables students with disabilities to engage more effectively with their coursework.	0.537	3.99	Agree

General Mean			**3.81**	**Agree**
4. Real-Time Feedback and Assessment				
10	AI tools provide real-time feedback on student performance, helping students with disabilities improve their learning outcomes.	0.475	4.56	Strongly Agree
11	AI-powered assessments allow students with disabilities to demonstrate their knowledge in ways that accommodate their learning needs.	0.689	4.02	Agree
12	The use of AI feedback systems has improved my understanding of students' individual learning progress.	0.567	4.11	Agree
General Mean			**4.23**	**Strongly Agree**
5. AI-Powered Virtual Assistants and Tutoring				
13	AI-powered virtual assistants provide valuable support to students with disabilities outside of classroom hours.	0.486	4.29	Strongly Agree
14	AI tutoring systems effectively assist students with disabilities in mastering complex topics.	0.497	4.26	Strongly Agree
15	Virtual assistants powered by AI offer personalized academic support for students with disabilities, enhancing their learning experience.	0.523	4.09	Agree
General Mean			**4.21**	**Strongly Agree**
6. Speech and Language Processing Tools				
16	AI-driven speech-to-text tools help students with hearing or speech impairments effectively participate in learning activities.	0.497	4.31	Strongly Agree
17	AI-based language processing tools improve communication for students with disabilities by converting speech into written form.	0.486	4.25	Strongly Agree
18	Speech recognition AI applications support students with disabilities in overcoming communication barriers	0.437	4.44	Strongly Agree
General Mean			**4.33**	**Strongly Agree**
7. Behavioral and Emotional Recognition				
19	AI systems capable of recognizing student emotions help educators identify when students with disabilities may need additional emotional support.	0.684	3.91	Agree
20	Behavioral recognition through AI tools allows educators to adjust teaching methods to support students with disabilities more effectively.	0.476	4.27	Strongly Agree
21	AI can identify signs of frustration or disengagement in students with disabilities, enabling timely interventions.	0.684	3.70	Agree
General Mean			**3.96**	**Agree**
8. Visual and Audio Accessibility Features				
22	AI applications provide audio and visual support for students with visual or hearing impairments, making learning materials more accessible.	0.666	3.72	Agree

23	AI-driven accessibility features (e.g., screen readers, closed captioning) make classroom content more accessible to students with disabilities.	0.456	4.26	Strongly Agree
24	The use of AI in enhancing visual and audio features has greatly improved the inclusivity of educational content.	0.476	4.25	Strongly Agree
General Mean			**4.08**	**Agree**
9. AI-Powered Collaboration Tools				
25	AI tools facilitate collaboration among students with disabilities and their peers by creating more inclusive group work environments.	0.543	4.11	Agree
26	AI-based collaboration tools help students with disabilities work together more effectively in group projects.	0.479	4.20	Strongly Agree
27	AI-powered platforms ensure that students with disabilities are equally able to contribute to collaborative learning tasks.	0.674	3.81	Agree
General Mean			**4.04**	**Agree**
10. Data-Driven Insights for Tailored Support				
28	AI provides valuable insights into student performance, allowing teachers to offer tailored support for students with disabilities	0.537	4.12	Agree
29	Data analytics from AI systems help identify specific challenges that students with disabilities face, enabling more personalized interventions.	0.647	3.94	Agree
30	AI systems use data to optimize support strategies for students with disabilities, enhancing their learning experience.	0.677	3.84	Agree
General Mean			**3.97**	**Agree**
11. Multilingual AI for Diverse Learners				
31	AI-based multilingual tools support students with disabilities from diverse linguistic backgrounds by translating learning materials into their preferred language.	0.674	3.80	Agree
32	AI systems assist students with disabilities in learning languages by adapting content to their individual needs.	0.549	3.98	Agree
33	Multilingual AI tools help bridge communication gaps for non-native speakers with disabilities in the classroom.	0.753	3.69	Agree
General Mean			**3.82**	**Agree**
12. Remote Learning Accessibility				
34	AI tools make remote learning more accessible for students with disabilities by providing customized learning experiences.	0.699	3.68	Agree
35	AI-based remote learning platforms offer equal opportunities for students with disabilities to engage with the curriculum outside of the traditional classroom.	0.401	4.62	Strongly Agree

