



(RESEARCH ARTICLE)



## UTILIZATION OF ASSISTIVE TECHNOLOGY FOR EFFECTIVE TEACHING AND LEARNING IN SPECIAL EDUCATION CENTRES IN ADAMAWA STATE

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### ABSTRACT

The purpose of this study was to ascertain the utilization of assistive technology for effective teaching and learning in special education centres in Adamawa State, Nigeria. The study was guided by two objectives and research questions which sought to determine the level of utilization of assistive technology and the challenges that affect its utilization respectively. A descriptive survey design was adopted for the study. The population of the study was 33 administrators and teachers of two government-owned special education centres in Jada and Mubi while total enumeration sampling procedure was used for the study. Data were collected using a validated questionnaire titled Utilization of Assistive Technology for Effective Teaching and Learning Questionnaire (UATETLQ). The questionnaire was validated by experts with a Cronbach's alpha reliability coefficient of 0.77. Data collected were analysed by means of mean and standard deviation using a criterion mean of 2.50. Results of the study showed that the level of utilization of assistive technology was low with a grand mean of 2.46. However, computers, tablets, and audio-visual materials were utilized more compared to screen readers, communication devices, and digital assessment tools. The result further showed that respondents agreed that the major challenges that hindered the utilization of assistive technology included high cost of assistive technologies, inadequate availability of appropriate assistive devices, inadequate funding, poor maintenance, poor electricity supply, and inadequate teacher training with a grand mean of 2.83. The study therefore concluded that limited fund, inadequate infrastructural facilities, inadequate equipment, and lack of adequate training impeded the effective utilization of assistive technology. The study recommended a continuous provision of funds, provision of appropriate assistive devices, continuous teacher training, improvement of electricity and internet networks, provision of technical support, and monitoring and evaluation of the utilization of assistive technology as well as strengthening partnership in special education in Adamawa State.

**Keywords:** Assistive Technology, Special Education, Teaching and Learning, Utilization, Learners with Disabilities, Adamawa State.

## 1 INTRODUCTION

The integration of assistive technology within special education environments has become increasingly vital for strengthening pedagogical approaches and educational outcomes for all learners, particularly those experiencing disabilities. Assistive technologies encompass a range of supportive mechanisms and specialized instruments that enable students with exceptional needs to surmount educational obstacles, enhance academic performance, and foster self-reliance (Al-Azawei, Serenelli, & Lundqvist, 2016). For instance, assistive technology may encompass communication systems, adaptive software applications, and specialized equipment designed to address the distinct needs of students who experience physical, sensory, or cognitive impairments.

In Adamawa State, Nigeria, special education centers serve as critical institutions for providing inclusive education to children with disabilities. However, despite the recognized benefits of assistive technology, its adoption and effective utilization still face numerous challenges, including limited awareness, inadequate training of educators, insufficient funding, and lack of access to appropriate devices (Edyburn, 2013). These challenges can negatively impact the quality of teaching and learning, thus limiting the educational outcomes for learners with special needs.

The importance of integrating assistive technology in special education is underscored by global educational policies advocating for inclusive education and equal opportunities for all learners (United Nations, 2006). Empirical studies have demonstrated that assistive technology not only facilitates access to curriculum content but also promotes learner engagement, motivation, and independence, which are essential for academic success (Alnahdi, 2020).

Given the increasing demand for inclusive education and the potential of assistive technology to transform teaching and learning experiences, it is imperative to investigate how these technologies are currently utilized in special education centers in Adamawa State. This study aims to explore the extent of assistive technology use, the factors influencing its adoption, and the perceived impact on teaching effectiveness and learner outcomes. The findings will provide valuable insights for policymakers, educators, and stakeholders to enhance the provision and integration of assistive technology, thereby improving educational equity and quality in the region.

### 1.1 Statement of the Problem

In Adamawa State, special education centres face significant challenges in delivering effective teaching and learning experiences to students with diverse disabilities. Despite advances in educational methods, the integration and utilization of assistive technology to support learners remain limited. Assistive technology, which includes devices, software, and tools designed to enhance the educational participation and achievement of students with special needs, has been proven to improve learning outcomes and facilitate inclusive education (Alnahdi, 2020). However, in many special education centres across Adamawa State, these technologies are either underutilized or inaccessible due to factors such as inadequate funding, lack of trained personnel, and insufficient awareness among educators and stakeholders (Edyburn, 2013).

