



Research Article

Role of Artificial Intelligence in Empowering Girls Under 16 Years with Disabilities: A Secondary Data-Based Analytical Study

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Abstract

Artificial Intelligence (AI) has become a powerful tool for promoting inclusive and accessible education, especially for girls under the age of 16 who live with disabilities. Across the world, children with disabilities remain one of the most marginalised groups in education systems, and girls often experience additional barriers due to gender discrimination, social inequality, and limited access to resources. According to UNICEF (2021), many girls with disabilities are denied equal learning opportunities because of social stigma, poverty, and inadequate educational support.

AI-based technologies are helping to reduce these challenges by creating more personalised and accessible learning environments. Tools such as speech recognition software, text-to-speech systems, intelligent tutoring platforms, and AI-driven assistive devices support students with visual, hearing, speech, or learning disabilities. UNESCO (2023) highlights that these technologies improve communication, participation, and independent learning, enabling students to engage more effectively in educational activities. AI can also adapt learning materials according to individual needs, making education more flexible and inclusive.

Despite these advantages, several challenges continue to limit the widespread impact of AI in education. The World Bank (2021) reports that many developing regions still face problems related to poor digital infrastructure, lack of internet connectivity, high technology costs, and insufficient teacher training. These issues create a digital divide that prevents many girls with disabilities from benefiting fully from AI-based educational tools.

Therefore, governments and educational institutions must invest in affordable technology, digital infrastructure, and inclusive policies to ensure that AI contributes effectively to equal educational opportunities for all children.

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KEYWORDS: Artificial Intelligence, Inclusive Education, Girls with Disabilities, Digital Inclusion, Assistive Technology.

1. INTRODUCTION

The integration of Artificial Intelligence (AI) in education has created new possibilities for inclusive and accessible learning across the world. According to UNESCO (2023), AI technologies are transforming traditional education systems by enabling adaptive learning environments, personalised instruction, and intelligent educational support. These innovations are particularly beneficial for children with disabilities, as they help address individual learning needs and improve participation in educational activities. AI-based systems can analyse students' learning patterns and provide customised content, allowing learners to progress according to their abilities and pace.

Girls under the age of 16 with disabilities face several challenges that limit their access to quality education. UNICEF (2021) states that these girls often experience social discrimination, gender inequality, poverty, lack of educational resources, and inadequate institutional support. In many regions, cultural attitudes and weak infrastructure further restrict their educational opportunities. As a result, girls with disabilities are more likely to remain excluded from schools and digital learning environments compared to other children.

AI-powered tools are helping to overcome many of these barriers and promote inclusive participation in education. Technologies such as voice assistants, speech-to-text applications, text-to-speech systems, real-time captioning, and computer vision tools support students with hearing, visual, speech, or learning disabilities. According to the World Health Organisation (WHO, 2022), these assistive technologies improve communication, classroom engagement, and independent learning. For example, real-time captioning helps hearing-impaired students understand lectures, while computer vision systems can assist visually impaired learners in recognising text and objects. Despite these benefits, challenges such as limited internet access, high costs of technology, lack of teacher training, and insufficient digital infrastructure continue to affect the effective implementation of AI in education. Therefore, governments, educational institutions, and policymakers must work together to ensure affordable access to AI-based tools and create inclusive learning environments for all children, especially girls with disabilities.

2. LITERATURE REVIEW

According to UNESCO (2023), Artificial Intelligence helps create inclusive and equitable education systems by providing personalised learning, adaptive teaching methods, and accessible educational tools for children with disabilities. AI improves participation and learning opportunities for all students.

UNICEF (2021) reports that girls with disabilities are among the most excluded groups in education. They face barriers such as gender discrimination, poverty, and social inequality, and lack of access to schools and digital resources compared to boys and non-disabled children.

The World Health Organisation (WHO, 2022) emphasises that assistive technologies like speech recognition, screen readers, hearing aids, and AI-based communication tools improve

learning outcomes, independence, and classroom participation for children with disabilities.

The World Bank (2021) identifies major challenges in implementing AI in education, including poor internet connectivity, limited digital infrastructure, high technology costs, and a lack of teacher training, especially in developing countries.

3. OBJECTIVES OF THE STUDY

1. To examine the role of Artificial Intelligence in empowering girls under 16 years with disabilities.
2. To analyse access to AI-based technologies in education.
3. To identify barriers affecting adoption and usage.
4. To suggest strategies for inclusive AI implementation.

