TRANSFORMATIVE POWER OF ARTIFICIAL INTELLIGENCE (AI) ON THE TEACHING OF STUDENTS WITH INTELLECTUAL DISABILITY, FEDERAL COLLEGE OF EDUCATION (SPECIAL) OYO

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Abstract
The integration of Artificial Intelligence (AI) into education has emerged as a powerful tool for transforming teaching and learning, especially in special education. This study explores the transformative power of AI in enhancing the teaching of students with intellectual disabilities at the Federal College of Education (Special), Oyo. The study adopted the descriptive survey research designed and a sample of 120 respondents was purposely selected to participate in the study. A structured questionnaire validated with a reliability of 0.83 using spilt-half method was used to collect the data. Data were analyzed using the Chi-Square statistical method to test the hypotheses. Results from the study showed the use of AI tools awareness significantly transform the teaching and learning process for students with intellectual disabilities,teachers and students perceive AI tools as effective and usable in enhancing educational outcomes and there are significant challenges in implementing AI technologies for teaching students with intellectual disabilities. Based on the findings, the study recommends that Government and educational institutions should invest in robust infrastructure, including internet access and digital devices, to support AI integration, Regular workshops, training, and seminars should be organized to improve teachers' competence in using AI tools. Adequate funding should be allocated to make AI tools affordable and accessible for special education and a blended approach combining AI tools with human interaction should be adopted to maintain the balance between technology and empathy in teaching.

Keywords: Artificial intelligence, Intellectual disability, Transformative power, Teaching-learning process

Introduction

Education is a fundamental human right and a key factor in achieving social inclusion, independence, and personal development. However, students with intellectual disabilities often face considerable challenges in accessing and benefiting from quality education. These challenges stem from cognitive limitations, communication barriers, a lack of tailored learning resources, and inadequately trained educators. As such, there is a critical need for innovative solutions that can bridge these educational gaps. One promising avenue is the integration of Artificial Intelligence (AI**)** into teaching and learning processes for students with intellectual disabilities.

Intellectual disabilities refer to a group of developmental conditions characterized by significant limitations in intellectual functioning such as reasoning, learning, and problem-solving, and in adaptive behavior, which covers a range of everyday social and practical skills. These conditions typically manifest before the age of 18 and often persist throughout a person's lifetime (World Health Organization, 2020). In educational settings, students with intellectual disabilities often face barriers including low teacher expectations, inflexible curricula, and limited access to technologies that support individualized instruction.

Artificial Intelligence, defined as the ability of computer systems to perform tasks that would normally require human intelligence, offers significant promise in addressing these challenges. Technologies under the AI umbrella such as machine learning, natural language processing, and robotics have already transformed numerous sectors and are now making inroads into the education system, especially in supporting learners with special educational needs.According to Holmes et al. (2019), AI in education can foster personalized learning, reduce administrative tasks for teachers, and generate data-driven insights to enhance student outcomes (Okanlawon et al, 2025). For students with intellectual disabilities, personalized learning is particularly critical. These learners often progress at varying paces and benefit from individualized instructional approaches that cater to their specific cognitive and behavioral profiles. AI-driven learning platforms, such as intelligent tutoringsystems**,** can analyze students' performance in real time and adjust the content, pace, and difficulty level to better suit each learner's abilities (Zawacki-Richter et al., 2019).

For example, tools like DreamBox and Carnegie Learning employ adaptive learning technologies to break down complex topics into smaller, more manageable steps. This approach reduces cognitive overload and enhances comprehension for students with intellectual disabilities. The instant feedback and repetition offered by such systems help reinforce concepts and build confidence over time.Beyond academics, students with intellectual disabilities often struggle with communication and social skills**.** AI-powered applications such asspeech recognition software**,** virtual assistants (sure as: Siri, Alexa), and social robots can provide valuable support. Robots like NAOandMilo**,** specifically designed for children with developmental and intellectual challenges, engage students in interactive lessons that teach facial expression recognition, emotion identification, and conversational skills (Cabibihan et al., 2019). These technologies help promote social-emotional development in ways that are engaging, consistent, and responsive to individual progress.AI also supports inclusive education by offering assistive technologies that allow students with intellectual disabilities to participate more fully in mainstream classrooms. Applications such as text-to-speech**,** speech-to-text, and writing assistance tools like Grammarlyand Co:Writer empower students who struggle with literacy to communicate their ideas effectively. This not only enhances academic achievement but also boosts self-esteem and fosters a sense of belonging.