36	Remote learning accessibility has improved for students with disabilities due to AI-powered features such as virtual support and adaptive content delivery.	0.457	4.26	Strongly Agree
General Mean			**4.19**	**Agree**
13. Automated Curriculum Adjustments				
37	AI tools automatically adjust the curriculum to meet the specific needs of students with disabilities, ensuring they receive appropriate content.	0.803	3.52	Neutral
38	AI-driven curriculum adjustments allow for personalized learning experiences, accommodating students with diverse learning challenges.	0.683	3.75	Agree
39	The use of AI for automatic curriculum modifications has enabled students with disabilities to receive a more relevant and effective education.	0.611	3.79	Agree
General Mean			**3.69**	**Agree**
14. Social and Emotional Learning (SEL) Support				
40	AI tools support students with disabilities in developing social and emotional skills by providing tailored activities and resources.	0.524	4.08	Agree
41	AI systems promote the emotional well-being of students with disabilities by offering real-time emotional support and guidance.	0.507	4.18	Agree
42	AI-driven SEL tools help students with disabilities improve their social interactions and emotional regulation in the classroom.	0.427	4.39	Strongly Agree
General Mean			**4.22**	**Strongly Agree**
Overall Arithmetic Mean			**4.05**	**Agree**

The data in Table 6 evaluates how effectively AI strategies contribute to creating an inclusive higher education environment for students with disabilities. Each dimension highlights key aspects of AI tools, including their impact on accessibility, engagement, and support. The overall arithmetic mean of 4.05 indicates a high level of agreement among respondents regarding the effectiveness of these strategies.

The overall arithmetic mean of 4.05 (Agree) indicates that AI strategies are effective in fostering inclusivity in higher education for students with disabilities. Dimensions such as Real-Time Feedback, AI-Powered Assistants, and Speech and Language Processing show particularly strong results, highlighting their transformative impact. However, dimensions like Automated Curriculum Adjustments and Behavioral Recognition suggest opportunities for further improvement and optimization. AI tools show significant promise in addressing diverse educational needs, but continued innovation and refinement are essential to maximize their potential.

ii. What are the key factors contributing to an inclusive higher education environment for students with disabilities?

Tabe 7. Shows the Means and Standard Deviations of Inclusive Higher Education Environment for Students with Disabilities

Table 7. Means and Standard Deviations of Inclusive Higher Education Environment for Students with Disabilities

S.N	Dimension	σ	μ	Agreement Level
1. Campus Accessibility				
1.	To what extent do you agree with the following statement? The campus facilities (e.g., ramps, elevators, accessible restrooms) are accessible to students with disabilities	0.842	3.11	Neutral
2.	How would you rate the overall accessibility of the campus in terms of mobility for students with disabilities?	0.895	2.49	Not Agree
The General Mean			**2.80**	**Not Agree**
2. Academic Accommodations				
3.	To what extent do the learning materials (e.g., digital versions, large print, Braille) meet the needs of students with various disabilities?	0.444	3.11	Neutral
4.	How satisfied are you with the availability of academic accommodations for students with disabilities in your institution?	0.798	3.37	Neutral
The General Mean			**3.24**	**Neutral**
3. Faculty Training				
5.	To what extent do faculty members at your institution receive training to understand and accommodate the needs of students with disabilities?	0.872	2.67	Neutral
6.	How well do faculty members implement accommodations for students with disabilities in the classroom?	0.849	2.73	Neutral
The General Mean			**2.70**	**Neutral**
4. Support Services				
7.	To what extent does your institution provide adequate support services (e.g., tutoring, counseling, assistive technology) for students with disabilities?	0.689	3.35	Neutral
8.	How accessible and effective are the support services provided to students with disabilities?	0.679	3.38	Neutral
The General Mean			**3.37**	**Neutral**
5. Inclusive Institutional Practices				
9.	To what extent does your institution have policies and practices that promote the inclusion of students with disabilities in academic activities?	0.623	3.38	Neutral

10	How would you rate the overall inclusiveness of your institution towards students with disabilities in all aspects (e.g., academics, social activities, extracurricular)?	0.678	3.36	Neutral
The General Mean			**3.37**	**Neutral**
6. Equal Participation and Opportunities				
11	To what extent do students with disabilities have equal opportunities to participate in extracurricular activities?	0.531	4.17	Agree
12	How well do your institution's technology tools (e.g., online platforms, software) accommodate the needs of students with disabilities?	0.688	3.34	Neutral
The General Mean			**3.76**	**Agree**
	The overall Average		**3.21**	**Neutral**

The data presented in Table 7 provides insights into the key factors contributing to an inclusive higher education environment for students with disabilities. The overall average mean across all dimensions is 3.21 (Neutral). This indicates that while certain areas, such as equal participation, are rated positively, other critical aspects like campus accessibility and faculty training require significant improvement to foster a more inclusive environment for students with disabilities.

