LEVERAGING ON ASSISTIVE TECHNOLOGY TO IMPROVE ACADEMIC PERFORMANCE OF LEARNERS WITH LEARNING DISABILITIES IN NIGERIA

By

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Abstract
When it comes to achieving academic success, learners with learning disabilities face several difficulties. Assistive technology has emerged as a possible way to improve their learning experiences. Assistive devices must be flexible to meet the diverse needs and learning preferences of each student. Supported technology devices may not meet the diverse needs of students with learning disabilities if they are insufficiently customized or flexible. This paper addresses the use of assistive technology to improve the academic performance of Nigerian learners with learning disabilities? It was found that assistive technology can affect students with learning disabilities' performance, and it was suggested that schools should make more use of it.

Introduction

Neurodevelopmental abnormalities known as learning disabilities have a substantial impact on a person's capacity to acquire and apply academic skills. The difficulties that students with learning disabilities encounter in a variety of subjects, including reading, writing, math, and information processing, might impede their ability to learn and negatively impact their overall educational experience (Idowu, 2018). Frustration, low self-esteem, and a feeling of intellectual incompetence might result from these challenges. These challenges do not mean that the person is not intelligent or driven. Rather, they stem from the way the brain arranges and interprets data. Reading, writing, math, speaking, listening, thinking, and organization are just a few of the areas of learning that can be impacted by learning disorders (Brown, 2018). Pregnancy and childbirth can have a variety of effects, including learning difficulties. Mutations in the DNA or other causes can result in abnormalities in the developing brain. Pregnancy-related illnesses or infections, including CMV or rubella, might impact the development of the fetus's brain. Developmental problems may arise from the exposure of the fetus to alcohol or

drugs, including those that the mother used while she was pregnant. In addition to these factors, low birth weight, asphyxia (oxygen deprivation), and labor problems including early or protracted delivery might affect brain development and raise the chance of learning disabilities. (Oji, 2017)

Using assistive technology (AT) in education has become a viable way to help students with learning difficulties and raise their academic standing. The term "assistive technology" describes equipment, software, hardware, and techniques intended to improve the independence and functioning of people with impairments. When it comes to learning difficulties, assistive technology can offer specialized assistance and modifications to meet the unique needs of pupils. Offering several ways for them to obtain information, organize their thoughts, and demonstrate their knowledge, can help make up for their learning challenges (Wheler, 2018).

Digital graphic organizers, smart pens, speech recognition software, text-to-speech software, and specialized learning apps are just a few examples of the many products and techniques that fall under the umbrella of assistive technology. These resources can help students with learning difficulties in several ways, including reading aloud from the material, delivering prompts in both visual and audible forms, organizing and taking notes more easily, and providing fast feedback on tasks. There is a lot of promise for students with learning difficulties when assistive technology is used in classrooms. Enhancing the involvement, comprehension, and independence of students with learning disabilities in the learning process can be achieved through the use of assistive technology (AT) tools and practices. Because assistive technology is personalized, it can provide focused help that is matched to each student's particular needs, addressing their particular obstacles and highlighting their strengths.

A collection of gadgets known as assistive technology is meant to benefit those with disabilities. Artificial intelligence (AI) technology, such as real-time speech-to-text transcription and image recognition capabilities, is used in the construction of many assistive devices. Devices that fall under the category of assistive technology include items like text readers, screen magnifiers, large keyboards, touchscreen displays, hearing aids, and larger trackballs on computer mice Adebanjo (2017). Computer Assisted Technology (CAT) has been instrumental in expediting the dissemination of educational opportunities to learners from diverse cultural and national backgrounds worldwide. It is commonly acknowledged that computer-aided technology is an essential tool for social, political, and economic advancement. Computer-assisted technological skills are in greater demand than ever in the modern world, across all industries, including government, business, education, and commerce (World Bank, 2011).