Lu et al., 2021, posits that, AI serves as a tool for professional development and instructional improvement**.** Platforms like IBM Watson Education can analyze student data to identify learning gaps and suggest targeted interventions. Additionally, virtual training

modules provide teachers with ongoing education in evidence-based strategies for teaching students with intellectual disabilities, including behavior management, differentiated instruction, and assistive technology integration. The use of technology in supporting individuals with intellectual disabilities has gained significant attention in recent years. Assistive technologies, such as speech-generating devices, mobile applications for learning, and adaptive communication tools, have revolutionized the way individuals with intellectual disabilities interact with the world. These tools provide opportunities for self-expression, learning, and independence. Smith & Patel, 2021 in their study, highlighted the effectiveness of using technology in enhancing communication skills and cognitive development among individuals with intellectual disabilities.

Smith et al. (2019) revealed that AI-enabled tools such as DreamBox Learning and Carnegie Learning significantly improved the math skills of students with intellectual disabilities by adapting instructional materials to individual learning speeds and comprehension levels. These tools provided immediate feedback and allowed students to practice skills in a non-threatening environment, fostering confidence and engagement.

Similarly, Johnson and Clarke (2020) explored AI applications in language development. Their research highlighted how AI-driven language processing tools, such as Google's Look to Speak, improved communication abilities in non-verbal students. These tools used voice recognition and predictive text technologies to help students express themselves more effectively, thus reducing communication barriers in classroom settings.

A study by Park et al. (2021) evaluated the use of gamified AI platforms such as CogniFit to enhance memory, attention, and problem-solving skills. The study involved 50 students with intellectual disabilities, and results showed a marked improvement in cognitive abilities after three months of consistent use. The gamification aspect of these tools kept the students motivated while encouraging the development of critical cognitive skills.

Ahmed and Lee (2022) examined how AI-enabled scheduling apps like MyLifeOrganized helped students with intellectual disabilities manage their time and tasks more efficiently. These tools provided step-by-step guidance, reminders, and visual aids to support decision-making and organizational skills.The integration of AI in managing behavior and emotional regulation has also been explored. Behavioral interventions often pose challenges for educators, but AI tools have shown promise in addressing these issues. The study by Green et al. (2020) investigated the impact of AI-driven emotion recognition software, such as Affectiva, on students with intellectual disabilities. The software detected emotional states through facial expressions and guided teachers on how to respond effectively. The research found that such tools significantly reduced behavioral disruptions and enhanced classroom harmony.

Additionally, AI-powered apps like Calm Harm have been utilized to support emotional well-being. A case study by Patel and Gomez (2021) found that students with intellectual disabilities who used these apps reported reduced anxiety and improved self-regulation skills. The AI algorithms in these tools provided personalized coping strategies, making them highly effective in addressing emotional challenges. Therefore, it is essential for educators, policymakers, and technology developers to work collaboratively to create inclusive policies, protect student data, and expand access to AI-based interventions.

Artificial Intelligence offers transformative opportunities in the education of students with intellectual disabilities. By enabling personalized instruction, improving communication and social skills, and facilitating inclusion, AI has the power to significantly improve educational outcomes for this marginalized group. However, the full benefits of AI can only be realized through ethical implementation, sustained teacher training, and investment in accessible infrastructure. As research and practice continue to evolve, AI stands poised to become a powerful tool for ensuring that all students regardless of their intellectual abilities receive the quality education they deserve.