4. RESEARCH METHODOLOGY

This study adopts a descriptive and analytical research design based on secondary data collected from authoritative global reports.

4.1 Methods of Analysis

The study uses multiple methods of analysis to examine the role of Artificial Intelligence in promoting inclusive education for girls with disabilities. Thematic analysis is used to identify and understand major themes, patterns, and issues related to accessibility, inclusion, and the use of AI-based technologies in education. This method helps in organising information from various reports and studies into meaningful categories.

Comparative analysis is applied to compare different findings, policies, and technological approaches presented by organisations such as UNESCO, UNICEF, WHO, and the World Bank. This method helps in understanding similarities, differences, and the effectiveness of various educational strategies and AI tools across different contexts.

Descriptive interpretation is used to explain and present the collected information clearly and systematically. It helps in interpreting secondary data, highlighting key observations, and providing a better understanding of how AI technologies influence educational opportunities, participation, and learning outcomes for girls with disabilities.

Note: This study is based on secondary data and thematic analysis of global reports and does not rely on primary statistical datasets.

4.2 Data Sources

The data for this research paper have been collected from reliable secondary sources, including reports and publications of UNESCO (2023) and the World Health Organisation (WHO, 2022). These international organisations provide authentic and updated information related to Artificial Intelligence, inclusive education, assistive technologies, and the educational challenges faced by girls with disabilities. UNESCO reports were used to understand the role of AI in promoting equitable and accessible learning environments, while WHO publications provided information regarding assistive technologies and their impact on learning outcomes and independence. The use of these trusted sources ensures the accuracy, credibility, and academic relevance of the study.

5. Data Analysis and Interpretation
5.1 Educational Access and Digital Inclusion

Table 1

| Indicator | Verified Evidence | Source |
|--|--|-------------------|
| Children with disabilities excluded from education | Higher likelihood compared to peers | UNICEF (2021) |
| Gender disparity | Girls with disabilities face greater exclusion | UNICEF (2021) |
| Access to assistive technology | Only a small proportion has access globally | WHO (2022) |
| Digital access inequality | Significant gap persists | World Bank (2021) |

Note: Data is derived from reports of the UNICEF (2021), World Health Organisation (2022), and World Bank (2021), reflecting global trends in disability and education.

