FACULTY OF EDUCATION
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ROLE OF ASSISTIVE TECHNOLOGY IN ENHANCING PARTICIPATION OF CHILDREN WITH DISABILITIES IN BASIC EDUCATION IN NIGERIA

Exploring the Perspective of Special Education Teachers

AYANTOYE, SEYE KENITH

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Abstract

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Aim: The core objective of this study is to investigate how assistive technology can be used to facilitate access to basic education among children with disabilities in Nigeria. Drawing on teachers' perspective, the study investigated how assistive technology facilitates children wtih disabilities inclusion and engagement with classroom learning and how assistive technology is used to solve learning problems and its challenges

Theory: Social model for disability was used to explain the conceptual meaning of disabilities in this study. Also, universal design for learning (UDL) theory provided the theoretical framework to investiagte the role of assistive technology in enhancing participation of children with disabilities in basic education

Method: Qualitative approach was used in this study. Eight (8) teachers with cognate five years experience in teaching children with disabilities were purposively sampled and data was obtained through the use of interview. Deductive thematic analysis was therefore used to analyse the data

Results: The findings show that assistive technology play a critical role in facilitating inclusive learning for children with disabilities by providing them with the tools they need to access education and participate fully in the learning process. Also, it was obtained that assistive technology is used to address learning difficulties such as reading, writing and arithmetic. Furthermore, it was found that assistive technology (AT) play a crucial role in facilitating independent learning among children with disabilities. However, challenges associated with the use of assistive technology in Nigeria such as lack of training, poor infrastructure, cultural barriers and limited awareness were also reported

Foreword

This research was motivated to raise a national consciousness about children with disabilities in Nigeria on how their academic lives can be improved in the classroom and what need to be done so that they do not remain at the bottom of the pyramid by the year 2030 (SDGs deadline). I observed that children with disabilities in Nigeria do not have the same level of opportunities just like their other peers who do not have disabilities in school, and this can deprive them full access and participation in basic education. It is therefore imperative to conduct empirical research to find a possible solution so that children with disabilities can access inclusive learning where their fundamental human right to learning will be achieved. As a result, this study was carried out to proffer solution and contribute to scholarly literatures.

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Abbreviations

AT	Assistive Technology
ST	Special Teachers
UDL	Universal Design for Learning

CHAPTER ONE

Introduction

Basic education is considered to be the fundamental and foundational education that children receive before pursuing higher education or vocational training. It typically covers primary and secondary education, which are mandatory in most countries around the world. However, it appears to me that this form of education has been under a major threat in Nigeria most especially for children living with disabilities and this negates the principle of sustainability goals which stipulated that basic education is a right for every child irrespective of their individual differences or status. In light of this, this study was motivated by examining relevant concept that can be used to enhance the participation of children with disabilities by sampling the perspective of teachers with requisite experience using qualitative approach. Teachers' perspective is considered to be imperative because of their closeness to school children, their relevance in curriculum implementation and their diagnostic prowess when it comes to classroom activities of the children.

Specifically, this study examined the role of assistive technology in enhancing participation of children with disabilities in basic education in Nigeria. From a similar vantage point, Obim et al. (2020) characterized AT as any tool or product that helps or supports a person with a particular disablities to perform like others with little to no assistance from people. In the same vein, Dominic et al. (2020), referred to AT as tools or software that have been specially created for a specific purpose or that have been modified and utilized to provide technical support for educators and learners with disabilities. However, the objectives of this study was born from the research lacuna that despite the enactment of law that centers on Discrimination Against Persons with Disabilities (Prohibition) in Nigeria (2019), there has been no conscious effort to domesticate a customized AT policy in Nigeria for the classroom settings. As a result of this, this study focused on the imperative role of AT in relation to inclusiveness, learning difficulties and independent learning. It is believed that this study will raise the consciousness and serve as a road map for relevant policy authorities while designing a customized AT policies for learning among children with disabilities in Nigeria.

Qualitative approach was used to sample eight (8) teachers. Due to the nature of the study, only teachers will make up the study sample, despite the fact that the perspective of children with

disabilities are frequently ignored when decisions are being made that could have an impact on their everyday lives and education. It is not therefore ideal that children with disabilities are not directly involved in this study and it can be considered as one of the limitation in this study. However, the perspective of children were not sought because the researcher believed that the teachers were in the better position to respond to the questions this study is seeking to answer and if this is not done it can water down the richness in data of the study. In addition, interview was used to get the teachers perspective on the research questions that was raised and the data gotten were analyzed using deductive thematic approach. In the same vein, social model for disability was used to explain the conceptual meaning of disabilities. And the model identified disabilities in the school context as restrictions put in place by modern social institutions that prevent learners with disabilities from fully accessing or participating in academic activities. Also, universal design for learning theory was used to explain the objectives of this study. This theory is founded on three principles: providing multiple means of representation, multiple means of action and expression, and multiple means of engagement. Basically, the theory is relevant for this study because it is regarded as a framework for designing educational instruction and curriculum that provides all learners with equal opportunities to learn (inclusiveness), regardless of their individual learning styles, abilities, or disabilities.

