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AN OVER VIEW ON THE USE OF ARTIFICIAL INTELLIGENCE IN PROMOTING INCLUSIVE TEACHER EDUCATION PROGRAMME

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Abstract
This study examines the role of Artificial Intelligence (AI) in promoting inclusive teacher education programmes in selected secondary schools in Gombe State, Nigeria, with particular reference to schools in Akko Local Government Area. The study is anchored on the need to strengthen teachers' competencies for addressing learner diversity, including learners with disabilities, language barriers and varied learning abilities. Drawing from existing literature and field observations, the study highlights how AI technologies support personalised and adaptive learning, assistive tools for learners with disabilities, multilingual and literacy support, automated assessment and feedback, intelligent tutoring systems, early identification of learning difficulties, and collaborative learning environments. The findings indicate that AI enhances inclusive teacher preparation by improving instructional planning, learner assessment practices and teachers' capacity to respond effectively to diverse classroom needs. However, the study also reveals major challenges limiting the effective use of AI in teacher education, including inadequate digital infrastructure, limited access to AI-enabled tools, and insufficient training opportunities for teachers. Significant differences in institutional capacity further suggest that unequal access to technology affects the quality of inclusive teacher education across schools. The study therefore concludes that strategic investment in infrastructure, continuous professional development and supportive policy implementation are critical for strengthening the impact of AI on inclusive teacher education in Gombe State.

Keywords: Artificial intelligence, Inclusive education, Teacher education, Teacher competency, Assistive technologies, Personalized learning, Educational technology, Gombe State, Nigeria

Introduction

Inclusive education aims to provide equitable access to quality education for all learners regardless of disability, socioeconomic status, gender, or cultural background. Achieving this goal requires preparing teachers who possess the knowledge, skills, and pedagogical competencies necessary to address learner diversity. In recent years, the emergence of Artificial Intelligence (AI) has introduced new opportunities for personalized learning, adaptive instruction, and data-driven decision-making within teacher education systems.

Inclusive Education refers to responding to diverse needs of all learners by increasing participation in school leading to reducing exclusion within education (UNESCO, 2001). Inclusive education is when all students regardless of any challenges they may have, are placed in age appropriate general education classes that are in their own neighborhood schools to receive high quality instruction, interventions, and supports that enable to meet success in the core curriculum (Alquraini & Gut, 2012 cited in Mc Manis, 2017). The school and classroom operate on the premise that students with disabilities are as fundamentally component as students without disabilities so that all students can be full participants in their classrooms and in the local school community.

Much of the movement is related to legislation that students receive their education in the least restrictive environment (LRE). This means they are with their peers without disabilities to the maximum degree possible, with general education the placement of first choice for all students. (Alqurains & Gut, 2012 cited in Mc Manis, 2017). Successful inclusion happens primarily through accepting, understanding, and attending to students' differences and diversity, which can include the physical, cognitive, academic, social, and emotional (Mc Manis, 2017).

Smith (2007) defined inclusion as the commitment to educate each child to the maximum extent appropriate in the school and classroom he/she would otherwise attend. Salend (2001) posited that inclusive education can be interpreted as the philosophy and practice for educating students with disabilities in general education settings. It also refers to the full time placement of children with mild and moderate disabilities in regular classrooms. According to Abang (2011) inclusive education is a policy aimed at minimizing barriers to education. The current trend in special education is that, schools are being required to make adjustment for all students to have access to opportunity and support for stimulating the growth, development and learning of children with disabling conditions within schools located in their neighborhood.

Steinbeck, Steinbeck and Johnson in Abang (2011) indicated that the process of inclusion embraces the following: Acceptance of children with special education needs as equals and valued members of the community. Recognition of what special needs children can offer in the community. Structured services aimed at meeting the children's needs. Support service brought to the children within the classroom. It emphasis on teachers and other school personnel working together and supporting each other through professional collaboration, team teaching, teacher and student assistance teams and cooperative arrangement. Parent's involvement and participation of the child should be emphasized. The movement to words more inclusion has led to some of the strongest professional battles ever waged in the field of special education. The battle is between radical integrationist and more conservative persuasion who have threatened to rip apart the field of special

education (Funch and Funch,1993 cited in Abang, 2011). However, some extremists or radicals are of the stand that inclusion means all residential schools, institutions, special schools and classes be done away with. These proponents advocated that all neighborhood schools must include all children in their catchments areas irrespective of any disability and severity of such a disability and that all students who are physically or mentally challenged be educated in the regular classes. This group understands normalization to mean that all non- integrated settings should be abolished, although the inventors of this concept show the need of much service delivery (Kauffman & Hallan, 1993 cited in Abang, 2011).