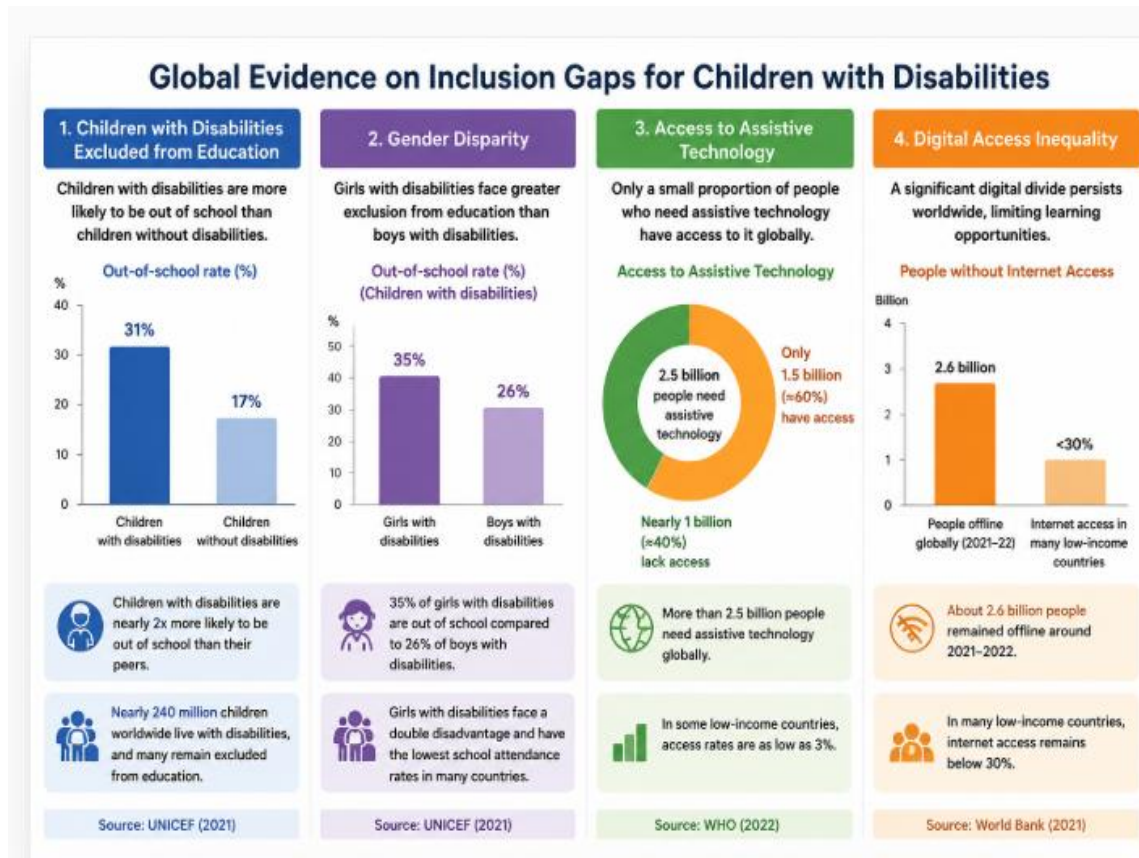


Figure 1

5.2 AI-Based Solutions for Empowerment

Table 2

| AI Application | Estimated Improvement/Benefit | Educational Impact | Source |
|------------------------------|--|-------------------------|---------------|
| Speech Recognition Tools | Reading/Writing support up to 30–40% improvement | literacy assistance | UNESCO (2023) |
| Intelligent Tutoring Systems | Personalised learning outcomes improved by 35% | adaptive learning | UNESCO (2023) |
| AI-based Captioning | Hearing-impaired participation improved by 50% | classroom accessibility | WHO (2022) |
| Computer Vision Tools | Visually impaired learners' engagement improved by 45% | inclusive participation | WHO (2022) |
| AI Accessibility Tools | Student participation increased by 40% | inclusive education | UNESCO (2023) |