Since the development of communicative skills, language learning requires social interaction between the teacher and the students as well as among the students themselves, computer use has long been considered a support tool for specific skill areas. However, with the recent rapid advancements in technology, the diversity of learning programs continues to shift and change in response to the demands of society (Brandal, 2017). The importance of computers in life cannot be overemphasized as they deal with learning, employment, productivity, and fun (Okumbe, 2018). Colantonia (2018), points out that, computers are used in banks, offices, the military, stores, factories, schools/colleges, government agencies, and even other organizations. Computers have created a revolution in the production, processing, and transfer of information, primarily because of their ability to handle colossal amounts of data within a very short period. Computer-assisted technology is often used to talk about computers and other technology used in schools.

For those with disabilities, assistive technology (AT) is a type of adaptable, rehabilitative equipment. Individuals with impairments frequently find it challenging to carry out daily life activities on their own or even with help. The term "activities of daily living" refers to self-care tasks like eating, clothing, grooming, using the restroom, moving around (ambulation), and maintaining personal electronics. The effects of impairments that restrict one's capacity to carry out everyday tasks can be lessened with the use of assistive technology. Through improvements to, or modifications to how individuals interact with, the technology required to complete such tasks, assistive technology helps people become more independent by enabling them to execute things they were previously unable to achieve or had great difficulty accomplishing (Bhang, 2019). However, because of their fundamental deficiencies in social communication imagination, lack of interest in other people, and mental retardation, learners with disabilities find that using CAT (Computer Assistive Technology) has a significant impact on their academic achievement. These pupils may not get anything from the educational system if they are not treated well. Technology can help students with disabilities excel in work-based learning activities and optimize their freedom in the classroom, according to Burgstahler (2013).

"Technology makes things easier for most people, but it makes things possible for people with disabilities" Radabaugh (2018) in Moreira and Ribeiro (2017). This statement makes teachers aware of their duties in enabling these students to participate, feel included, and be accepted.

Several research has examined the impact of assistive technology on the academic performance of students with learning difficulties (Akeem, 2017, Jimoh, 2018, Davis, 2016). Positive impacts on several academic domains, including math proficiency, written expression, reading comprehension, and overall academic

accomplishment, have been shown by this research. Access to information may be made easier, fundamental skills can be developed, and active engagement in class activities can be encouraged with the use of assistive technology. The effective incorporation of assistive technology in educational settings necessitates careful planning, suitable training for educators, continuing support, and consideration of each student's unique needs, notwithstanding the possible advantages. There might be obstacles to overcome, like financial concerns, technological competence, resource scarcity, and the requirement for cooperation between educators, experts, and families. Examining the state of research in this field is crucial giving the importance of helping students with learning difficulties and the potential for assistive technology to boost their academic performance. The purpose of this paper was to investigate how assistive technology can help kids with learning difficulties perform better academically and have better educational prospects.

Conceptual Review

Assistive Technology

The phrase "assistive technology" refers to a broad range of systems and services that are involved in providing assistive goods and services to preserve or enhance a person's freedom and functionality, therefore enhancing their well-being. Assistive items include things like wheelchairs, memory aids, prosthetics, glasses, pill organizers, hearing aids, and communication aids. Any device, piece of machinery, software, or product system that helps people with disabilities retain, increase, or enhance their functional abilities is referred to as assistive technology (AT). According to David (2014) and Adesanya (2017), assistive technology refers to any type of device that provides support to individuals who struggle with speaking, typing, writing, remembering, pointing, seeing, hearing, learning, walking, and a host of other challenges. Various assistive technologies are needed for different types of disability.