This thesis is divided into seven chapters. The first chapter comprised the introduction with focus on the study problem, objectives and questions. Chapter two focused on review of related literatures. The third chapter comprises of the study theoretical framework. Furthermore, chapter four is on methodological framework while chapter five focused on presentation of research results. Chapter six contains discussion and also chapter seven contains conclusions and recommendations for further research

Objectives of this study

The core objective of this study is to investigate how assistive technology can be used to facilitate access to basic education among children with disabilities in Nigeria. Drawing on teachers' perspective, the aims of the study is:

-to explore how AT facilitates children with disabilities inclusion and engagement with classroom learning

-to explore how AT is used to solve learning problems and its challenges

Research Questions

1. What is the role of classroom assistive technology in the facilitation of inclusive learning for children with disabilities from teachers' perspective in Nigeria?
2. How can classroom assistive technology be used to solve learning difficulties among children with disabilities from teachers' perspective in Nigeria?
3. How can classroom assistive technology be used to increase independent learning among children with disabilities from teachers' perspective in Nigeria?
4. What are the challenges of using classroom assistive technology from teachers' perspective in Nigeria?

Background

There are approximately 240 million children who have one or more disabilities and require some form of special education in the globe; of these, about 21 million live in Nigeria (UNICEF, 2021). With this enormous population, it has been said that educating these children in Nigeria is difficult because many of them are exposed to hostile environments and in many cases, they are marginalized in terms of educational opportunities (Obaka, 2017). According to Itulua-Abumere et al (2019), children who require particular assistance in daily tasks, such as self-care, schooling, and social involvement, are referred to as "children with disabilities." For instance, due to their physical and academic constraints, children with vision, auditory, physical, mental, and other disabilities are different from other learners. As a result of this, it has been put forward that children who has this form of disabilities needs a customized education which is known as "special education" (Francisco et al, 2020). This form of education is meant to give children with disabilities a level plain field just like their other colleague who doesn't have this kind of challenge.

Even though special education has been projected to be the solution for learners with disabilities, the role of teachers is very fundamental to it successful implementation. In the classrooms, teachers work with different categories of children as they engage in the teaching and learning process. Teachers are confronted with school children's individual differences and developmental capabilities especially in basic education that involves basically children

(Nwahunanya, et al, 2020). In regards to this, teacher's perspective about learners with disabilities is very fundamental for proper evaluation of learners' physical and emotional needs so that effective inclusive learning can be achieved. According to the Federal Republic of Nigeria (2004), learners who require some form of special education have various intellectual and physical disabilities, such as being unable to walk, manage items, use one or both arms and legs, run, or keep balance. Recently, various educational facilities have been established to cater for the educational growth of learners with disabilities, particularly in an inclusive learning environment. These modern educational facilities aimed at helping learners with disabilities are known as assistive technology (Nwahunanya, et al, 2020).

According to Omede (2012) AT are equipments designed for people with special needs to help them learn. For example, individuals who have hearing loss require speech synthesizer, ear mold machines, impedance audiometers, among others. Likewise, children with learning disabilities the following devices will be found helpful; toys, painted picture, animated instructional materials, cardboard papers, atomic absorption and many more. For children with visual impairments to access education, different resources and tools are needed. These are canes, abacuses, digital recorders, Braille sheets, Braille computers, reading devices and so on (Aderibigbe et al, 2017). However, there are different types of assistive products (AP), from well-known ones for mobility like wheelchair and canes to less common types for interaction or cognition like head control and eye-gaze gadgets (Rowlands, 2015). In addition, Alimi et al. (2022), avowed that the term "assistive technology" refers to a broad range of technological innovations that can be utilized to assist learners with disabilities in overcoming the difficulties related to learning in the cognitive, affective, and psychomotor domains speedily, easily, or autonomously. The author further explained that AT encompasses the process of choosing, and using assistive, adaptive, and therapeutic technologies for individuals with disabilities.

Empirically, AT has been described as a tool that can be used to enhance inclusive learning. Roberts et al (2008) avowed that effective integration of assistive technology can assist all students access the general education curriculum by giving them various ways to finish their tasks and enhancing their independence in executing things that they were previously unable to finish or had a lot of trouble completing. Similarly, Hern´andez (2003) reiterated that AT integrates a learner's cognitive capabilities to an educational opportunity which might not be

attainable because of their disabilities. In addition, AT is has also been pronounced to be very effective in addressing many learning challenges learners with disabilities encounter during learning. Raskind (1994) asserted that different AT that can assist children with disabilities overcome their different learning difficulties in literacy which involves reading, writing and listening. In the same vein, Cutler (1990) noted that spellcheckers were beneficial for helping children with disabilities make up for their spelling problems. Collins (1990) discovered that word processor use aided in the development of children with disabilities writing abilities. Brown (1987) discovered that using speech recognition technology in combination with word processing improved pupils' ability to produce written language.

Furthermore, the usefulness of AT has been domiciled in the fact that it is a viable tool that can be used to stimulate independent learning among children with disabilities. This assertion was advanced by Rabonye (2020) who opined that appropriate AT will enable children with learning disabilities gain access information and complete tasks effectively, thereby enabling them to achieve the highest level of independence and academic attainment. Also, it has been deduced that AT provides more independent learning chances and various practice drills (Zayyad, 2019). Alnahdi (2014) reiterated that with the help of supportive programs (special education) and innovations like assistive technology (AT), children with disabilities will develop the ability to complete some challenging academic tasks independently, participate in class discussions, and complete academic tasks independently (Alnahdi, 2014).

Considering the imperative position of AT for children with different forms of disabilities and also the immense benefit it can accord them, it is essential for AT to be taking serious most especially by policies makers and stakeholders in Nigeria because AT has been portrayed to be a tool that can give children with disabilities inclusive learning, solve the problem of learning difficulties and also help to improve independent learning opportunities in an academic environment. All these can be seen as principles of sustainable development goals (SDGs).