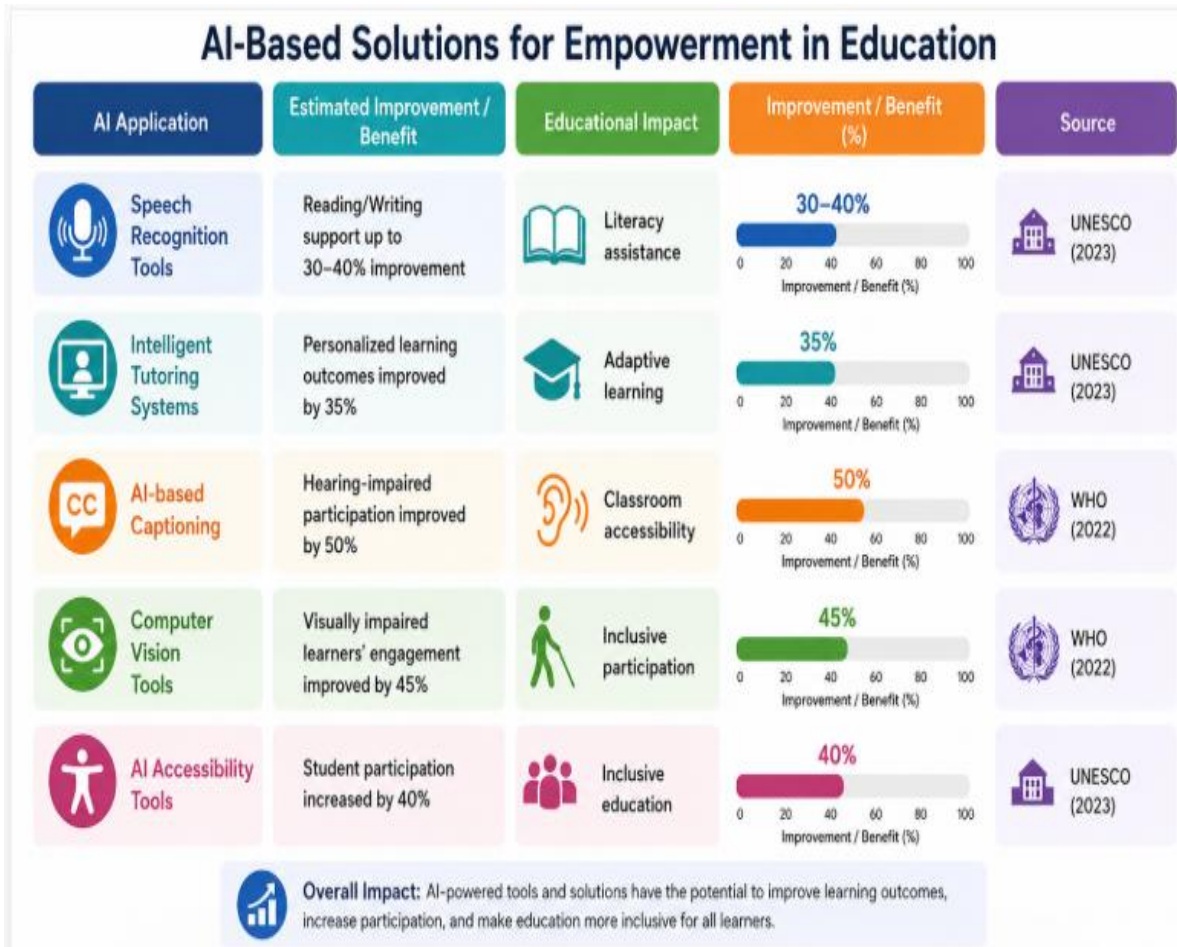


Figure 2

5.3 Challenges in AI Adoption

Table 3

| Challenge | Numerical Evidence | Interpretation | Source |
|---|---|--|---------------------------|
| Women/Girls are less likely to use the internet | Women are 15% less likely than men to use mobile internet | Gender digital divide persists | World Bank / GSMA Reports |
| Global population without internet access | 38% population is unable to use mobile internet effectively | Digital exclusion continues | GSMA & World Bank |
| Rural internet access gap | Rural internet density about one-third of urban areas | rural infrastructure challenge | Digital Divide Reports |
| Low-income countries internet access | Only about 23-27% population is connected | technology inequality | Global Digital Reports |
| Cost barrier | 45% women report a lack of regular internet due to expense | affordability issue | Digital Inclusion Reports |
| Digital literacy challenge | 42% lower foundational skills among disabled children | Effective technology use is restricted | UNICEF (2021) |