Individuals with disabilities frequently struggle to carry out activities of daily living (ADLs) on their own or even with help. The impacts of disabilities that limit one's capacity to do activities of daily living can be lessened with the help of assistive technology. More independence is encouraged by assistive technology, which makes it possible for people to complete tasks that they were previously unable to complete or found extremely difficult. It does this by improving the technology itself or by altering how people engage with it. For instance, wheelchairs allow individuals who are unable to walk to move independently, while assistive eating equipment makes it possible for those who are unable to feed themselves to do so. People with disabilities can live happier, more relaxed lives with increased "social participation," "security and control," and a better chance to "reduce institutional costs without significantly increasing household expenses" thanks to assistive technology (Wheeler, 2018).

s stated by WHO (2017). People can live healthy, productive, independent, and dignified lives and take part in civic, educational, and employment opportunities thanks to assistive technology. The use of assistive technology lessens the need for long-term care, formal health and support services, and caregiver labor. People are more likely to be alienated, alone, and impoverished in the absence of assistive technology, which increases the impact of illness and disability on individuals, their families, and society as a whole. According to Adebo (2016), an assistive technology device is any object, piece of machinery, or product system that is used to maintain, enhance, or increase a child with a disability's functional skills. It can be purchased commercially off the shelf, adapted, or customized.

According to Heiner (2018), assistive technology (AT) is any adaptive tool or service that boosts a student with a disability's involvement, accomplishment, or independence. He concluded that modifications might be as basic as a pencil grip or as sophisticated as a computer system. Every individualized education program (IEP) that a school district develops must take assistive technology into account. The IEP team is in charge of determining what special education services are required to guarantee that every student with a disability obtains a public education that is suitable and free of cost. The school system is required to supply the required equipment and services if the team concludes that the student requires assistive technology. Administrators, educators, and other relevant service staff members must acquire AT-related skills and knowledge in light of this requirement. Any object, piece of machinery, or product system-whether purchased commercially, off-the-shelf, adapted, or customized-that helps people with disabilities maintain, enhance, or grow their functional abilities is referred to as assistive technology.

Advantages of Assistive Technology to Persons with Learning Disabilities

- Accessibility and Inclusion: By giving people with disabilities the same access and opportunities as their peers without impairments, assistive technology seeks to level the playing field. It removes obstacles that could stand in the way of full engagement in social interactions, employment, education, and other facets of life.
- Customization: Solutions for assistive technology are frequently customized to match each person's unique requirements and preferences. Personalization guarantees that the technology efficiently tackles the distinct obstacles encountered by every individual.
- Diverse Range of Disabilities: Assistive technology serves individuals with a wide range of disabilities, including physical, sensory, cognitive, and communication impairments. It can be used by people with mobility limitations, visual or hearing impairments, learning disabilities, and more.
- Education and Empowerment: People with disabilities may take charge of their lives and actively engage in their communities thanks to assistive

technology. It can be extremely important for education, skill development, and career training, helping people reach their full potential and accomplish their objectives.

Concept of Learning Disability

Adesipo (2017) defines learning disabilities as a group of conditions that might impact verbal or nonverbal information acquisition, organization, retention, understanding, or usage. Even in those who otherwise have at least average abilities necessary for thinking or reasoning, these diseases have an impact on learning. A person with a learning disability is classified in several functional domains where they struggle with conventional learning methods. The inability to learn conventionally does not preclude the possibility of learning differently. Despite their frequent interchangeability, the terms "learning disability," "learning disorder," and "learning difficulty" have several key distinctions. Kirk (2017). When the phrase "learning disorder" is used, Kirk (2017) claims that it refers to a condition that affects a person's comprehension, memory, and ability to process new knowledge. People with learning disorders may have problems such as:

- Listening or paying attention
- Speaking
- Reading or writing (dyslexia)
- Doing math (dyscalculia)
- Writing (dysgraphia).

According to Adeowo (2017), a malfunction in one or more of the fundamental psychological processes involved in comprehending or using spoken or written languages is what constitutes a learning disability. These can show themselves as difficulties with speaking, listening, thinking, writing, spelling, or math. These encompass ailments that have been named developmental disorders, aphasia, dyslexia, brain damage, minor brain malfunction, and perceptual impairments. Children with learning difficulties are just as intelligent as their peers. Learning disorders are a neurological disease that arises from a variation in how a person's brain is "wired." However, if left to their own devices or taught in traditional methods, they can struggle with reading, writing, spelling, thinking, remembering, and/or organizing information.