It has been extensively published the rationale behind the justification and significance of AT. SDGs are thought to be pertinent to AT, and most notably, the UN Convention on the Rights of Persons with Disabilities (UNCRPD) suggests that accessibility to AT be recognized as a fundamental human right. The functionalities and participation of children with disabilities in

school can be impacted by access to assistive technology (AT). Therefore, a lack of AT has an impact on the rights and quality of life of young children with disabilities most especially in school (Ebuenyi, 2021). Consequently, as a result of the essential role of AT, the Assistive Product List (APL) was developed through the Global Cooperation on Assistive Technology (GATE) initiatives, which was formed by the WHO to improve access to AT in acknowledgement of its significance. Similarly, the World Health Organization recommended that nations create national APL that is pertinent to the unique requirements of people with disabilities in their nations through GATE. In regards to the foregoing, it is therefore impossible not to overstate the relevance of assistive technology (AT) for learning among children with disablities because it has been shown to support these children by enhancing, maintaining, or strengthening their functional capacities in school.

Statement of the Problem

According to UNICEF (2021), the most alienated and marginalized categories of children worldwide are those with disabilities. Growing up, they are likely to have worse healthcare, less education, and fewer economic opportunities. They are also more likely to live in poverty and experience higher inequality than their counterparts without disabilities. Given their gender, disablities, and additional aggravating elements like their race and income, females with disabilities experience even greater hostility. In low-income nations, fewer than 10% of children with disabilities attend school, yet it is believed that one in ten children worldwide has a disability. The absence of assistive technology, unsuitable surroundings in transportation and schools, and prejudice are significant obstacles that prevent children with disabilities from accessing education and participating in society (UNICEF, 2021).

In Nigeria, the attitude of government towards providing assistance in regards to assistive technology to school children with disabilties maybe termed as not encouraging. Presently, there are no known clear policies on the provision of assistive technology in Nigeria for school children with disabilities. Although, 2018 saw the enactment of law which centers on Discrimination Against Persons with Disabilities (Prohibition) Act which is known as the newest document on disabilities in Nigeria. According to Ebuenyi (2021), the Act only calls for the integration of disabled people into society and formed the National Commission for People with Disabilities, which is in charge of overseeing issues relating to education, healthcare,

socioeconomics, civil rights, and other related issues for individuals with disabilities in the country. Despite being signed into law over four years after the APL's inception, the Act does not mention the APL or offer suggestions for an AT policy in Nigeria most especially in the classroom even though it acknowledges the right of people with disabilities to AT. It also does not clearly indicate how AT should be administered (Ebuenyi, 2021). Likewise, Nwabueze et al (2018) reported that there has been inconsistent adherence to laws protecting children with disabilties and emphasizing inclusion in educational environments and programs in Nigeria. They emphasized that most children with disabilties continue to attend special schools in isolation or are withdrawn from regular classrooms.

In Nigeria, having an inclusive education in order to align with the intent of Sustainable Development Goals (SDG) has been seen as lip service (Agbakuribe et al, 2021). According to Ngwoke et al (2020), various disabilities has been ranked on the basis of a sociocultural logic and there is a view that some disabilities are more admissible to inclusive education within the country's inclusive learning environments than others. Therefore, the inclusive education's zero-rejection concept, which emphasizes providing each child with an equal opportunity to succeed in school, is violated by this. To solve this problem, provision of assistive technology has not been perceived important and this make the concept of inclusive education more challenging in the four walls of learning. According to Omede (2012), it was inferred that there is poor level of appreciation of assistive technology use among educational stakeholders in Nigeria. This might be due to the fact that the advantageous end result AT can give to children with disabilties in school is not properly envisage. Additionally, studies indicate that educators themselves exhibit signs of unease in inclusive education classrooms because of inadequate specialized devices or training to handle and mange children with disabilities in conventional classrooms (Olumorin et al, 2022).

In addition, managing children with disabilities pose challenges to both families and professionals at homes and in schools because these children are mostly confronted with learning difficulties (Adebisi et al, 2015). Even though the use of AT has been proposed to be a solution to this challenge, its usage has been underexplored in Nigeria (Olumorin et al, 2021). This, however, contradicts the principle of the country's education policy, which states that schools would have access to the essential facilities, materials, and resources to allow easy

access to high-quality education for children with disabilties, thereby eliminating any learning problems. Aside this, mobility and performance of school task is another major issue child with disability face, many of them cannot access public space without the help of family members (Ngwoke et al, 2020). This infer that they experience limited learning opportunities. In the same vein, the World Bank and the Global Partnership for Education in 2017 found that 3 out of 10 children with disabilties in 19 low- and middle-income nations had never attended school and that only approximately half of those who do, finish elementary school (Banham et al, 2018)

Having said the foregoing, it is clear that the problem of AT usage in Nigeria is rooted in a lack of awareness of the critical role of AT in the classroom for children with disabilities, as well as how the function of AT is relevant to achieving access to basic education in Nigeria. As a result, it is critical to investigate the perspectives of experienced special education teachers on how AT can be used to promote inclusion and involvement in classroom learning among children with disabilities. It is hoped that this will promote awareness among significant stakeholders, particularly the academic community and parents, about the importance of AT in learning for children with disabilties.