This gap hinders the full realization of the potential benefits that assistive technology can offer, thereby affecting the quality of education provided to special needs students. Furthermore, the failure to effectively integrate these technologies into teaching practices limits the ability of educators to personalize learning, accommodate diverse learning styles, and promote independence among learners with disabilities (Okolo & Diedrich, 2014). Given the increasing emphasis on inclusive education policies globally and nationally, it is imperative to investigate the extent to which assistive technology is being utilized in special education centres in Adamawa State, identify barriers to its effective use, and explore strategies to enhance its implementation for improved teaching and learning outcomes.

Addressing this problem will contribute to the development of more accessible, equitable, and effective educational environments for students with disabilities, ultimately supporting their academic success and social integration.

### *Objectives of the Study*

This research initiative aims to investigate the application of assistive technology to enhance teaching and learning effectiveness within special education facilities located in Adamawa State. In particular, this research endeavours to:

- Determine the level of utilization of assistive technology for effective teaching and learning in special education centres in Adamawa State.
- Ascertain the challenges facing the utilization of assistive technology for effective teaching and learning in special education centres in Adamawa State.

## 1.2 Research Questions

The following research questions were raised to guide the conduct of the study:

- What is the level of utilization of assistive technology for effective teaching and learning in special education centres in Adamawa State?
- What are the challenges facing the utilization of assistive technology for effective teaching and learning in special education centres in Adamawa State?

## 1.3 Review of Related Literature

The use of assistive technology (AT) in special education has been widely recognized as a critical factor in enhancing the educational experiences and outcomes for learners with disabilities. Assistive technology encompasses a range of devices, software, and tools designed to support individuals with special needs in overcoming barriers to learning and communication (Alnahdi, 2019). Globally, research shows that integrating AT into teaching strategies promotes inclusivity, fosters learner independence, and improves academic performance (Smith & Smith, 2020).

Fasina et al. (2026) executed an investigation examining educator perspectives and implementation of assistive technology in facilitating effective instruction and learning outcomes for learners with disabilities in Ijebu Ode, Ogun State, Nigeria. Their results indicated insufficient levels of educator implementation of assistive technology in promoting effective instruction and learning among learners with disabilities. Dimiri and Sunday (2025) evaluated educator perspectives regarding the presence and implementation of assistive technology for learners experiencing learning disabilities in Eti-Osa, Lagos State. Their results demonstrated that although certain assistive technologies were present and implemented, their presence proved insufficient to address the comprehensive learning requirements of learners with disabilities. Furthermore, the investigation also identified insufficient financial resources and insufficient educator professional development as impediments to comprehensive implementation.

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## 2 RESEARCH METHODOLOGY

### 2.1 Research Design

A descriptive survey methodology was utilized in this investigation to gather quantitative information regarding the adoption of assistive technology within specialized educational facilities. This methodological approach was deemed appropriate because the research aimed to assess the extent of assistive technology adoption and identify impediments to its implementation without altering any independent variables. The selection of the descriptive survey methodology was substantiated by the research objectives, which concentrated on characterizing the prevailing circumstances concerning assistive technology adoption in special education centres located in Adamawa State.

### 2.2 Population, Sample and Sampling Techniques

The investigation encompassed administrators and educators from two publicly funded specialized educational institutions in Adamawa State: the Special Education Centre in Jada, comprising three administrative personnel and 15 educators, and the Special Education Centre in Mubi, comprising three administrative personnel and 12 educators. The Jada facility served students with visual impairments, hearing impairments, and cognitive disabilities, whereas the Mubi facility primarily served students with hearing impairments. A comprehensive enumeration sampling approach was implemented due to the limited population of administrators and educators across both institutions. Consequently, all 33 qualified administrators and educators participated in the study, thereby reducing the potential for sampling error.

### 2.3 Instrument for Data Collection

The investigation employed a standardized questionnaire designated as the Utilization of Assistive Technology for Effective Teaching and Learning Questionnaire (UATETLQ), which was constructed in accordance with the research objectives and existing scholarship on assistive technology in specialized education. The questionnaire contained two components. Section A solicited demographic information, encompassing gender, professional experience, academic credentials, and specialized training in assistive technology, whereas Section B addressed the research inquiries.