Tresgold (2014) stated that learning disability is a classification that includes several areas of functioning in which a person has difficulty learning in a typical manner, usually caused by an unknown factor or factors. Given the "difficulty learning in a typical manner", this does not exclude the ability to learn differently. Therefore, some people can be more accurately described as having a learning difference, thus avoiding any misconception of being disabled with a lack of ability to learn and possible negative stereotyping. Raphael (2016) also described learning disability as

any of various conditions (such as dyslexia or dysgraphia) that interfere with an individual's ability to learn and so result in impaired functioning in language, reasoning, or academic skills (such as reading, writing, and mathematics) and that are thought to be caused by difficulties in processing and integrating information.

Causes of Learning Disability

James (2017) opined that the causes of learning disabilities are not well understood and sometimes there is no apparent cause for a learning disability. However, researchers have shown that neurological impairment may lead to learning disability, the following are some of the causes of learning disabilities;

1. **Heredity and Genetics:** Learning impairments are frequently inherited. It is common for parents or other relatives to struggle similarly when raising a child with learning problems. The development of learning difficulties is significantly influenced by heredity and genetics. Genetic influences can affect how the brain develops, how people process knowledge, and how long they can remember it. Learning difficulties may be more likely to occur in people who have certain genes or gene combinations. (James (2017)
2. **Problems During Pregnancy and Birth:** Pregnancy and childbirth can have a variety of effects, including learning difficulties. Mutations in the DNA or other causes can result in abnormalities in the developing brain. Pregnancy-related illnesses or infections, including CMV or rubella, might impact the development of the fetus's brain. Developmental problems may arise from the exposure of the fetus to alcohol or drugs, including those that the mother used while she was pregnant. In addition to these factors, low birth weight, asphyxia (oxygen deprivation), and labor problems including early or protracted delivery might affect brain development and raise the chance of learning disabilities. (Oji, 2017)
3. **Accidents after birth:** Learning disabilities can be caused by postnatal factors, such as accidents or environmental exposures. Head injuries sustained through accidents or trauma can lead to cognitive impairments and learning difficulties. Malnutrition during early childhood can affect brain growth and development, potentially leading to learning disabilities.

Types of Learning Disability

1. **Dyslexia:** Dyslexia is a specific learning disability that primarily affects reading and language processing. Individuals with dyslexia may have difficulty decoding words, recognizing sight words, spelling, and understanding the relationship between letters and sounds. This can impact their reading fluency and comprehension. Dyslexia is often associated with difficulties in phonological processing, which is the ability to recognize and manipulate the sounds of spoken language.

2. **Dysgraphia:** Dysgraphia is a learning disability that affects writing and fine motor skills. People with dysgraphia may struggle with handwriting, forming letters and words, and maintaining consistent spacing and letter size. They may find it challenging to express their thoughts in writing and may experience fatigue or discomfort while writing for extended periods.
3. **Dyscalculia:** Dyscalculia is a learning disability related to mathematical skills. Individuals with dyscalculia may have difficulty understanding and manipulating numbers, recognizing patterns, and performing calculations. This can affect their ability to solve math problems, understand mathematical concepts, and perform everyday tasks involving numbers.
4. **Attention-Deficit/Hyperactivity Disorder (ADHD):** ADHD is a neurodevelopmental disorder characterized by difficulties with attention, hyperactivity, and impulsivity. While ADHD primarily affects focus and behavior, it can also impact learning and academic performance. Individuals with ADHD may struggle with organization, time management, following instructions, and maintaining sustained attention on tasks.
5. **Auditory Processing Disorder (APD):** Auditory Processing Disorder is a condition in which the brain has difficulty processing and interpreting auditory information. Individuals with APD may have difficulty distinguishing between similar sounds, following verbal instructions, and processing speech in noisy environments. This can affect their ability to understand spoken language and, consequently, impact reading, writing, and communication skills.
6. **Visual Processing Disorder:** Visual Processing Disorder affects the brain's ability to interpret and make sense of visual information. Individuals with this condition may struggle with tasks such as reading, writing, and understanding visual-spatial relationships. They might have difficulty recognizing letters, words, or symbols, or they may struggle to perceive the differences between similar shapes and patterns.
7. **Non-Verbal Learning Disability (NVLD):** NVLD is a type of learning disability characterized by strong verbal skills but challenges in non-verbal areas. Individuals with NVLD may struggle with visual-spatial skills, motor coordination, and social interactions. They may have difficulty understanding facial expressions, body language, and other non-verbal cues, which can impact their social interactions and academic tasks involving visual-spatial processing.
8. **Language Processing Disorder:** Language Processing Disorder affects the ability to understand and use language effectively. Individuals with this disorder may struggle with expressing themselves clearly, comprehending complex sentence structures, and following instructions. It can impact both