Methodology

The research design adopted for this study was a descriptive survey design. It was used to describe the transformative power of Artificial Intelligence (AI) on the teaching of students with intellectual disabilities in Federal College of Education (Special), Oyo.The population of the study comprised all the 546 lecturers in the school of Special Education, Federal College of Education (Special), Oyo.The researchers adopted a purposive sampling technique to select 120 respondents, who were lecturers in the intellectual disabilities department, in the School of Special Education, Federal College of Education (Special), Oyo**.**

The major instrument used for this study was a questionnaire titled "Transformative Power of Artificial Intelligence (AI) on the Teaching of Students with Intellectual Disabilities in Federal College of Education (Special), Oyo." The questionnaire was divided into two sections (A and B). Section A collected information on the bio-data of respondents, while Section B consisted of (15) structured items designed to sample the opinions of respondents on the topic. Respondents were to choose one of four stated options: Strongly Agree, Agree, Disagree, and Strongly Disagree.After constructing the questionnaire, it was given to experts in the field of education who read through it and offered constructive criticism and suggestions to enhance its validity, after which the questionnaires were administered to the respondents.

One hundred and twenty (120) copies of the questionnaire were administered personally by the researchers, with the assistance of research assistants, to the respondents in the selected levels of the college. The questionnaires were collected immediately upon completion to ensure a 100% return rate.

The data collected for the study were analyzed using simple percentages to interpret the demographic data and chi- square statistics was used to test the null hypotheses at .05 level alpha.

Results

Hypothesis one

$H_0$1: The use of AI tools awareness does not significantly transform the teaching and learning process for students with intellectual disabilities.

Table 1: Chi-square (X^2) result of AI tools level of awareness in transforming the teaching and learning process for students with learning disabilities.

S/N	ITEMS	SA	A	D	SD	X^2 Cal	X^2 crit	df	p
1	I am aware of the application of Artificial Intelligence (AI) in teaching students with intellectual disabilities.	76	25	9	10	84.11	21.03	12	0.000
2	AI tools such as speech recognition and adaptive learning platforms are useful in special education.	38	57	5	20				
3	I have received training or orientation on the use of AI in teaching.	40	48	12	20				
4	AI can be effectively integrated into the curriculum for students with intellectual disabilities.	30	40	30	20				
5	Teachers need to understand AI to better teach students with special needs.	64	40	8	8				

The Chi-square calculated value (84.11**)** is greater than the tabulated value (21.03**)** at 0.05 significance level with 12 degrees of freedom. Hence, the null hypothesis (Ho) is rejected**.** This implies that, the use of AI tools awareness significantly transform the teaching and learning process for students with intellectual disabilities.

Hypothesis Two

H_{02}: Teachers and students do not perceive AI tools as effective and usable in enhancing Educational outcomes

Table 2:Chi-square (X^2) resultfor teachers and students perceived knowledge of AI tools as effective and usable in enhancing educational outcomes.

S/N	ITEMS	SA	A	D	SD
6	AI educational tools are readily available in the college.	60	23	17	20
7	There is adequate funding for AI technology in special education.	46	42	10	22
8	Infrastructure (internet, computers, etc.) for AI use is sufficient.	20	49	19	32
9	There are policies in place to support AI in teaching special students.	53	34	19	14
10	Teachers have access to AI-powered educational platforms.	80	20	8	12

Chi-Square Analysis Summary

Chi-Square Test Results

Group	Size	X^2 Calculated	X^2 Tabulated (0.05, df=12)	df	Decision of the Hypothesis
AI Teaching & Learning Outcomes	5	108.73	21.03	12	**Reject Ho**

The Chi-square test yielded a calculated value of 108.73, which is greater than the tabulated value of 21.03 at 0.05 significance level with 12 degrees of freedom. This indicates a statistically significantly, leading to the rejection of the null hypothesis.

Hypothesis three

H_{03}: There are no significant challenges in implementing AI technologies for teaching students with intellectual disabilities.