Section B was organized into two parts, each containing 10 items. Part I assessed the extent to which assistive technology including computers, screen readers, and digital assessment tools was utilized within special education centres. Part II comprised items designed to identify obstacles to assistive technology utilization, such as insufficient financial resources, unstable power supply, and inadequate professional development for educators. Both parts employed a four-point Likert scale for measurement. Utilization items were scored as Very High Utilization (4), High Utilization (3), Low Utilization (2), and Very Low Utilization (1), while challenge items were scored as Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). Validation of the Instrument

Three subject matter experts specializing in special education, educational technology, and psychometric assessment conducted face and content validation of the preliminary questionnaire. These experts examined each item for intelligibility, applicability, sufficiency, and congruence with the study's research objectives and questions. The feedback and recommendations provided by these experts were systematically reviewed and integrated into the refined instrument.

## 2.4 Reliability of the Instrument

Instrument reliability was established through a pilot study involving educators from a special education centre excluded from the primary investigation. Cronbach's alpha coefficient was employed to evaluate the pilot data and assess the questionnaire's internal consistency. The analysis yielded a reliability coefficient of 0.77, demonstrating acceptable internal consistency appropriate for the research.

## 2.5 Method of Data Analysis

Data obtained from the completed questionnaires underwent analysis using descriptive statistical methods, with particular emphasis on calculating mean values and standard deviations using a criterion mean of 2.50 for decision-making. Scores of 2.50 and above signified high utilization, while below 2.50 indicated low utilization.

# 3 RESULTS

## 3.1 Research Question 1: What is the level of utilization of assistive technology for effective teaching and learning in special education centres in Adamawa State?

**Table 1: Mean and Standard Deviation of level of utilization of assistive technology**

| S/N | ITEM                                                                                                                     | Mean | S.D. | Interpretation   |
|-----|--------------------------------------------------------------------------------------------------------------------------|------|------|------------------|
| 1   | Assistive technologies are regularly used to support teaching and learning in this special education centre.             | 2.48 | 0.82 | Low utilization  |
| 2   | Teachers use computers and tablets to support the learning needs of learners with disabilities.                          | 2.55 | 0.76 | High utilization |
| 3   | Teachers use screen readers or text-to-speech technologies to support learners with visual or reading difficulties.      | 2.31 | 0.91 | Low utilization  |
| 4   | Teachers use audio and visual learning materials to improve learners' understanding of lesson content.                   | 2.59 | 0.71 | High utilization |
| 5   | Teachers use hearing-assistive technologies to support learners with hearing impairments.                                | 2.44 | 0.88 | Low utilization  |
| 6   | Teachers use communication devices or applications to support learners who have difficulty communicating verbally.       | 2.36 | 0.93 | Low utilization  |
| 7   | Teachers use assistive technology to provide learners with different ways of participating in classroom activities.      | 2.51 | 0.79 | High utilization |
| 8   | Assistive technologies are incorporated into lesson planning and instructional activities in this centre.                | 2.47 | 0.84 | Low utilization  |
| 9   | Teachers use assistive technology to assess learners' progress and provide appropriate feedback.                         | 2.39 | 0.87 | Low utilization  |
| 10  | Assistive technology is used consistently to promote independent learning among learners with special educational needs. | 2.53 | 0.80 | High utilization |
|     | Grand Mean                                                                                                               | 2.46 | 0.84 | Low utilization  |

The results in table one indicates that the level of utilization of assistive technology for effective teaching and learning in special education centres is low, with a grand mean of 2.46 and a standard deviation of 0.84. Since the grand mean is below the criterion mean of 2.50, the research question is interpreted as indicating a low level of utilization.

The highest mean score was recorded for the use of audio and visual learning materials ( $M = 2.59$ ), followed by the use of computers and tablets ( $M = 2.55$ ). This suggests that these technologies are relatively more utilized than other forms of assistive technology.

The use of assistive technology to provide different means of classroom participation also recorded a relatively high mean ( $M = 2.51$ ). However, the use of screen readers or text-to-speech technologies recorded the lowest mean ( $M = 2.31$ ), indicating limited utilization. Similarly, communication devices or applications ( $M = 2.36$ ) and assistive technology for assessment and feedback ( $M = 2.39$ ) recorded relatively low levels of utilization.