Relevance of the study

This research is timely and significant because it is geared towards raising a kind of national consciousness about children with disabilties in Nigeria, how their academic life can be improved in the classroom and what need to be done so that they won't remain at the bottom of the pyramid by the year 2030 (SDGs deadline). Similarly, this study is meant to enlightened major academic stakeholders and even policy makers in the academic environment on the imperative role that assistive technology (AT) plays in the classroom in ensuring that children with disabilties have the same learning opportunities as children without disabilities and in assisting schools and teachers in delivering on the promise of inclusive education. Another noteworthy finding that this current study is expected to bring to research is how AT can be a valuable tool in addressing the problem of learning difficulties among children with disabilties. If these are accomplished as a result of this study, the use of AT will be well-promoted and appreciated due to the benefits it will provide to children with disabilties. Specifically, it will

allow these children to participate more fully in all facets of life while also assisting them in exercising their legal right to a free suitable communal education in the least restrictive location.

CHAPTER TWO

THEORETICAL FRAMEWORK

A theory can be described as an exposition of knowledge that entails a logical and creative organization of concepts that presents a tentative, deliberate, and systematic understanding of phenomena (Chinn et al, 1999). A theoretical framework conveys a broad illustration of how different variables relate to one another in a specific study context (Rowlands, 2015). However, the theoretical framework guiding this study are presented and discussed in terms of how they are frame, and why they are suitable, for this study. Two theory was used in this study to explain the variables of interest. Social model for disability was used to explain the conceptual meaning of disabilities while universal design for learning theory was used to explain the role of assistive technology in special education in enhancing access to basic education

Social Model of Disability

The social model for disability has been used to explain and differentiate the conceptual meaning of disabilities from the medical model (Bampi et al, 2010). Even though, these two models have been widely used to classify disabilities, it is important to explain the disparities that exist between them and why I have chosen to adopt the social model in this study to explain the concept of disability. According to the medical concept, a disability is any limitation or lack of capacity to behave in a manner that is considered to be normal. The social model, in contrast, contends that restrictions put in place by modern social institutions prevent people with disabilities from fully participating in society (Barnes et al., 2008). More specifically, the social model of disability was created by individuals with disabilities, and it had its origins in the 1976 publication of The Fundamental Principles of Disability by the Union of the Physically Impaired Against Segregation (UPIAS). It was started as a direct challenge to the dominant models of disability, which saw disability as an individual, medical condition that needed to be prevented, treated, or put under control, or as a charitable issue, which saw people with disabilities as disadvantaged people who needed to be pity and catered for by isolated charity services. (Carson,2009).

The Social Model of Disability demonstrates that impediments, not deficiencies, are what render people disabled. For instance, it's not someone's challenges that makes traveling so

difficult, it's heavy doors and inaccessible public transportation. Each person with a disability is free to compile a list of the obstacles that prevent them from fully participating in society. It is simple to see how a variety of impediments limit the chances available to persons with disabilities when these obstacles and other people's unfavorable views are taken into account. Instead of the alternative Medical Model of Disability, which relies on healing everyone who has a disability, the Social Model of Disability asserts that the solution is to remove these barriers (Barnes et al., 2008). As a concrete illustration, if individuals with poor vision are provided with a straightforward piece of equipment such as a pair of glasses, it will enable them to fully participate in society and every from of hindrances and limitatation will be completely removed. Similarly, making public transportation accessible to everyone with ramps and highly visible guide rails is the social model's straightforward response to the problem of mobility for someone who cannot acesss public transportation.

From the standpoint of the social model, excessive resources are devoted to one-on-one interventions with steadily declining results. Therefore, despite the increased potential advantages of such investments, changes to the environment frequently go unnoticed or are underfunded (Barnes et al., 2004). Simply put, removing obstacles from the environment is likely to help not only people who have mobility disabilities but also other groups (such as mothers with prams and pushchairs and porters with trolleys), whereas physical rehabilitation will only help those who are fortunate enough to have access to it. However, the relevance of social model of disability in classroom for learner cannot be overemphasized. The model is an essential road map for creating a more inclusive classroom where all leaners' needs are satisfied! Understanding the models of disability will help instructors create dialogues, resources, and activities in the classroom that take into account the diverse identities and experiences of people with disabilities (Matthews, 2009).

Therefore, the use of this models in this study is plausible because the use of assistive technology in Nigeria where the educational right of children with disabilities is still being regarded as a subject of social negotiation is relevant. The teachers are known as custodian of learners in school and they are well equipped and familiar with the social construct of disabilities. As a result, the teachers are expected to be well experienced and informed about how the use of assistive technology can be used to bridge the gap and provide a stimulating and

balanced environment to complement the existing learning environment where all children can learn irrespective of their disabilities.

Universal Design for Learning Theory

Universal design for learning is a learning and instruction method that aims to make high-quality literacy and experiential learning multifaceted, multisensory, fulfilling, purposeful, and engaging for all children. Universal Design started as an architectural concept including the structuring of the environment for maximum accessibility and efficiency. It has recently been broadened and incorporated into learner-centered classrooms, comprising the meticulous planning and utilization of space, materials, curriculum, technology, and personnel" (Brand et al, 2012). It may be seen as an educational framework that aims to provide all learners, regardless of their abilities or disabilities, with equal opportunities to learn. UDL is based on the idea that learning environments should be designed to meet the needs of all learners from the outset, rather than retrofitting accommodations for students with disabilities. It was conceptualized by Mace (1996) as designing of things and surroundings to be useable by all individuals, to the maximum extent possible, without the requirement for adaption or specialist design

"Universal Design for Learning (UDL) encourages the "design of instructional materials and activities that allows learning goals to be attainable by individuals with wide differences in their abilities to see, hear, speak, move, read, write, understand, attend, organize, engage, and remember without having to adapt the curriculum repeatedly to meet special needs" (Orkwis, 1999). Empirically, UDL has been shown to improve student learning outcomes, increase student engagement, and reduce barriers to learning. One study, for example, found that when teachers implemented UDL in their classrooms, their students showed significant gains in academic achievement, including improved reading comprehension and math skills (Pisha & Coyne, 2001). "The concept of UDL is the intersection where all of our initiatives integrated units, multi-sensory teaching, multiple intelligences, differentiated instruction, use of computers in schools, performance-based assessment, and others come together" (Palley, 2001).

