



INNOVATIVE APPROACHES AND INTEGRATIVE STRATEGIES IN TEACHER EDUCATION: ADVANCING TECHNOLOGY AND SUPPORT FOR LEARNING DISABILITIES IN COLLEGES OF EDUCATION IN NORTH EAST, NIGERIA

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Abstract:

This study investigates the use of innovative approaches and integrative strategies in teacher education, with a specific focus on enhancing technological support and providing assistance for students with learning disabilities in colleges of education in North East Nigeria. The study is guided by three main objectives: to examine the extent to which technology is integrated into teacher education for supporting students with learning disabilities; to analyze the attitudes of teacher educators towards inclusive teaching strategies, and to identify the challenges and opportunities in adopting technology-based solutions for learning disabilities, three research questions and hypotheses in line with the research objectives, A descriptive survey design was adopted for this study. The population comprised teacher educators and administrators across colleges of education in North East Nigeria, with a sample of 150 participants chosen via stratified random sampling. Data were collected using a structured questionnaire validated by educational experts. For data analysis, descriptive statistics and regression analysis were employed to examine the relationships among variables. Results indicate that while teacher educators show a positive attitude toward technology-based support for learning disabilities, the actual integration is limited due to resource constraints and lack of specialized training. Recommendations include prioritizing professional development in adaptive technology, increasing funding for inclusive education resources, and fostering partnerships with stakeholders to support students with disabilities effectively.

Keywords: Teacher education, innovative strategies, learning disabilities, technology integration, inclusive education, North East Nigeria, educational support,

Introduction

In recent years, the education sector has

increasingly recognized the importance of inclusivity and the need to cater to diverse



learning needs, especially for students with learning disabilities. In teacher education, integrating innovative approaches and adaptive strategies is essential to prepare future educators for supporting all students equitably. However, while this shift is gaining traction globally, regions like North East Nigeria face unique challenges in implementing such changes. These challenges are often tied to socio-economic constraints, limited access to educational resources, and the need for infrastructure that can effectively integrate technology into teaching practices. For teacher educators in this region, providing support for students with learning disabilities requires a specialized skill set and access to relevant tools that promote an inclusive learning environment. (Okeke & Eke, 2020; Brown & Green, 2019).

Learning disabilities encompass a range of cognitive impairments, such as dyslexia, dyscalculia, and ADHD, which can hinder a student's ability to learn at the same pace as their peers without tailored support. Teacher education programs play a critical role in equipping educators with the knowledge and skills necessary to address these unique needs. Yet, integrating specialized teaching strategies and technology-based solutions within these programs remains limited in North East Nigeria. Bridging this gap calls for innovative solutions that incorporate both modern technological tools and inclusive teaching methodologies, aimed at creating a supportive learning environment for all students. (Okeke & Eke, 2020).

The advancement of educational technology offers promising avenues for enhancing teacher preparation, especially in inclusive education. Technology can be instrumental in developing adaptive learning tools, visual aids, and assistive devices that can help mitigate learning challenges. However, for these tools to be

effective, teacher educators must possess not only the technical skills to utilize them but also an open and positive attitude toward inclusion. This requires a shift from traditional teaching methods to integrative strategies that foster inclusivity and support students with learning disabilities, (Field, 2018).

In North East Nigeria, the effective adoption of such inclusive practices faces significant obstacles, including limited funding, insufficient training, and scarce institutional resources. Addressing these issues requires a multifaceted approach that not only provides technological support but also encourages positive attitudes and open-mindedness among teacher educators toward students with learning disabilities, (Brown & Green 2019).

This study aims to explore the level of technology integration in teacher education programs in North East Nigeria and assess teacher educators' attitudes toward using innovative strategies for inclusive teaching. Furthermore, it seeks to identify the barriers to implementing technology-based solutions for supporting students with learning disabilities. By understanding these dynamics, this study hopes to contribute meaningful insights into ways colleges of education can advance their approach to inclusivity, advocating for policies and practices that strengthen support for all learners.