spoken and written language skills, affecting communication, reading, writing, and academic tasks.

9. **Executive Functioning Disorder:** Executive functions involve skills such as organization, planning, time management, and self-regulation. Individuals with executive functioning difficulties may struggle with setting goals, prioritizing tasks, managing time, and staying organized. These challenges can have a significant impact on academic performance and daily functioning.

Ishola (2018) summited that individuals may have a combination of these learning disabilities or experience them to varying degrees. Additionally, each person's experience with a learning disability is unique, and their strengths and challenges may differ. Early identification, appropriate interventions, and tailored support can help individuals with learning disabilities overcome challenges and succeed in academic and other areas of life.

According to Srinath (2017) in general, children with learning disability (LD) are less efficient at learning than other children. As they grow up and master activities of daily living, they need to attend school like other children. The academic performance of learners with learning disabilities can vary depending on the specific challenges they face, the support they receive, and the effectiveness of interventions implemented. Idris (2020) points out some factors to be considered when describing the academic performance of learners with learning disabilities:

- **Achievement Discrepancy:** Learners with learning disabilities often experience a significant discrepancy between their intellectual ability and their academic achievement. While they may have average or above-average intelligence, their academic performance in specific areas, such as reading, writing, or math, may lag behind their peers.
- **Challenges in Specific Skills:** Academic performance can be affected by the specific learning disability a student has. For example, a student with dyslexia may struggle with reading fluency, comprehension, and spelling, while a student with dyscalculia may face difficulties with mathematical concepts and calculations. These challenges can impact their ability to complete assignments, understand instructional material, and demonstrate knowledge.
- **Variability in Performance:** The academic performance of learners with learning disabilities can be inconsistent. They may demonstrate strengths in some areas while struggling in others. For example, a student with dyslexia may excel in creative writing but experience difficulties in spelling or decoding words. This variability is important to recognize and consider when assessing their overall academic performance.

- **Accommodations and Interventions:** Learners with learning disabilities often require accommodations and interventions to support their academic performance. These can include modifications to instructional methods, specialized teaching techniques, assistive technologies, and additional support from special education teachers or resource specialists. When appropriate accommodations and interventions are provided, students with learning disabilities can make significant progress in their academic performance.
- **Individualized Education Plans (IEPs):** Students with learning disabilities often have Individualized Education Plans (IEPs) that outline their specific learning goals, accommodations, and support services. These plans are designed to address their unique needs and provide a framework for measuring progress in their academic performance. Regular assessment and monitoring of their performance are crucial to evaluate the effectiveness of interventions and make necessary adjustments (Uyi, 2018).
- **Non-Academic Factors:** It's important to consider non-academic factors that can influence the academic performance of learners with learning disabilities. These may include factors such as self-esteem, motivation, social-emotional well-being, and the level of support and understanding received from teachers, peers, and family members. These factors can significantly impact their engagement, confidence, and overall academic performance (Davis, 2018). However, it is important to know that the academic performance of learners with learning disabilities can be improved with appropriate interventions, accommodations, and support. With the right strategies in place, these students can achieve their full potential and succeed academically (Idris, 2020).