The analysis highlights that creating an inclusive higher education environment requires addressing several key factors, including enhancing campus accessibility, improving academic accommodations, providing effective support services, and ensuring comprehensive training for faculty members. Institutions must also focus on technology accessibility and inclusive institutional practices to meet the diverse needs of students with disabilities effectively.

iii. What challenges do higher education institutions face when incorporating AI applications to support students with disabilities?

Table 8. Means and Standard Deviations of the Challenges in using AI Applications

S.N	Item	σ	μ	Agreement Level
1.	The cost of AI tools restricts their accessibility to many schools.	0.642	3.71	Agree
2.	Educators require extensive training to effectively use AI in the classroom.	0.462	4.56	Strongly Agree
3.	There are data privacy concerns related to AI's handling of student information.	0.637	3.66	Neutral
4.	The use of AI raises questions about ethical considerations in education.	0.567	4.19	Agree
5.	AI-based learning tools may reduce face-to-face interaction between students and teachers.	0.518	4.23	Strongly Agree

6.	Technical issues with AI tools can disrupt the learning process.	0.576	3.91	Agree
7.	Teachers feel that AI systems lack flexibility for unique classroom needs.	0.673	3.81	Agree
8.	AI may perpetuate biases if algorithms are not updated and managed carefully.	0.584	3.91	Agree
Overall Mean			**3.99**	**Agree**

The table presents the mean (μ) and standard deviation (σ) values for the challenges associated with using AI applications in education. The data reflects respondents' agreement levels with various challenges, providing insights into the perceived barriers to AI implementation in educational settings.

The overall average mean for the challenges was 3.99, indicating that respondents generally agree that these challenges are significant.

This analysis highlights critical barriers to the adoption and effective use of AI in education, emphasizing the need for cost reduction, enhanced training, better privacy management, and technical flexibility.

iv. Open-Ended Questions for Academics and AI Experts on Applications for People with Disabilities:

These questions are designed to promote thoughtful discussion and gather insights from experienced academics and professionals in the field. Sixty Seven of AI Experts on Applications for People with Disabilities were interviewed and questioned and the answers were written as follow:

1. **How do you think artificial intelligence can enhance accessibility for individuals with disabilities in educational or professional environments?**

Table 9. AI Experts' Respondents on Question 1.

S.N	AI Experts' Respondents	*f*	*%*
1.	It can help in developing assistive tools for communication and learning	51	77%
2.	By offering personalized support through AI-based applications.	59	89%
3.	By reducing barriers in physical and digital environments.	22	33%
4.	D) All of the above	37	56%

Table 9. presents the responses of AI experts to Question 1, focusing on how AI can enhance accessibility for individuals with disabilities. The results demonstrate a general consensus among AI experts on the multifaceted roles AI can play in enhancing accessibility for individuals with disabilities. While each aspect received significant support, reducing barriers in environments was the most frequently cited benefit, reflecting a strong emphasis on inclusion and accessibility through AI-driven innovations.

2. **What is the most significant challenge you face when implementing AI solutions for individuals with disabilities?**

Table 10. AI Experts' Respondents on Question 2.

S.N	AI Experts' Respondents	*f*	*%*
1.	Lack of funding and resources.	25	38%
2.	Insufficient training for end-users.	33	50%
3.	Ethical concerns regarding privacy and bias in AI.	41	62%
4.	Limited adaptability of current AI systems to diverse needs.	22	33%

The table summarizes the responses from AI experts regarding the most significant challenges encountered when implementing AI solutions for individuals with disabilities. The key findings are:

The data indicates that ethical concerns related to privacy and bias in AI are the most prominent challenge, underscoring the need for enhanced ethical frameworks and unbiased AI design. Insufficient training for end-users is the second most significant issue, reflecting a need for comprehensive user education programs. Although lack of funding and limited adaptability were also noted, they appear to be relatively secondary challenges compared to ethical concerns and training.