The results consequently indicate that widely accessible technologies including computers, tablets, and multimedia resources are employed with greater frequency, while specialized assistive technologies demonstrate lower utilization rates. This observation may underscore the necessity for enhanced availability of suitable assistive equipment, educator professional development, technical assistance, and continued financial commitment to digital infrastructure within special education facilities.

### 3.2 Research Question 2: What are the challenges facing the utilization of assistive technology for effective teaching and learning in special education centres in Adamawa State?

**Table 2: Mean and Standard Deviation of Challenges Facing the Utilization of Assistive Technology**

| S/N | Item                                                                                                                    | Mean ( $\bar{X}$ ) | SD   | Decision |
|-----|-------------------------------------------------------------------------------------------------------------------------|--------------------|------|----------|
| 1   | Inadequate funding limits the availability and utilization of assistive technologies in this centre.                    | 2.91               | 0.78 | Agreed   |
| 2   | Unreliable electricity supply hinders the effective use of assistive technologies in teaching and learning.             | 2.87               | 0.81 | Agreed   |
| 3   | Limited access to internet services affects the utilization of internet-based assistive technologies.                   | 2.68               | 0.86 | Agreed   |
| 4   | The high cost of purchasing assistive technologies limits their availability in the centre.                             | 3.02               | 0.71 | Agreed   |
| 5   | Teachers have insufficient training on how to use assistive technologies effectively.                                   | 2.84               | 0.83 | Agreed   |
| 6   | Lack of technical support makes it difficult for teachers to use and maintain assistive technologies.                   | 2.76               | 0.89 | Agreed   |
| 7   | Inadequate availability of appropriate assistive devices limits their use for learners with different disabilities.     | 2.95               | 0.75 | Agreed   |
| 8   | Poor maintenance and frequent breakdown of assistive devices discourage their regular use.                              | 2.89               | 0.80 | Agreed   |
| 9   | Lack of suitable digital and instructional materials compatible with assistive technologies limits their effective use. | 2.63               | 0.91 | Agreed   |
| 10  | Large class sizes and limited time make it difficult for teachers to effectively integrate assistive technologies.      | 2.72               | 0.87 | Agreed   |
|     | Grand Mean                                                                                                              |                    | 0.82 | Agreed   |

The results in table 2 indicate that the identified factors constitute challenges to the utilization of assistive technology for effective teaching and learning in special education centres. The overall grand mean of 2.83 and standard deviation of 0.82 is above the criterion mean of 2.50, indicating that respondents generally agreed that these factors hinder the effective utilization of assistive technologies.

The highest mean score was recorded for the high cost of purchasing assistive technologies ( $M = 3.02$ ). This was followed by inadequate availability of appropriate assistive devices ( $M = 2.95$ ) and inadequate funding ( $M = 2.91$ ). This suggests that financial constraints and limited availability of appropriate devices are prominent challenges affecting assistive technology utilization.

Other notable challenges include poor maintenance and frequent breakdown of devices ( $M = 2.89$ ), unreliable electricity supply ( $M = 2.87$ ), and insufficient teacher training ( $M = 2.84$ ). Lack of technical support ( $M = 2.76$ ) and large class sizes and limited instructional time ( $M = 2.72$ ) were also identified as challenges.

The collective evidence indicates that financial constraints, infrastructural limitations, equipment deficiencies, professional development gaps, and institutional barriers jointly impede the optimal deployment of assistive technology within special education facilities.

#### 4 DISCUSSION OF FINDINGS

The results in table one indicates a low level of utilization of assistive technology in special education centers, with a grand mean of 2.46. The highest mean was for audio and visual materials ( $M = 2.59$ ), followed by computers and tablets ( $M = 2.55$ ). Classroom participation technologies scored moderately ( $M = 2.51$ ), while screen readers ( $M = 2.31$ ), communication devices ( $M = 2.36$ ), and assessment tools ( $M = 2.39$ ) showed limited usage. These findings suggest a preference for commonly available technologies and highlight a need for better access, teacher training, and investment in specialized assistive technologies. This finding agreed with the findings of Fasina et al. (2026) whose findings showed a low level of teachers' utilization of assistive technology for effective teaching and learning among students with disabilities.