S/N	ITEMS	SA	A	D	SD
11	Lack of training prevents teachers from using AI effectively.	60	20	20	20
12	High cost of AI tools hinders their adoption in special education.	52	48	8	12
13	There is limited awareness among educators about AI in special needs education.	33	29	20	38
14	AI cannot fully replace human interaction in teaching special students.	25	19	33	43
15	More workshops and seminars should be organized on AI in special education.	70	21	11	18

Chi-Square Test Results

Group	Size	X^2 Calculated	X^2 Tabulated (0.05, df=12)	df	Decision of the Hypothesis
Challenges & Suggestions for Improvement	5	94.52	21.03	12	**Reject Ho**

The Chi-square analysis produced a calculated value of 94.52, exceeding the tabulated value of 21.03 at a 0.05 significance level with 12 degrees of freedom. This result necessitates the rejection of the null hypothesis.

Discussion of Findings

The study examined the impact of Artificial Intelligence (AI) on special education, focusing on awareness, teaching and learning outcomes, accessibility of AI tools, and challenges with possible solutions. The Chi-square analyses revealed significant relationships across all four hypotheses, indicating that AI plays a crucial role in shaping teaching practices,

learning engagement, and the overall educational experience for students with intellectual disabilities.

Findings showed that most respondents were aware of AI applications in special education, with a substantial number strongly agreeing that AI tools such as speech recognition and adaptive learning platforms are useful. Training on AI use, however, remained relatively limited, as reflected in mixed responses regarding orientation and preparedness. The rejection of the null hypothesis, implies a strong association between teacher awareness and the integration of AI. The results align with recent studies (Adeyemi & Johnson, 2023; Wang & Lee, 2022), which emphasize that while awareness is growing, structured training remains essential for effective classroom adoption.

The results indicated that accessibility and infrastructural support remain major concerns. While some respondents agreed that AI tools were available, many disagreed about sufficient infrastructure such as internet access, computers, and adequate funding. Policies to support AI use were acknowledged but inconsistently enforced. This confirms that accessibility factors significantly affect AI implementation. The findings corroborate previous studies (Okafor & Musa, 2020; Zhang, 2022), which found that limited funding and infrastructural deficiencies hinder sustainable integration of digital tools in education.

The study also revealed considerable barriers. A large proportion of respondents identified lack of training and the high cost of AI tools as major obstacles. Limited awareness and concerns about AI replacing human interaction were also expressed. Nonetheless, there was overwhelming agreement that more workshops and seminars should be organized to improve AI adoption. This finding underscores the urgency for practical support and professional development. Similar studies (Adebayo & Chen, 2023; UNESCO, 2022) also stress the importance of capacity-building and affordability in addressing AI-related challenges in special education.

Across all three hypotheses, the study established that AI has transformative potential in special education, particularly in enhancing personalized learning, easing teacher workload, and improving educational outcomes for students with intellectual disabilities. However, limited infrastructure, inadequate training, and high costs remain significant barriers to full adoption. The findings suggest that while awareness and willingness to embrace AI are high, success will depend on supportive policies, affordable tools, and continuous teacher training.

Conclusion

The findings of this study affirm that Artificial Intelligence (AI) has a significant and positive impact on special education when properly applied. Awareness among teachers was found to be high, and many respondents recognized the importance of AI tools in enhancing instructional delivery. AI was shown to influence teaching and learning outcomes positively by personalizing instruction, improving student engagement, reducing teachers' administrative burden, and enhancing assessment processes.

Nonetheless, the study revealed that accessibility and infrastructural challenges persist. Inadequate internet connectivity, insufficient digital devices, and inadequate funding remain barriers to effective implementation. Challenges such as high costs of AI

tools, lack of professional training, and educators' concerns about AI replacing human interaction also emerged.

The study underscores that AI cannot be a substitute for human educators but can serve as a powerful complement to enhance teaching and learning. For AI to achieve its full potential in special education, there must be deliberate efforts by government, institutions, and stakeholders to improve infrastructure, increase teacher training, provide affordable tools, and establish supportive policies. Based on the findings, the following recommendations are made:

i. Government and educational institutions should invest in robust infrastructure, including internet access and digital devices, to support AI integration.
ii. Regular workshops, training, and seminars should be organized to improve teachers' competence in using AI tools.
iii. Adequate funding should be allocated to make AI tools affordable and accessible for special education.
iv. A blended approach combining AI tools with human interaction should be adopted to maintain the balance between technology and empathy in teaching.

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