The optimal use of UDL is as a structure for inclusive instruction that is based on learning sciences research in the areas of psychology and neuroscience (Meyer et al, 2006). The UDL model was created to be used for designing inclusive educational experiences, whether they be at educational settings or individual-classroom level. The fundamental tenet of UDL is that educational opportunities should be inclusive of all prospective students from the beginning (Meyer et al, 2006). This theoretical practice, Universal Design for Learning was developed in 1984 by Center for Applied Special Technology (CAST). It was developed as a means of expanding learning opportunities for all learners and it is a method of teaching and learning that encompasses a wide variety of content areas while it is also simultaneously customized to meet the needs of all individuals" (Brand et al, 2012). This theory is however founded on three principles: providing multiple means of representation, multiple means of action and expression, and multiple means of engagement. This means that it gives educators the understanding of providing learners with various ways of accessing information, expressing what they have learned, and engaging with the content. For example, a UDL lesson might include a lecture, visual aids, and hands-on activities to provide multiple means of representation. Students might have the option to write an essay, create a video, or give an oral presentation to demonstrate what they have learned, providing multiple means of action and expression. Finally, educators might use gamification or collaborative learning to engage students with different interests and abilities, providing multiple means of engagement.

Structural Components of Universal Design for Learning Theory

Multiple Means of Engagement

This is an essential element of the three core tenets because it addresses how individuals emotionally relate to and engage with subject matter and information (Hitchcock et al.,2002). Motivation, a vital aspect in learning achievement, is thought to be influenced by desire and emotional attachment to learning resources. Closely related is the significance of the learner establishing self-regulation skills in order to achieve self-motivated progress towards their own personal aspirations (Hitchcock et al., 2002). The fundamental premise here is that teachers who create environment for learning must give numerous modes of participation (Meyer & Rose, 2006). This derives from the premise that there is no one technique to involve all students equally because people's motives and feelings and experiences varies. As a result, when

developing a teaching curriculum, approaches, materials, and input, teachers ought to think about numerous options for each, making a variety available, in order to activate the emotional component of learning for each student. As a result, variety and choice are emphasized as important guiding concepts (Meyer et al., 2014). In other words, this principle offers numerous opportunities to involve students in the learning process while also acknowledging that they have a variety of interests, preferences, and motivational levels. Giving learners options so they can select subjects, exercises, and evaluations that are interesting and important to them is one way to do this.

Multiple Means of Representation

While it's important to develop student engagement with the learning resources and tasks, it's equally important for students to be able to absorb and understand the subject matter. This, according to UDL, are extensive brain response systems that enable students to recognize, classify, and comprehend sensory stimuli, the building blocks of information (Rose et al, 2007). Arguments have been made that all academic content demonstrates pattern identification, which is the basic cognitive skill (Rose et al, 2007). Teachers must therefore be mindful of the reality that learners will receive information in a number of ways, recognize and predict patterns, and create new knowledge to enhance their understanding as a result of the recognition networks. When creating an inclusive educational setting, teachers should take into account various forms of representation and use a variety of methods for delivering and illustrating information (Hitchcock et al., 2003). For instance, they should take into account the auditory, optical, and physiological ways of representing knowledge, employ various languages and interpretations, and use a variety of mediums to show concepts rather than training that focuses primarily on print. This produces a "rich cognitive environment for learning" in additional to catering to the learning styles of all learners (Meyer et al, 2014). For students from various backgrounds, it also enables the contextualization of knowledge. The "what" of learning can be summed up in terms of recognition networks and related notions. In a clearer sense, this approach acknowledges that learners digest information in various ways and offers a variety of presentation options to accommodate their various needs. In order to communicate information, this may involve using text, photos, videos, and other multimedia formats.

Multiple Means of Action and Expression:

The purpose of this concept is to enable meaningful interaction between students and the information they are being given in order for them to learn. The pre-frontal cortex is described by Rose et al. (2007) as playing a significant part in the strategic network's function in processing information and communicating understanding. Setting goals, keeping track of one's progress, organizing tasks, and planning are all related to executive functioning. Pedagogical planning should take this into account because neuropsychological research shows that the tactical networks' performance varies depending on the individual, just like it does with the other two networks (Rose et al, 2007). In order to account for observable differences among learners, the notion of offering multiple ways to act and express oneself is important. When creating inclusive learning environments, teachers ought to think about many methods that students can express and communicate their information, understanding, and perspectives (Hitchcock et al, 2003). This is therefore seen as assisting individuals in growing their strategic networks and related executive functioning abilities through trial and error with various tactics, organizational structures, and planning methods (Meyer et al.,2014). It may be argued that historically, writing has been the most common form of action and expression made accessible to learners. Meyer et al. (2014) encourage instructors to think about and apply visual techniques, multimodal approaches that include movement, various speech patterns, and visual content. Students should be given access to a variety of techniques and allowed to experiment with them in order to determine whichever ones work most effectively for them. So, this approach offers several opportunities for students to interact with the content and communicate their understanding while also acknowledging that various students will demonstrate their knowledge and abilities in different ways. Giving customers the choice to answer verbally, in writing, via multimedia, or in other ways is one way to do this.