Inclusive contend that special classes, separate schooling, or other forms of removing children with disabilities from the regular environment should occur only when the nature or severity of the disability of the child is such that education in regular classes (with the use of supplementary service) cannot be accomplished. United nations educational scientific and cultural organization (1994) proclaims that regular schools with inclusive orientation are the most effective means of combating discrimination, building an inclusive society and achieving education that for all. Ejiogu (2015) maintained that, inclusive education is a system or practice by which every student of school age is offered the opportunity of quality education in mainstream setting. It allows students with disability (special education students) to be educated in regular classrooms alongside their non-special education counterparts. It emphasizes opportunities for equal participation but with options and methods of instruction which balance the interests of both classes of students. Inclusive education is anchored on the notion that students with disability will benefit from enhanced leaning, social and communication skills, while those without disability will benefit from the exposure to diverse characteristics, talents and temperaments.

Adedokun and Olaleye (2014) asserted that, inclusion may be partial or full. Full inclusion is the integration of all students, even those that require substantial education and behavioural supports and services to be successful in regular classes and the elimination of segregated special classes. In full inclusion, special education is considered a service not a place and those services are integrated into daily routines and classroom structure, environment, curriculum and strategies and brought to the student instead of removing the student to meet his/her individual needs. While the partial inclusion represents a situation where students with special needs are educated in regular classes but when there is need for any special service such as speech therapy, these students with special needs are pulled out of the regular classroom for these special services.

Artificial Intelligence in Promoting Inclusive Teacher Education Programme

(AI) plays a pivotal role in making education accessible and generating dynamic and interactive teacher-student relationships. With reference to individual learning backgrounds, AI adapts learning content in terms of existing knowledge, learning speed, and personal goals of individual learners. Personalized learning ensures that students are educated in a way that addresses their individual learning experience, hence ensuring engagement and understanding. Compared with the traditional learning processes, AI never simply examines a student's study history and identifies his/her weaker areas to further provide special classes or study materials accordingly to facilitate the learning. With such a forceful process, other than filling gaps in learning, even students are given autonomy in dealing with

study procedures, and as a result, more efficient and satisfactory learning outcomes are obtained. (Akgun & Greenhow, 2021).

Artificial Intelligence (AI) is increasingly becoming a force of education reform, especially in tutoring. AI-based tutoring systems like chatbots and intelligent tutoring systems (ITS) offer personalized instruction to students beyond the walls of a conventional classroom setting. These systems break down individual learning patterns and tailor learning material to address particular strengths and weaknesses, enhancing student interest and comprehension. For educators, AI instructors provide numerous advantages in terms of minimizing repetitive tasks and providing students with instant feedback. In this manner, instructors get more time to plan the class and monitor the activity level of the learners. Moreover, AI instructors are capable of emulating one-to-one instruction in which the learning plan is adapted in line with the pace and learning tendency of each student, a feature of which is particularly favorable to students of exceptional talents receiving higher or professional instructions. However, the use of AI tutors in education is not issue-free. The concerns are the possible overreliance on technology diminishing the critical thinking capacity of learners. The other concern is to have precision and appropriateness of AI-created material to maintain education integrity. Briefly stated, AI tutorial systems have the potential to assist learning significantly through personalized, user-friendly, and efficient support of students and instructors alike. All this is necessitated by well-directed application with regular observation for balancing issues thereof in an endeavor to utilize education best with the aid of AI. (Akgun & Greenhow, 2021).