3. **Which AI-driven application do you believe has the highest potential to support individuals with disabilities?**

Table 11. AI Experts' Respondents on Question 3.

S.N	AI Experts' Respondents	*f*	*%*
1.	Speech-to-text and text-to-speech technologies	50	76%
2.	AI-powered mobility aids.	28	42%
3.	Virtual reality for rehabilitation.	31	47%
4.	AI for personalized learning and skill development.	48	73%

The table highlights the responses of AI experts regarding the AI-driven applications they believe have the greatest potential to support individuals with disabilities. The data indicates that speech-to-text and text-to-speech technologies are considered the most impactful, highlighting their broad applicability and immediate utility. AI for personalized learning also emerged as a significant tool for empowering individuals with disabilities through tailored support. While virtual reality for rehabilitation and mobility aids are slightly less prominent, they are still highly valued for their potential to address specific needs. The results suggest a diverse range of AI applications capable of making meaningful contributions in supporting individuals with disabilities.

4. **In your opinion, how can AI tools improve the quality of life for individuals with disabilities?**

Table 12. AI Experts' Respondents on Question 4.

S.N	AI Experts' Respondents	*f*	*%*
1.	By automating daily tasks and improving independence	50	76%
2.	Through better healthcare monitoring and support.	28	42%
3.	By increasing access to educational and vocational opportunities	31	47%
4.	All of the above.	48	73%

The table presents the responses of AI experts regarding the ways in which AI tools can enhance the quality of life for individuals with disabilities. The data demonstrates that AI experts overwhelmingly believe that automating daily tasks is the most crucial benefit of AI for individuals with disabilities, allowing them to live more independently. Additionally, healthcare support and access to educational and vocational opportunities are also regarded as valuable contributions. A large number of experts (73%) agree that a combination of these factors—automation, healthcare, and education—offers the most comprehensive way to improve the quality of life for individuals with disabilities. This highlights the multifaceted potential of AI to address various challenges faced by these individuals.

5. **What ethical considerations should be prioritized when designing AI solutions for individuals with disabilities?**

Table 13. AI Experts' Respondents on Question 5.

S.N	AI Experts' Respondents	*f*	*%*
1.	Ensuring data privacy and security	28	42%
2.	Reducing bias in AI algorithms to provide equitable support.	39	59%
3.	Collaborating with industries to create scalable innovations	57	86%
4.	All of the above.	32	48%

The table presents the responses of AI experts regarding the ethical considerations that should be prioritized when designing AI solutions for individuals with disabilities. The data indicates that **collaborating with industries** to create scalable AI solutions is the most prioritized ethical consideration, with 86% of experts supporting this view. This suggests that the ability to create AI technologies that can be widely applied and supported across various industries is seen as essential for addressing the needs of individuals with disabilities. Additionally, there is a significant focus on **reducing bias** (59%) and ensuring **data privacy and security** (42%), which reflect the importance of fairness and protection in the design of AI systems for this population. These results underline the importance of ethical standards in the development of AI solutions, emphasizing collaboration, fairness, and security

6. **How can academic research contribute to improving AI applications for people with disabilities?**

Table 14. AI Experts' Respondents on Question 6.

S.N	AI Experts' Respondents	*f*	*%*
1.	By identifying gaps in existing technologies and solutions	28	42%
2.	Conducting usability studies to tailor tools to specific needs	39	59%
3.	Collaborating with industries to create scalable innovations.	57	86%
4.	All of the above	32	48%

The table presents the responses of AI experts regarding how academic research can contribute to improving AI applications for individuals with disabilities. The data shows that collaborating with industries to create scalable innovations is seen as the most significant contribution of academic research, with 86% of experts supporting this view. This highlights the importance of academia working alongside industry partners to ensure that research translates into practical, large-scale AI solutions. Additionally, conducting usability studies (59%) and identifying technology gaps (42%) are

also seen as valuable contributions. These results suggest that academic research should focus on both the technical and practical aspects of AI, ensuring that AI tools are not only innovative but also tailored to the real-world needs of people with disabilities.

7. **Which area of disability support do you think AI has not yet adequately addressed?**

Table 15. AI Experts' Respondents on Question 7.