Relevance of Universal Design for Learning Theory to The Study Objectives

In the sphere of education, the theory of "universal design for learning" has gained importance. It refers to the process of developing general education curricula (together with the standards, resources, strategies, and assessments that make them up) that are well thought out, constructed, tested, and validated to accomplish results for the broadest range of learners, including those with disabilities, without requiring further adaptation or specialized design (Hitchcock et al,

2003). Considering this, assistive technologies as a tool can be used to achieve the intent of universal design for learning model so that the learning environment will be more accommodative to every learner irrespective of their individual differences or disabilities. Moreso, there is a need to achieve an equilibrium academic environment where nobody will be left out. According to Hitchcock et al, (2003) UDL and other techniques must coexist since no one strategy can provide all the accessibility and learning supports that are required.

To offer suitable support and challenge for a typically broad spectrum of learners, Universal Design for Learning offers curricular flexibility (in activities, in the way that instruction is delivered, in the ways that learners respond or demonstrate knowledge, and in the ways that learners are engaged). Individualizing education also makes use of UDL ideas. Rose and Meyer (2002), for instance, said that Universal Design for Learning explains how children with disabilities have a variety of intelligence and ways of learning. They also discuss the ways in which particular methods that are in line with the UDL tenets and can benefit learners of various backgrounds. For instance, teachers should offer a variety of adaptable presentation techniques to assist recognition learning. They must offer numerous, adaptable platforms for expression and apprenticeship in order to assist strategic learning. The teacher should offer students a variety of flexible engagement opportunities to encourage effective learning. This assertion, described the three major component of UDL which also represent the objectives this study set to achieve. That is, an inclusive learning environment where children can learn independently while learning disabilities is being addressed through the use of assitive technology as a design for learning tools so that school children with disabilities can represent and express their knowledge effectively and also be properly engaged.

Theoretical Intersection Between Universal Design for Learning (UDL) Model and Social Model of Disability

Universal Design for Learning (UDL) has been described in this study as an approach that can be used to deliver learning instruction to children with varying disabilities. As a result, it is an evidence-based framework that supports everyone's right to an education with the goal of creating inclusive learning settings free from barriers (Blamires, 1999). This strategy is intended to be used in tandem with high-quality, cutting-edge education that is sensitive to the access needs of children with a variety of disabilities. The concept of UDL, according to

Blamires (1999), emphasizes the provision of a variety of opportunities for expression, representation, and engagement.

The term "design" in UDL is particularly pertinent in the context of education, particularly among special education teachers as well as significant educational stakeholders who are in charge of designing inclusive curricula. This is because this principle will provide them with the framework they need to accommodate all kinds of disabilities among children. Children are more likely to learn in inclusive classrooms where their learning difficulties, variety of disabilities, and access problems can be addressed when UDL is used. Understanding the diversity of learners as end users is essential when integrating UDL principles into the teaching and learning process..

However, from the viewpoint of children with disabilities, UDL is consistent with the social model of disability, in which resolving access to social variables such as education is seen as a social duty. This method acknowledges that the elimination of access barriers established by society and the environment should be prioritized more than focusing on the disabilities itself. This includes restrictions relating to law, the written word, spoken language, and the physical environment. These can all be found in educational settings. All learners will benefit from a more inclusive learning environment if there is a greater emphasis on identifying and removing these barriers using the UDL principles. It is significant to note that the impact of a disability will be lessened by eliminating such disabling obstacles within the learning setting, including the curriculum that may be related to the usage of assistive technology in schools. This strategy guarantees that social structures and processes, including the educational system, take responsibility for the elimination of limitations to ensure that all schoolchildren feel accepted, included, as well as and are capable of showcasing their full potential.

Specifically these two theories has a relevant position in this study. For example, the data collected in this research indicated that assistive technology such as *text-to-speech software can be used to read aloud digital text for schoolchildren who struggle with reading, while screen readers can provide audio descriptions of images for schoolchildren who are visually impaired.* To put this example in a typical theoretical perspective, the *text-to-speech software* for example can be considered as a learning design that is used towards the facilitation of an equitable

learning environment for learners who has a reading problem (UDL) and at the same time eliminating the social problem of poor literacy (social model of disability). Like this example, the universal design for learning model has the potential to accommodate every disability and provide a framework and design where learning instruction can be tailored to accommodate the disabilities created by social constructs. As a result, every constraint will be removed and every child, regardless of disability, will be able to participate and access basic education.

Conceptual Framework

Assistive Technology

Assistive technology is a broad phrase that refers to tools, applications, and systems that help people who have disabilities enhance or strengthen their functional capacity (Assistive Technology Industry Association, 2020). The word AT can be refer to as custom built software and hardware, there can exist in various forms such as low-tech or high-tech and this ranges from room arrangement to pencil grips, that make learning or educational process more available to certain people. It was defined as "any item, piece of equipment, or product system, whether purchased commercially off the shelf, adapted, or customized, that is used to increase, maintain, or improve functional skills of people with impairments" (Islim et al, 2012). From a similar vantage point, Obim et al. (2020) characterized AT as any tool or product that helps or supports a person with a particular disablities to perform like others with little to no assistance from people. In the same vein, Dominic et al. (2020), referred to AT as tools or software that have been specially created for a specific purpose or that have been modified and utilized to provide technical support for educators and learners with disabilities.