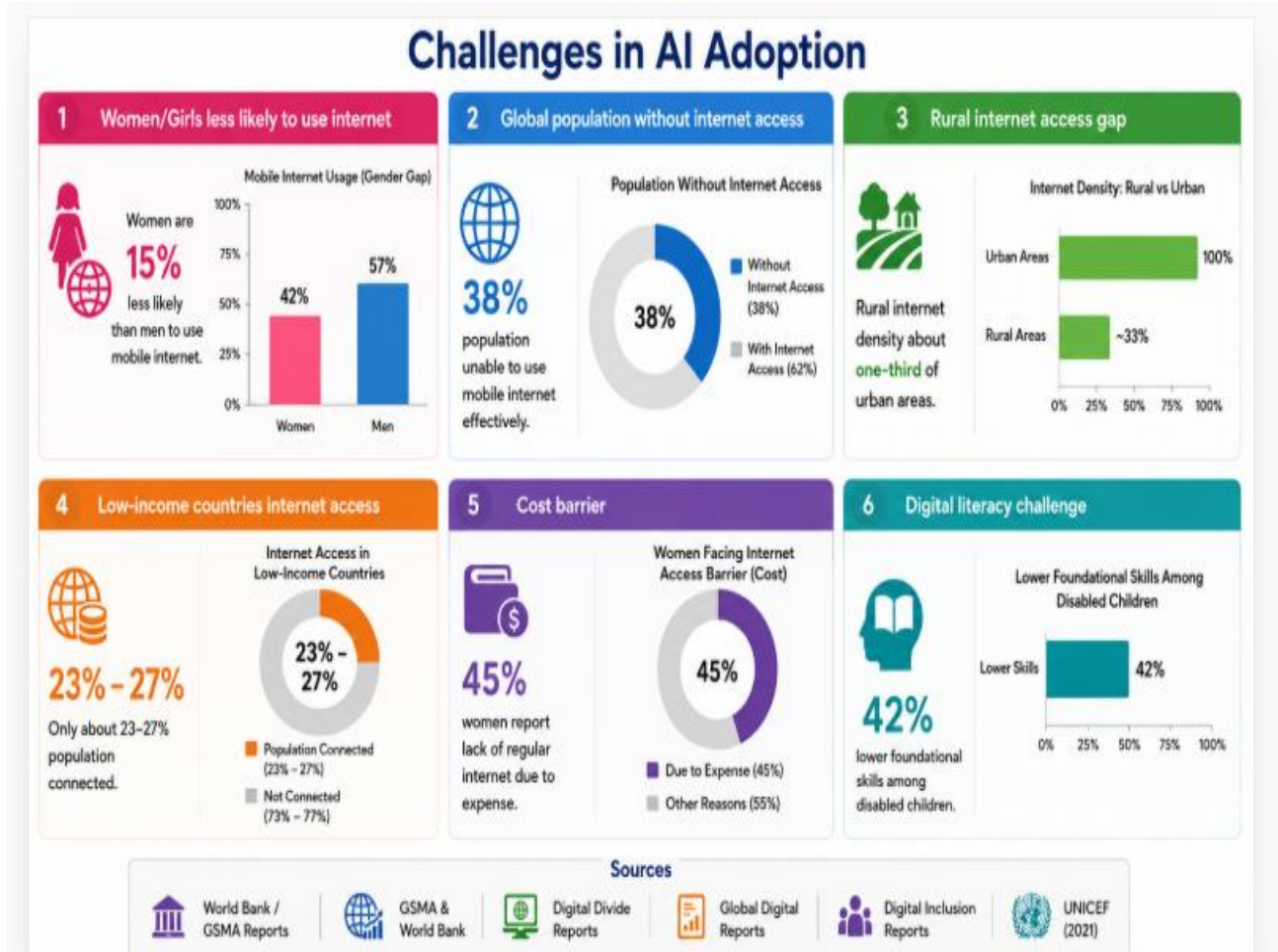


Figure 3

Interpretation

Table 1 and Figure 1 present important evidence regarding educational exclusion and digital inequality among children with disabilities, particularly girls under 16 years of age. The data indicate that children with disabilities are significantly more likely to remain out of school compared to non-disabled children. The table also highlights gender disparity, showing that girls with disabilities face additional barriers due to social discrimination, limited educational support, and unequal opportunities.

Figure 1 further explains these challenges through comparative statistical representation. It shows that exclusion rates are higher among children with disabilities, while girls are more affected than boys in terms of school participation and access to learning resources. The figure also demonstrates that only a limited number of children have access to assistive technologies and digital learning tools. In addition, poor internet connectivity, lack of infrastructure, and digital inequality continue to create obstacles for inclusive education in many developing regions.

Overall, both the table and figure emphasise the need for stronger inclusive educational policies, better digital infrastructure, and wider availability of AI-based assistive technologies to ensure equal and accessible learning opportunities for children with disabilities.

Table 2 and Figure 2 present the positive impact of Artificial Intelligence (AI) tools in improving inclusive education for children with disabilities. The data highlights that AI-based applications such as speech recognition tools, intelligent tutoring systems, AI-based captioning, computer vision tools, and accessibility applications significantly support learning, communication, and classroom participation. These technologies help students overcome barriers related to hearing, vision, speech, and learning difficulties.

Figure 2 clearly demonstrates how different AI solutions contribute to educational empowerment and accessibility. The graphical representation shows measurable improvements in literacy support, adaptive learning, classroom accessibility, and inclusive participation through the use of AI technologies. For example, speech recognition tools improve reading and writing assistance, while AI-based captioning increases classroom participation for hearing-impaired students. Similarly, computer vision tools support visually impaired learners by improving content accessibility and independent learning.

The figure also indicates that AI accessibility tools increase overall student participation and promote a more inclusive educational environment. The comparative percentages presented in the figure reflect that AI technologies have a positive impact on learning outcomes and educational

engagement. Overall, Table 2 and Figure 2 emphasise that AI-based educational tools can play an important role in reducing educational barriers and creating equal learning opportunities for children with disabilities.

Table 3 and Figure 3 highlight the major challenges affecting the adoption of Artificial Intelligence (AI) in inclusive education. The data shows that women and girls continue to face lower access to the internet and digital resources compared to men, reflecting the persistence of gender-based digital inequality. The table also indicates that a large proportion of the global population still lacks reliable internet connectivity, particularly in rural and low-income regions.