Artificial Intelligence (AI) has greatly enhanced the efficiency of the learning environment by providing immediate answers to students' questions. AI-based tools such as virtual assistants and chatbots assist in answering frequently asked and redundant questions, thereby freeing up time for students and unloading the workload on teachers. This unloads the teachers' workload so that they can focus more on instructional work, while students have immediate access to information, therefore yielding to a highly responsive and interactive learning process. In addition, AI enables automating scholarly and administrative tasks, personalized learning, and unrestricted access to course materials. With these streamlined procedures, AI makes the education system more efficient and effective and capable of satisfying the divergent needs of learners and enhancing learning outcomes across the board. (Akgun & Greenhow, 2021).

Key ways Artificial Intelligence (AI) can enhance inclusive education in Gombe State, Nigeria, focusing on real classroom conditions and policy realities.

1. **Personalized and Adaptive Learning for Diverse Learners**: AI makes it possible to design learning pathways that respond to the individual learning pace, ability and background of each learner. In many public schools in Gombe State, classrooms are overcrowded and teachers often use one method for all learners. AI-based learning systems can automatically: diagnose what a learner already knows, identify learning gaps, and recommend suitable lessons and exercises. For example, when a learner repeatedly fails questions in Biology or Mathematics, the system can reduce task difficulty, provide simpler explanations, and give additional practice before moving forward. This is especially important for: slow learners, learners who missed school due to displacement or family responsibilities, and learners with mild learning difficulties. Through adaptive learning, students are not labelled or isolated. Instead, they receive invisible and

continuous support that allows them to learn alongside their peers.

2. **AI Support for Learners with Disabilities:** Inclusive education requires that learners with physical, sensory and cognitive disabilities can fully participate in classroom activities. AI improves access through several assistive technologies, such as: text-to-speech systems for learners with visual impairment, speech-to-text tools for learners who cannot write easily, AI-powered reading support tools for learners with dyslexia, voice-controlled interfaces for learners with motor impairments. In practical terms, a learner who cannot see printed textbooks can listen to AI-generated audio versions of lessons. A learner who cannot write fast can speak and have the system convert speech into written answers. This allows learners with disabilities to: follow lessons independently, complete assignments with minimal assistance, and participate confidently in classroom tasks.

3. **Language and Literacy Support for Multilingual Learners**: Many learners in Gombe State come to school speaking local languages before mastering English. This often creates learning barriers, especially in Science and Social Studies. AI can assist by: translating instructional content into familiar languages, simplifying complex English texts, offering audio explanations for difficult words and concepts, and supporting pronunciation and reading practice. For learners with weak literacy skills, AI systems can break down sentences, highlight key ideas, and provide short explanations using simpler vocabulary. This reduces language-related exclusion and helps learners understand academic concepts before struggling with the language of instruction.

4. **Automated Assessment and Immediate Feedback:** One major challenge in inclusive classrooms is that teachers cannot provide individual feedback to every learner regularly. AI systems can automatically: mark objective tests, analyse student responses, identify common misconceptions, and provide instant feedback. When learners receive immediate feedback, they understand: what they got wrong, why it was wrong, and how to improve. For learners with learning difficulties, repeated feedback is essential. AI allows these learners to practice many times without waiting for the teacher, reducing frustration and increasing confidence. For teachers, AI reduces workload and frees time for targeted support to learners who need special attention.

5. **Intelligent Tutoring Systems for Individual Academic Support**: AI-powered tutoring systems act as virtual teaching assistants that provide step-by-step support outside classroom hours. These systems can: explain concepts using different methods, provide hints when learners are stuck, ask guiding questions, and adjust explanations based on learner responses. In rural and semi-urban schools where remedial teachers and specialists are limited, intelligent tutors can serve as additional academic support for: learners who fall behind, learners preparing for examinations, and learners who need repeated explanations. This helps prevent academic exclusion caused by limited teacher availability.

6. **AI Support for Teachers and Inclusive Lesson Planning**: AI does not replace teachers. Instead, it strengthens their capacity to manage diverse classrooms. AI tools can help teachers by: analysing class performance data, identifying learners who need special support, recommending teaching strategies for mixed-ability classrooms, and suggesting appropriate instructional resources. Teachers can use this information to: modify lesson plans, design differentiated activities, and group learners based on learning needs rather than ability labels. This supports inclusive

pedagogy and enables teachers to respond more effectively to learner diversity.