Furthermore, Disability.gov (2012) has explained AT as "any tech innovation, piece of device, tool, or system that assists individuals who have disabilities to actively engage in school and other related activities. AT include wheelchair, walkers, computer applications, hardware, and computer attachments. AT are tools which can be inform of hardware or software that improve movement, listening, movement, visual, and communication capabilities. Individuals with severe impairments have the opportunity to live independently and contribute to society (WHO, 2012)

AccesIT (2012) provides a more comprehensive and contemporary definition of AT. it was explained that Persons with impairments utilize assistive technology to do things that might be challenging or unattainable. Mobility aids such as crutches and wheelchairs, as well as computer hardware, and applications, that help individuals with impairments access information technologies, are examples of assistive technology. Individuals who have impaired hand function, for instance, can use a keyboard with large keyboards or a special mouse to navigate a computer, while those who are visually impaired can use computer application that reads words on the computer monitor aloud, those who have low vision can use application that magnifies the information displayed on the screen, those who have auditory disabilities can use a TTY, and those who have voice impairments can use a gadget that speaks aloud as they type. Coleman (2011) states that "AT may include anything that enables a child with a handicap to carry out a task that they would not otherwise be able to carry out or that increases the activity's effectiveness. Even basic objects can be AT. An AT might be a piece of Scotch tape that a learner uses to hold the paper steady when using just one hand.

The importance of AT was also highlighted by Alkahtani (2013). The researcher opined that with the use of assistive technology, pupils who have disabilities can access the curriculum more easily and have better learning experiences. Similar to this, Starcic et al (2010) noted that a variety of assistive technology tools are accessible to teachers to help them enhance their learners' functional capacities by enhancing their engagement in learning and extracurricular activities. Kosakowski (1998) added that it is imperative for teachers to use assistive technology in order to assist children with variety of disabilities in school so that they can make up for their particular classroom problems. Additionally, Adebisi, Liman, and Longpoe (2015) talked about the different assistive technology products available to help children with special educational needs and illustrate that computer-assisted instruction includes a number of software programs that can help children improve their academic performance and realize their full potential. Basic spellcheckers, sophisticated voice recognition software, and learning resources applications are all examples of these technologies. The needs of children with learning difficulties can be effectively met by software like voice recognition, text prediction, spell checkers, and arithmetic applications, among several others (Njikem, 2020).

Roles of Assistive Technology in Special Education

With the use of AT, children who have impairments can increase and improve their independence in schoolwork, their involvement in class activities, as well as their ability to complete some challenging academic activities (Alnahdi, 2014). Technology solutions that can assist pupils overcome their academic difficulties should be made available to teachers who work with children with disabilities (Mull & Sitlington,2003). While they will still lag behind their classmates without disabilities, this teacher will assist children by teaching them how to use lightweight, affordable equipment that, in most situations, might allow learners live and behave more autonomously after graduating from high school (Blackorby & Wagner, 1996). For example, teaching children how to use a calculator may be more useful than starting with basic arithmetic lessons for them (like adding two numbers). However, if children can operate the calculator but struggle to pronounce numbers accurately, they can use more sophisticated tools, like a talking calculator, which can be used when they need it and assists children pronounce number properly (Lankutis, 2004).

For reasons other than mere convenience, technology has the ability to make life easier for children with disabilities (Wehmeyer et al, 2008). Several impediments to education for people with physical disabilities have been eliminated through technology. Because to advancements in technology, children living with disabilities can now finish their schoolwork, take tests, and read books alongside their peers. The goal of technology is to make people's lives better. Individuals who are impaired require the usage of assistive technology in order to make up for their disabilities (Igwebuike et al, 2015). A well-suited AT offer alternatives to persons who face difficulties during learning activities because of limiting circumstances. While assistive technology does not solve disabilities, it does aid the individual to carry out an activity more independently (Hopkins, 2004).

Specifically, depending on the disabilities, a child could struggle to hold a crayon, understand a question properly, concentrate on an image, indicate an answer in time especially when they already know the answer, concentrate on an activity when other students are present, or respond to questions at the same pace as the entire class. Teachers have typically thought that all pupils already possess these talents or can acquire them with only minimal coaching, motivation, and determination. A lot of other pupils, for instance, saying something like, "Be sure to pay

attention to the question attentively!" may be sufficient. A statement like this, nevertheless, might not be appropriate or even offensive for learners who are struggling. A visually impaired child does not require a reminder to "look carefully at what It is being written on the board," because it will not improve the learner's ability to see the blackboard, albeit the reminder may cause the pupil to feel more anxious and self-conscious (Seifert et al, 2009). In regards to the aforementioned narratives, AT as a tool will bridge the gaps and complement the lacuna the convectional teaching method could not handle when teaching children with disabilities and also when a teacher is trying to promote inclusiveness in the classroom.