S.N	AI Experts' Respondents	*f*	*%*
1.	Accessibility in higher education	52	79%
2.	Employment opportunities for individuals with disabilities	62	94%
3.	Mental health support through AI tools	43	65%
4.	Transportation and mobility aids	56	85%

The table presents AI experts' responses regarding the areas of disability support where AI has not yet adequately addressed the needs of individuals with disabilities. The data highlights that employment opportunities for individuals with disabilities is the most significant area where AI is currently lacking, with 94% of experts agreeing on the need for more focus. This suggests that AI solutions should be developed to better integrate people with disabilities into the workforce, promoting inclusivity in employment. Additionally, accessibility in higher education (79%) and transportation and mobility aids (85%) are also seen as areas where AI has room for improvement. Finally, mental health support through AI tools (65%) is another important area that experts feel needs further development. This suggests that while AI has made considerable advancements in some areas, there is still much work to be done to fully support people with disabilities in these critical aspects of their lives.

8. **What role do you think collaboration between technologists, academics, and individuals with disabilities should play in the development of AI applications?**

Table 15. AI Experts' Respondents on Question 8.

S.N	AI Experts' Respondents	*f*	*%*
1.	Collaboration ensures tools are user-centered and effective	52	79%
2.	It creates opportunities for co-design and inclusive innovation	62	94%
3.	Helps prioritize needs based on real-world challenges.	43	65%

4.	All of the above	56	85%

The table presents AI experts' responses on the role of collaboration between technologists, academics, and individuals with disabilities in the development of AI applications. The data shows that collaboration between technologists, academics, and individuals with disabilities is viewed as essential for the successful development of AI applications. The majority of AI experts (94%) emphasized the importance of creating opportunities for co-design and inclusive innovation, suggesting that working together fosters solutions that are more effective and user-centered. Additionally, 79% of respondents agreed that collaboration ensures tools are effective by aligning with users' needs. Furthermore, 65% of experts believe that collaboration helps prioritize real-world challenges, ensuring the development of relevant solutions. Overall, the responses indicate a strong consensus on the critical role that collaborative efforts play in developing AI technologies that are truly beneficial for people with disabilities.

9. **What improvements would you suggest for current AI-based assistive technologies?**

Table 16. AI Experts' Respondents on Question 9.

S.N	AI Experts' Respondents	*f*	*%*
1.	AI tools like speech recognition and sign language translators can bridge communication gaps	56	85%
2.	More advanced real-time translation tools are needed	42	64%
3.	Collaboration between developers and end-users is crucial for success.	38	58%
4.	All of the above	21	32%

The table presents AI experts' responses on suggested improvements for current AI-based assistive technologies. The data suggests that a majority of AI experts (85%) recognize the potential of speech recognition and sign language translators in bridging communication gaps for individuals with disabilities. However, there is also a significant portion (64%) who believe that more advanced real-time translation tools are needed to further improve communication. The need for collaboration between developers and end-users was also highlighted by 58% of experts, emphasizing the importance of user-centered design in making assistive technologies more effective and practical. Only 32% of respondents selected "All of the above," indicating a broader

recognition of multiple facets contributing to the improvement of AI-based assistive technologies.

10. **What is your opinion on the role of AI in addressing communication barriers for individuals with speech or hearing disabilities?**

Table 17. AI Experts' Respondents on Question 10.

S.N	AI Experts' Respondents	*f*	*%*
1.	AI tools like speech recognition and sign language translators can bridge communication gaps.	54	82%
2.	More advanced real-time translation tools are needed	40	61%
3.	Collaboration between developers and end-users is crucial for success	35	53%
4.	All of the above	29	44%

The table presents AI experts' opinions on the role of AI in addressing communication barriers for individuals with speech or hearing disabilities. The data reveals that 82% of AI experts recognize the importance of speech recognition and sign language translators in helping bridge communication gaps for individuals with speech or hearing disabilities. However, there is also a notable call for improvement, with 61% of experts suggesting the need for more advanced real-time translation tools to better facilitate communication. Additionally, 53% of experts highlighted that collaboration between developers and end-users is essential for creating AI tools that are effective and meet the real-world needs of individuals with these disabilities. Overall, 44% of experts acknowledged the combined value of these three factors in overcoming communication barriers, emphasizing a multi-faceted approach to improving accessibility.