The integration of technology in teacher education has transformed educational practices by enabling more personalized, inclusive, and efficient learning experiences (Brown & Green, 2019). Research suggests that digital tools and assistive technologies can significantly enhance the learning process for students with disabilities by providing accommodations that reduce barriers to participation and comprehension (Meyers



et al., 2021). In particular, adaptive technologies such as speech-to-text applications, audiobooks, and specialized software can be critical for supporting students with dyslexia, ADHD, and other learning disabilities (Smith & Tyler, 2020). However, studies have shown that access to and familiarity with these technologies vary significantly by region, with economically constrained areas such as North East Nigeria facing particular challenges in adoption (Okeke & Eke, 2020). The availability of infrastructure, funding, and professional training are major determinants of the effectiveness of technology integration in teacher education programs (Awofala et al., 2019). This disparity highlights the need for context-sensitive strategies that align with local capacities and resources.

Inclusive education advocates for an environment that accommodates all learners, regardless of their abilities, and promotes strategies that allow for differentiated instruction. Teacher preparedness to work with diverse student needs, including those with learning disabilities, is critical to the success of these inclusive strategies (Brock & Carter, 2022). In teacher education, training that emphasizes inclusive pedagogies and individualized support has been shown to positively impact educators' abilities to accommodate diverse learners (McLeskey & Waldron, 2021).

Recent studies indicate that teacher attitudes towards inclusive practices significantly influence the success of these strategies (Olufunke & Afolabi, 2021). When educators feel prepared and supported, they are more likely to adopt and implement inclusive approaches in their classrooms. Research from developing regions suggests, however, that limited exposure to evidence-based inclusive practices often leads to low confidence

among educators in addressing learning disabilities (Uzoечи, 2020).

Implementing technology-based solutions for learning disabilities in under-resourced areas comes with specific challenges. These include a lack of funding, inadequate access to digital tools, and limited training for educators in both inclusive pedagogies and technology use (Chukwu, 2019). In North East Nigeria, socio-economic factors and infrastructural deficiencies further complicate the adoption of innovative teaching tools, with most institutions struggling to allocate resources for specialized technology (Adamu & Musa, 2020). Moreover, government policies on inclusive education and funding mechanisms often lag behind the growing demand for technology-based learning support (Ibrahim & Yakubu, 2021).

Studies have also highlighted that even when technology is available, teacher educators may lack the training required to use it effectively for students with learning disabilities (Etim & Solomon, 2019). To bridge this gap, researchers recommend collaborative efforts involving government bodies, educational institutions, and non-governmental organizations (NGOs) to provide resources and training that can help educators implement inclusive practices with confidence (Mohammed et al., 2021). While significant progress has been made globally in integrating technology and inclusive practices in teacher education, the literature reveals gaps in application within regions like North East Nigeria. Specifically, there is limited research on the interaction between teacher attitudes, available resources, and technology-based solutions for learning disabilities in this region. Understanding these dynamics can offer insights into how teacher education programs might be enhanced to better support inclusive education goals and promote equity in learning outcomes. This study seeks to address these gaps by



examining the unique context of North East Nigeria and proposing strategies that align with local capacities and needs

Statement of the Problem

The integration of technology in teacher education has become an essential factor in preparing educators to address diverse learning needs effectively, particularly for students with learning disabilities. In North East Nigeria, however, the implementation of adaptive and inclusive educational practices remains limited, largely due to inadequate resources, insufficient training, and lack of structured support systems. This gap not only affects the quality of education provided to students with learning disabilities but also limits the capacity of future educators to create inclusive learning environments.

While global research underscores the benefits of using technology to support students with disabilities through tools such as assistive devices, adaptive software, and personalized learning applications these resources are often unavailable or underutilized in North East Nigeria. Teacher education programs in the region often lack sufficient exposure to innovative approaches that enhance teaching strategies for students with special needs. Consequently, future teachers may enter the profession underprepared to support diverse learners effectively, especially those with learning disabilities.