The findings in table two show that several factors impede the use of assistive technology in special education centers, with a grand mean score of 2.83 indicating general agreement among respondents. The highest challenges identified include the high cost of assistive technologies ( $M = 3.02$ ), inadequate availability of devices ( $M = 2.95$ ), and insufficient funding ( $M = 2.91$ ). Other barriers are poor maintenance of devices ( $M = 2.89$ ), unreliable electricity ( $M = 2.87$ ), and insufficient teacher training ( $M = 2.84$ ). Additional issues include lack of technical support and large class sizes. Collectively, financial, infrastructural, equipment-related, professional development, and institutional factors restrict effective use of assistive technology in these settings. This finding agree with the findings of Dimiri and Sunday (2025) and Fasina et al (2026) who found out that the availability and utilization of assistive technology for pupils with learning disabilities were constrained by inadequate funding, insufficient teacher training, limited teacher competence and inadequate professional development

#### 5 CONCLUSION

The investigation demonstrates that assistive technology adoption remains limited within special education facilities across Adamawa State. Although general-purpose devices such as computers and tablets are utilized, advanced assistive technologies including screen readers and augmentative and alternative communication devices are infrequently implemented, as evidenced by a mean score of 2.46. Multiple barriers—encompassing financial constraints, infrastructural deficiencies, and professional capability gaps—account for this insufficient utilization, with a grand mean of 2.83 indicating substantial consensus regarding obstacles such as inadequate financial resources, elevated procurement expenses, and deficient educator preparation. The optimal implementation of assistive technology necessitates not merely the availability of devices but also the development of educator expertise, ongoing professional advancement, dependable technological infrastructure, and an enabling institutional framework. Advancing these technological applications requires coordinated engagement among governmental bodies, educational professionals, and relevant stakeholders to expand availability and enhance educational outcomes for students with disabilities.

##### 5.1 Recommendations

Based on the findings and conclusions of the study, the following recommendations are made:

- The Adamawa State Government and relevant educational authorities should allocate increased financial resources to support the procurement, deployment, maintenance, and renewal of assistive technology solutions within special education facilities.
- Special education centres should be equipped with a comprehensive array of assistive technologies designed to accommodate various disability categories, including screen readers, text-to-speech applications, hearing-assistance systems, alternative and augmentative communication tools, and other pertinent technological solutions.
- Educational institutions should establish systematic professional development initiatives, including regular workshops, seminars, hands-on training sessions, and structured programmes to strengthen educators' competencies in selecting, implementing, integrating, and assessing assistive technologies.
- Professional development programmes should extend beyond basic device operation to encompass practical applications in curriculum design, instructional delivery, student assessment, collaborative classroom activities, and personalized educational approaches.
- Special education centres should be provided with reliable electrical infrastructure and robust internet connectivity to facilitate the effective utilization of both standalone and web-based assistive technology applications by educators and learners.

- Special education centres should establish dedicated technical support infrastructure, including qualified information and communication technology specialists or appropriately trained technical personnel responsible for installation, maintenance, and repair of assistive devices, with preventive maintenance protocols implemented to ensure optimal device functionality and longevity.
- Educational institutions must supply digital instructional materials that are fully compatible with assistive technologies. Educators should have access to appropriately designed and readily accessible digital educational resources, including electronic textbooks, audio content, video materials, accessible evaluation instruments, and supplementary learning resources that integrate seamlessly with assistive technology platforms for instructional and learning purposes.
- Classroom environments must facilitate individualized technology utilization. School leadership should establish suitable operational frameworks, including optimal class sizes, flexible scheduling arrangements, and personalized instructional support, to enable educators to effectively deploy assistive technologies in addressing the distinct requirements of individual learners.
- Assistive technology must be integrated into institutional planning and financial allocation. School administrations should incorporate the costs associated with assistive technology procurement, professional development, ongoing maintenance, and periodic replacement into their strategic development plans and recurring budgetary allocations, rather than treating it as an isolated expenditure.
- Collaborative relationships should be cultivated. Government entities should establish partnerships with academic institutions, non-governmental organizations, international development agencies, technology enterprises, and organizations specializing in disability services to consolidate resources, contribute specialized knowledge, and create tailored assistive technology solutions.

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## STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

### *Disclosure of conflict of interest*

The authors declare no conflict of interest regarding this manuscript.

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