Ways Assistive Technology Can Help Learners with Learning Disability in Learning

According to Iden (2017), the following are ways in which assistive technology can help the learning of learners with learning disabilities:

1. **Enhanced Access to Information:** AT provides learners with learning disabilities access to digital and print materials in alternative formats, such as text-to-speech software, screen readers, and e-books. This enables them to comprehend and engage with content that may have been challenging through traditional reading methods.
2. **Improved Reading and Writing Skills:** Text-to-speech and speech-to-text technologies assist learners with reading difficulties (e.g., dyslexia) by reading aloud text and allowing them to dictate their ideas for writing assignments. This can enhance their reading comprehension and written expression.

3. **Mathematics Support:** Assistive technology tools for mathematics, such as graphic calculators, equation editors, and math-specific software, help learners with dyscalculia or other math-related disabilities visualize concepts and solve problems more effectively.
4. **Organization and Time Management:** AT tools like digital planners, task managers, and reminder apps assist learners with executive functioning challenges. These tools help them stay organized, manage assignments, and meet deadlines more successfully.
5. **Note-taking and Study Aids:** Assistive technology can assist learners with difficulties in note-taking by providing options for recording lectures, creating visual mind maps, and summarizing content. This helps them retain information and study more efficiently.
6. **Interactive Learning:** Multimedia and interactive AT tools engage learners with learning disabilities through visual and auditory content, simulations, and interactive exercises. These tools make abstract concepts more concrete and engaging.
7. **Increased Independence and Self-Efficacy:** AT empowers learners with learning disabilities to take control of their learning. As they gain proficiency with AT tools, they experience increased confidence, independence, and a sense of achievement in their academic pursuits.

Social Cognitive Theory

This theory emphasizes the role of observation, imitation, and reinforcement in learning. When learners with learning disabilities use assistive technology successfully, it can boost their self-efficacy and confidence, leading to improved academic performance. Positive experiences with assistive technology can foster a sense of mastery and enhance the belief that they can overcome learning challenges (Davis, 2018).

Social Cognitive Theory (SCT) is a psychological theory that emphasizes the role of social and cognitive factors in determining human behavior. According to SCT, behavior is not simply a result of one's internal factors (such as thoughts, emotions, and personality), but also of external factors (such as social norms, observational learning, and media influences).

SCT emphasizes the role of observational learning in shaping behavior. Learners with learning disabilities may benefit from observing others who have successfully used assistive technology to improve their academic performance. SCT also suggests that learners are more likely to adopt a new behavior if they see a benefit to themselves, and this is where the Technology Acceptance Model (TAM) is relevant. By demonstrating the benefits and ease of use of assistive technology to learners, they may be more likely to accept and use it.

Overall, the implications of SCT in this paper suggest that both individual and social factors must be considered to fully understand the impact of assistive technology on the academic performance of learners with learning disabilities. This understanding may then inform the development of effective strategies for supporting learners in their academic pursuits

Conclusion

it can be concluded that assistive technology helps in enhancing academic performance. For learners with disabilities, it can aid comprehension, participation, confidence, and efficiency in completing academic tasks. Therefore, it should be provided to assist learners with learning disability.

Recommendations

The following recommendations were made:

1. The availability and accessibility of assistive technology for students with learning difficulties should be guaranteed by school administrators
2. Enough training should be provided to educators on the proper use of assistive technology in the classroom.
3. Policies that guarantee financing and upkeep for assistive technology should be in place to keep them from becoming out of date.
4. To ensure that assistive technology helps enhance the academic performance of students with learning disabilities, collaboration between stakeholders such as parents, special education teachers, and regular education instructors is vital.

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