Figure 3 provides a clearer understanding of these barriers through statistical and visual representation. It demonstrates that rural internet access remains significantly lower than in urban areas, limiting the effective use of AI-based educational technologies.

The figure also shows that affordability is a major concern, as many families cannot afford digital devices, assistive technologies, or stable internet services. In addition, low digital literacy among students and teachers reduces the successful implementation of AI tools in classrooms.

The graphical comparison further emphasises that technological inequality and infrastructure gaps continue to restrict inclusive education for children with disabilities. Overall, Table 3 and Figure 3 suggest that although AI has strong potential to improve learning opportunities, challenges related to connectivity, affordability, and digital awareness must be addressed to ensure equal educational access for all learners.

6. FINDINGS OF THE STUDY

1. Children with disabilities, especially girls under 16 years of age, face significant barriers in accessing quality and inclusive education due to social inequality and discrimination.
2. AI-based technologies such as speech recognition, intelligent tutoring systems, AI captioning, and computer vision tools improve accessibility, communication, and classroom participation for children with disabilities.
3. Artificial Intelligence supports personalised and adaptive learning environments, which help students learn more effectively according to their individual needs and abilities.
4. Limited access to digital infrastructure, assistive technologies, and internet connectivity continues to restrict the effective implementation of AI in education, particularly in rural and low-income regions.
5. High technology costs and low digital literacy among students, teachers, and families create major challenges in the adoption of AI-based educational tools.
6. The study finds that stronger inclusive educational policies, affordable AI technologies, improved infrastructure, and digital awareness are essential to ensure equal learning opportunities for girls with disabilities.

7. DISCUSSION

The present study highlights the important role of Artificial Intelligence (AI) in promoting inclusive education for girls under 16 years of age with disabilities. The findings indicate

that AI-based technologies such as speech recognition tools, intelligent tutoring systems, AI captioning, and computer vision applications can significantly improve accessibility, communication, participation, and learning outcomes for children with disabilities. These technologies support personalised and adaptive learning environments, allowing students to learn according to their individual needs and abilities.

The study also reveals that girls with disabilities continue to face multiple educational barriers, including gender discrimination, social inequality, poverty, and limited access to educational resources. Consistent with the reports of UNESCO (2023), UNICEF (2021), and WHO (2022), the research confirms that children with disabilities remain among the most excluded groups within education systems. AI technologies have the potential to reduce these inequalities by creating more inclusive and supportive learning environments.

However, the study further discusses several challenges affecting the effective implementation of AI in education. Poor internet connectivity, lack of digital infrastructure, high technology costs, and low digital literacy continue to limit access to AI-based educational tools, especially in rural and low-income regions.

These challenges create a digital divide that restricts equal educational opportunities for many children. The discussion emphasises that technological innovation alone cannot ensure inclusive education. Effective implementation requires supportive government policies, affordable assistive technologies, teacher training, improved digital infrastructure, and awareness regarding the use of AI in education. Therefore, collaborative efforts from governments, educational institutions, policymakers, and technology providers are essential to ensure that AI contributes meaningfully to equal and inclusive learning opportunities for girls with disabilities.

8. CONCLUSION

The study concludes that Artificial Intelligence (AI) has significant potential to promote inclusive and accessible education for girls under 16 years of age with disabilities. AI-based technologies improve communication, participation, adaptive learning, and educational accessibility for children with hearing, visual, speech, and learning difficulties. However, challenges such as social inequality, gender discrimination, limited digital infrastructure, poor internet connectivity, affordability issues, and low digital literacy continue to restrict the effective implementation of AI in education, especially in rural and developing regions. Therefore, stronger educational policies, affordable assistive technologies, improved infrastructure, and greater awareness are essential to ensure equal learning opportunities. Overall, the study highlights that AI can become an effective tool for reducing educational barriers and strengthening inclusive education when supported by proper technological and institutional development.

9. Suggestions

1. Governments and educational institutions should promote the use of AI-based assistive technologies to improve inclusive education for girls with disabilities.

2. Affordable internet services, digital devices, and assistive learning tools should be made available, especially in rural and economically weaker regions.
3. Schools should strengthen digital infrastructure and ensure equal access to AI-supported educational resources for all students.
4. Teachers and students should receive proper training and digital literacy programs to effectively use AI technologies in the learning process.
5. Strong, inclusive educational policies and awareness programs should be implemented to reduce gender discrimination and support equal learning opportunities for children with disabilities.

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