Existing studies on inclusive education and technology integration in Nigeria are limited in scope, with little focus on teacher education programs in the North East region. This gap highlights a critical need to explore the specific challenges, perceptions, and opportunities surrounding the use of technology in supporting learning disabilities within these programs. Understanding these dynamics is crucial to developing strategies that will foster

inclusive education through better resource allocation, professional development, and policy support. (UNESCO, 2021).

This study, therefore, seeks to address the gap by investigating the extent of technology integration in teacher education for supporting students with learning disabilities in North East Nigeria. It also aims to analyze teacher educators' attitudes toward inclusive strategies and identify the key challenges that limit the adoption of technology-based solutions. By focusing on these areas, this research hopes to provide insights that will contribute to the advancement of teacher education practices and improve educational outcomes for students with learning disabilities in the region.

Objectives

The following are the research objectives:

1. To assess the current level of technology integration in teacher education programs aimed at supporting students with learning disabilities in North East Nigeria.
2. To evaluate the attitudes and perceptions of teacher educators toward innovative teaching strategies and inclusive practices for students with learning disabilities.
3. To identify the key challenges and resources that affect the adoption and implementation of technology-based solutions for supporting students with learning disabilities in colleges of education in North East Nigeria.

Research Questions

The following are the research Question:

1. What is the current level of technology integration in teacher education programs designed to support students with learning disabilities in North East Nigeria?
2. How do teacher educators perceive and respond to the use of innovative



strategies in their teaching practices for supporting students with learning disabilities?

- 3 What challenges and available resources influence the effectiveness of technology-based approaches in supporting learning disabilities within teacher education programs in North East Nigeria?

Hypotheses

The following are the research Hypotheses:
 H₀₁: There is a significant positive relationship between the level of technology integration in teacher education programs and the effectiveness of support provided to students with learning disabilities.

2. Teacher educators' positive attitudes toward inclusive teaching strategies are significantly associated with the successful implementation of practices that support students with learning disabilities.
3. Institutional resources and support significantly impact the adoption of technology-based solutions for learning disabilities in colleges of education in North East Nigeria.

Methodology

The methodology for this study outlines the research design, population and sample selection, data collection instruments, and statistical techniques used to analyze the impact of technology integration and innovative strategies in supporting students with learning disabilities in teacher education programs in North East Nigeria. This study employs a descriptive survey design, a common approach for capturing and analyzing quantitative data from a target population. The survey design enables the researcher to collect relevant data from teacher educators and administrators to evaluate the extent of technology use, attitudes toward inclusive teaching strategies, and challenges

affecting technology adoption (Creswell, 2014).

The study population consists of teacher educators and administrators in colleges of education across North East Nigeria. Using stratified random sampling, a sample of 150 participants was selected. Stratified sampling ensures that all groups within the target population are represented, which enhances the generalizability of the results (Frankel & Wallen, 2015).

Data were collected using a structured questionnaire developed based on previous studies in similar fields (Okeke & Eke, 2020; Brown & Green, 2019). The questionnaire was validated through expert review to ensure content validity and reliability, covering four key sections: Demographics: Participant background information, including years of experience and exposure to inclusive education.

Technology Integration: Items assessing the current level of technology integration in supporting students with learning disabilities.

Attitudes toward Inclusive Strategies: Questions measuring participants' attitudes toward using innovative and inclusive strategies. Challenges and Resources: Items identifying obstacles and available resources impacting the adoption of technology-based solutions. The data were analyzed using descriptive statistics (mean, standard deviation, and frequency) to summarize the main findings, and regression analysis to examine relationships between technology integration, attitudes toward inclusivity, and resource availability. Descriptive statistics provided an overview of participant responses, while regression analysis tested the hypotheses and identified key predictors of successful support for learning disabilities (Field, 2018)



Results,

Table 1: Descriptive Statistics of technology integration in teacher education programs:

S/N	Variable	Mean	Standard Deviation	Frequency (%)
1	Technology integration level	3.45	0.86	Low:40%, Moderate:35%, High: %25
2	Attitudes towards inclusive strategies	4.12	0.64	Positive:70%, Neutral:20% Negative: 10%
3	Challenge in implementation	3.78	0.90	Low:15%, Moderate:50%, High: 35%
4	Availability of the resources	2.90	0.95	Low:55%, Moderate:30%, High: 15%

The descriptive statistics reveal that the level of technology integration in teacher education programs is generally low to moderate, with only 25% of participants indicating high integration. Attitudes toward inclusive strategies are predominantly positive, with 70% expressing favorable views. However, a

substantial proportion of respondents (35%) encounter high levels of challenges, with limited resources available to support technology adoption. These findings suggest disconnect between the positive attitudes of educators and the actual level of Technological and institutional support available to them.

Table 2: Regression Analysis on significant relationships between predictor variable and the dependent,

Predictor Variable	Dependent Variable	Coefficient (B)	Standard Error	T-Value	P-Value	Interpretation
Technology integration level	Support for learning Disability	0.45	0.10	4.5	0.001	Significant Positive Relationship: Higher Technology Integration lead to Improve Support
Attitudes towards inclusive strategies	Implementation Success	0.30	0.08	3.75	0.001	Positive Attitudes Significantly enhance Implementations of inclusive Strategies
Availability of the resources	Technology Adoption	0.40	0.09	4.44	0.001	Increased Resources Significantly boost Technology Adoption efforts.



The regression analysis shows significant relationships between each predictor variable and the dependent outcomes, all at $p = 0.001$. Specifically, a higher level of technology integration correlates with improved support for students with learning disabilities ($B = 0.45$). Positive attitudes toward inclusive strategies also significantly increase the likelihood of successful implementation ($B = 0.30$), indicating the importance of educator mindsets in driving inclusive practices. Additionally, resource availability is a significant predictor of technology adoption ($B = 0.40$), emphasizing the need for adequate institutional support to facilitate technological integration in educational settings.

Conclusion

This study concludes that, despite the positive attitudes of teacher educators towards inclusivity and technology, structural barriers such as limited funding, lack of training, and resource constraints restrict the effective integration of these tools to support students with learning disabilities. Teacher educators' willingness to adopt inclusive strategies presents a strong foundation for future improvements in teacher education; however, without adequate resources and institutional commitment, progress will remain limited. This research emphasizes the importance of bridging the gap between positive attitudes and practical resources to create a more inclusive and technologically supportive educational environment (Awofala et al., 2019).

Recommendations

To address the identified gaps and enhance the effectiveness of teacher education in supporting learning disabilities, the following recommendations are proposed:

1. Increase Funding for Technology and Resources educational institutions, and NGOs, should allocate dedicated funding to

acquire adaptive and assistive technologies. This investment would help bridge the gap between the enthusiasm of educators and the limited resources currently available, as highlighted by prior studies (Awofala et al., 2019; Chukwu, 2019).

2. Professional Development and Training Teacher educators require ongoing training
In both adaptive technologies and inclusive education practices to maximize their impact in supporting students with disabilities. Such professional development initiatives, which could include workshops and certifications, will equip educators with the skills needed to use inclusive tools effectively.
3. Collaborate with Educational Technology Partners establishing partnerships with
Technology providers and NGOs can make assistive devices and educational resources more accessible. Collaborations with technology companies may allow colleges of education to access discounts on adaptive technologies, while NGOs can provide additional support and training opportunities
4. Develop and Enforce Inclusive Education Policies Policymakers should establish clear
guidelines and policies that mandate and support the integration of inclusive technologies in teacher education. This policy framework would not only prioritize inclusivity but also hold institutions accountable, ensuring a more equitable learning environment.
5. Implement Continuous Assessment and Feedback Mechanisms To track the effectiveness



of technology and inclusive practices, colleges of education should establish regular assessment mechanisms. Continuous feedback will allow institutions to adjust their strategies based on the practical experiences and challenges reported by teacher educators, thus improving support for students with learning disabilities.

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