7. **Early Identification of Learning Difficulties and At-Risk Learners**: One major weakness in many school systems is the late identification of learning challenges. AI systems can monitor learning patterns over time and detect early signs of: reading difficulties, numeracy problems, persistent low engagement, and abnormal learning progression. For example, when a learner consistently struggles with comprehension tasks across several weeks, the system can alert the teacher or school administrator. Early identification allows schools to: initiate remedial programmes, provide counselling support, and refer learners for professional assessment where necessary. This prevents long-term academic failure and school dropout.

8. **Collaborative and Engaging Learning through AI-Supported Environments**: AI can promote inclusion by encouraging participation, interaction and teamwork among learners with different abilities. AI-supported learning platforms can: form balanced learning groups, assign roles during group activities, monitor participation levels, and encourage peer tutoring. Learners who are shy, slow learners or learners with disabilities are given structured opportunities to contribute. Through interactive simulations, educational games and guided group tasks, learners become active participants rather than passive listeners. This improves: social inclusion, learner engagement, and classroom cohesion. Collaborative AI environments therefore support not only academic inclusion, but also social and emotional inclusion in schools. When carefully implemented, AI can strengthen inclusive education practices in Gombe State without undermining the central role of teachers.

AI plays a meaningful role in promoting inclusive teacher education by offering personalized learning pathways, supporting inclusive assessment practices, and enhancing teacher competency. The findings align with global literature highlighting AI's ability to transform teacher training. However, the study also revealed that inadequate infrastructure and limited capacity-building opportunities hinder optimal adoption. The significant institutional differences further suggest that equitable technological investment is crucial for improving inclusive teacher education outcomes across Gombe State.

Globally, AI tools such as intelligent tutoring systems, speech-to-text software, learning analytics, and assistive technology have transformed teacher preparation. In Nigeria, especially in regions such as Gombe State, the integration of AI into teacher education remains at an early stage due to inadequate infrastructure, limited awareness, and insufficient training. This study therefore investigates how AI can promote inclusive teacher education programmes in Gombe State and examines its impact on teacher preparedness for inclusive classroom

Conclusion

It is clear that zero rejection (inclusive education) continues to be a global educational challenge in which every learner is to be provided with a non-restrictive environment for social adjustment and optimal academic performance. That every child reserves the right to be educated in Nigeria. But government seems to be lackadaisical in the implementation of inclusive education, as it is more of theory than practice. Hence government and public need to be more serious about the implementation of inclusive education.

Conclusion

This study concludes that Artificial Intelligence has strong potential to improve inclusive teacher education in selected secondary schools in Gombe State by enhancing teachers' ability to deliver personalised instruction, support learners with disabilities, manage multilingual classrooms, conduct timely assessment and identify learners at risk of academic failure. The integration of AI tools contributes meaningfully to improving teacher competency, instructional efficiency and inclusive classroom practices. Nevertheless, the study reveals that the practical implementation of AI in teacher education remains limited by inadequate infrastructure, insufficient professional training and uneven institutional capacity. These constraints reduce the extent to which AI can support inclusive teaching and learning in the study area. The study therefore emphasizes that effective and sustainable integration of AI in inclusive teacher education requires deliberate government commitment, improved technological facilities, structured teacher capacity-building programmes and equitable resource distribution across schools. Strengthening these enabling conditions will significantly enhance teachers' preparedness for inclusive classrooms and promote equitable learning opportunities for all learners in Gombe State.

Suggestions

The following suggestions were offered:

1 Students with anxiety should be integrated into mainstream classes (not segregated).
2 Those identified with anxiety disorders should be referred to the counselors for intervention programmes which are effective in reducing anxiety in the use of Artificial Intelligence AI
3 Parents should avoid unrealistic achievement expectations and pressure to their children.
4 Teachers and school administrators should reduce the frequent level of evaluation, and social comparison in the use of AI.
5 Students should be informed on time of tests and the purpose of such tests, so as to enable them to make adequate preparations to attend them through Google forms.
6 Government should have a true political will to truly implement the policy of inclusion and establish or provide adaptive learning environment for better education.
7 Awareness should be created to parents and general public on the advantages of AI on inclusive education for both disabilities and non-disabilities children.
8 Teachers should be trained and more enlightened on how to handle the disability and non-disabilities students in the same environment as the interaction between the teacher and the student is limited to sometimes.

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