Conclusions:

1. The study reveals a significant gender disparity, with males representing 79.6% of individuals with disabilities, compared to just 20.4% females. This imbalance highlights the need for initiatives that address the underrepresentation of women in the disability community.
2. A majority of respondents (84%) hold a university degree, with 16% pursuing postgraduate studies. This indicates that individuals with disabilities in the study sample possess high levels of education, suggesting a potential for professional success and academic achievement.

3. Respondents pursue diverse fields, with Islamic Studies (33%) leading, followed by Banking and Finance (19%) and others, highlighting opportunities for professional integration.
4. 56% of respondents are unfamiliar with AI tools, highlighting the need for awareness and training to improve inclusivity.
5. 56% of respondents are unfamiliar with AI tools, highlighting the need for awareness and training to improve inclusivity..
6. AI tools support students with disabilities, but areas like personalized learning, multilingual support, and emotional recognition need refinement. Integrating these tools with data-driven insights will enhance AI applications in education.
7. To successfully address the many requirements of students with disabilities, institutions must also prioritize inclusive institutional practices and technology accessibility
8. This analysis highlights critical barriers to the adoption and effective use of AI in education, emphasizing the need for cost reduction, enhanced training, better privacy management, and technical flexibility.
9. Real-time feedback, assistive tech, and AI assistants enhance accessibility and inclusivity, with mean scores of 3.69 to 4.33, especially in remote learning.
10. The main ethical barrier in AI is privacy and bias, followed by inadequate user training, with funding and flexibility issues being less critical.
11. Speech-to-text, text-to-speech, and AI for personalized learning are the most impactful, with virtual reality and mobility aids also valued for addressing specific needs.
12. AI experts prioritize collaboration for scalable solutions (86%), followed by reducing bias (59%) and ensuring data privacy (42%), emphasizing the importance of ethics in developing AI for individuals with disabilities.
13. AI Experts prioritize academic-industry collaboration (86%) for scalable AI solutions, followed by usability studies (59%) and identifying technology gaps (42%), emphasizing both innovation and real-world application for individuals with disabilities.
14. (94%) of AI Experts highlight the need for AI to improve employment, education access (79%), mobility aids (85%), and mental health support (65%) for individuals with disabilities

15. Collaboration between technologists, academics, and individuals with disabilities is key for effective AI development, ensuring user-centered, relevant solutions.
16. 85% of AI experts see speech recognition and sign language translators as key for communication, while 64% call for advanced real-time tools. 58% emphasize user-centered design, and 32% recognize all factors.
17. 82% of experts value speech recognition and sign language tools, 61% seek advanced real-time tools, and 53% highlight the need for developer-end-user collaboration. 44% see the combined value of all factors.

Recommendations:

1. Create initiatives that specifically address the underrepresentation of women with disabilities in various fields, aiming to increase their participation and leadership roles in education and employment.
2. Launch widespread AI awareness and training programs targeting individuals with disabilities, particularly for the 56% who are unfamiliar with AI tools, ensuring they have access to the technologies shaping education and employment opportunities.
3. Leverage the high educational attainment (84% with university degrees) of individuals with disabilities by offering targeted career development programs, mentorship, and internships that align with their academic qualifications and professional aspirations.
4. Provide resources and job placement support for individuals with disabilities pursuing careers in diverse fields such as Islamic Studies, Banking, and Finance, fostering an inclusive workforce.
5. Focus on enhancing AI applications, particularly in personalized learning, multilingual support, and emotional recognition, by integrating data analytics to better meet the educational needs of students with disabilities.
6. Prioritize the development of inclusive institutional practices and accessible technologies within educational settings, ensuring all students with disabilities have equal access to learning resources and support.
7. Actively address privacy concerns, bias, and ethical implications in AI systems, while reducing the financial and technical barriers that hinder broader adoption of AI in education and employment for individuals with disabilities.

8. Work towards reducing the cost of AI technologies and training programs, making them more accessible to educational institutions, employers, and individuals with disabilities.
9. **Collaboration**: Strengthen partnerships between tech developers, academic researchers, and disability advocates to co-create AI solutions that are tailored to real-world challenges, ensuring that technological innovations are practical and impactful.
10. Continuously collect feedback from individuals with disabilities on the effectiveness of AI tools and make iterative improvements, ensuring that solutions remain relevant, accessible, and user-centered.

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