Burgstahler (2003) claims that assistive technology will enable children with disabilities to achieve their maximum level of independence in classroom activities, engage in classroom conversations, have access to classmates, mentors, master school activities that they would otherwise be unable to complete, have a wide variety of educational options, take part in experiences that they would not otherwise be able, and more. AT has been emphasized that it can make children with special needs and schoolchildren without special needs have access to the same education in the same environment. According to Joseph (2013), AT benefits disabled children in a variety of ways. They may be capable of comprehending grade-level information thanks to it. Technology improves writing and organizational skills and provides the material in a variety of ways (optically, audibly, etc.). According to Ufford (2007), assistive technology is any product or service that facilitates an individual with a disability's daily tasks. In addition, Ufford (2007) lists the types of learning issues that assistive technology can help with, including difficulties with organization, memory, reading, handwriting, arithmetic, and hearing.

Access to Inclusive Basic Education in Nigeria

In Sub-Saharan Africa, educational achievement has increased exponentially during the past 20 years due to the fact that education have influence on skills important for psychological development and improved quality life for both people and society as a whole. In addition to being provided as a basic human right to ensure that society is literate, education is also viewed as the "tool par excellence" that inspires and encourages people to contribute to the sustainable development of their country. Notwithstanding the fact that education around the world is a tool for empowering people with or without disabilities and for social development, the National Policy on Education (FRN, 2004) avowed that education should support a just and equal society

with a vast, dynamic country that is full of promising prospects for everyone. Regrettably, children with various forms disabilities that has been defined by Zimba (2006) as people with psychological, physical, intellectual, or sensory disabilities find it difficult to access inclusive learning as a result of some fundamental factors.

Olufunke et al. (2014) asserted that inclusive basic education in Nigeria has run into numerous challenges and barriers, which has ultimately caused the country's educational system to malfunction. According to Odebiyi (2016), the primary obstacles to inclusive education in Nigeria are a shortage of competent teachers, a lack of support services, a deficit of pertinent materials, a paucity of staff and training programs, a lack of finance, and appropriate legislative framework. On the other hand, Lawal (2022) stated that eradicating all hurdles, hindrances, and impediments is essential to the effective implementation of basic inclusive education. The researcher went on to say that each obstacle should be overcome one at a time, and that the best way to incorporate inclusive education is to screen children with special needs and learning disabilities early, train specialists and teachers to work with them, provide them with facilities and instructional materials, monitor public awareness campaigns about inclusive education, and allocate enough funding to support individual children. Similarly, Maria, et al (2015) stated that good access to inclusive education requires recognizing child's needs and rights, involving parents and caregivers, the society, state and local governments, and creating a hospitable environment at school for all children.

Specifically, the term "inclusive education" refers to a method of education that addresses the unique needs of children and learners with vision, auditory, mental, psychological, physiological and learning disabilities. According to Ajuwon (2008), inclusive education is the philosophy and method used to educate children with special needs in situations where there are other children without disabilities. The goal of inclusive education is to ensure fairness, justice, and equality for all children who have been denied an education due to a disability (Christopher et al, 2012). Going by this, it can be said that the abolition of segregated special classrooms and the integration of all children, even those who need significant intellectual and behavioral support and resources to succeed in ordinary courses, is known as full inclusion. In a related perspective, Nigeria Policy on Education (2004) emphasized that all Nigerian children should have access to educational opportunities, regardless of any actual or perceived

disabilities. Likewise, Isuwa et al (2014) maintained that for pupils who have disabilities, inclusive education can have a variety of social as well as academic benefits, including better high school graduation rates, personal success in language and mathematics, and more favorable relationships with those who are not disadvantaged. Moreso, Lawal (2022) posited that in order to achieve a functional inclusive education system in Nigerian schools, an enabling educational environment that is accommodating for those with learning disabilities must be created. Also, there must be provision to learning resources centers with instructional materials and at the same time re -training of teachers on how to recognize and interact with disabled students in a traditional classroom setting, and placing specialists to screen those with special needs and learning impairments in designated centers in every Local Government must be instituted.

CHAPTER THREE

LITERATURE REVIEW

Strategy Used to Review the Related Literatures

A literature review is a crucial part of the thesis, where its goal is to present the backdrop and rationale for the conducted study (Bruce, 1994). The author extracts and synthesizes the major themes, problems, outcomes, and research techniques that emerge through critical reading and evaluation (Nunan, 1992) to create a plausible and coherent position that bring forth a research problem that can be investigated (Rudestam & Newton, 2007). In this present study, a systematic literature approach was adopted. According to Page et al (2021), there are several important purposes for systematic reviews. They can give summaries of the state of knowledge in an area, from which new research objectives can be determined. However, to make sure a systematic review is relevant to readers, writers must offer a clear, thorough, and excellent description of why the review was conducted, what they did (such as how papers were searched and chosen), and what they discovered (Moher, 2018). In line with this, the PRISMA model, which includes four-phase flow diagram (identification, screening, Eligibility, Included) was adapted. The PRISMA approach is appropriate when appraising literature because it offers a simple structure that can be utilized to increase the scientific merit and transparency of a reported systematic review or meta-analysis (Swartz, 2011). The model contains a flowchart which outlines the selection, suitability, and inclusion standards for studies that fall within the purview of a review (Selçuk, 2019). Also, in this study, the researcher made use of goggle scholar to search for relevant articles.

In addition, it has been avowed that for systematic review to be detail, logical and coherent, it is imperative for the author to give a precise and clear standard that was used to exclude and include literatures in the review. According to Tony (2019), when drawing up inclusion and exclusion criteria, it is imperative to lay down the reason in clear terms why literatures were included and excluded in the course of review. The inclusion and exclusion criteria that were used to collect relevant articles for the study were stated below

Criterial for Literature Exclusion

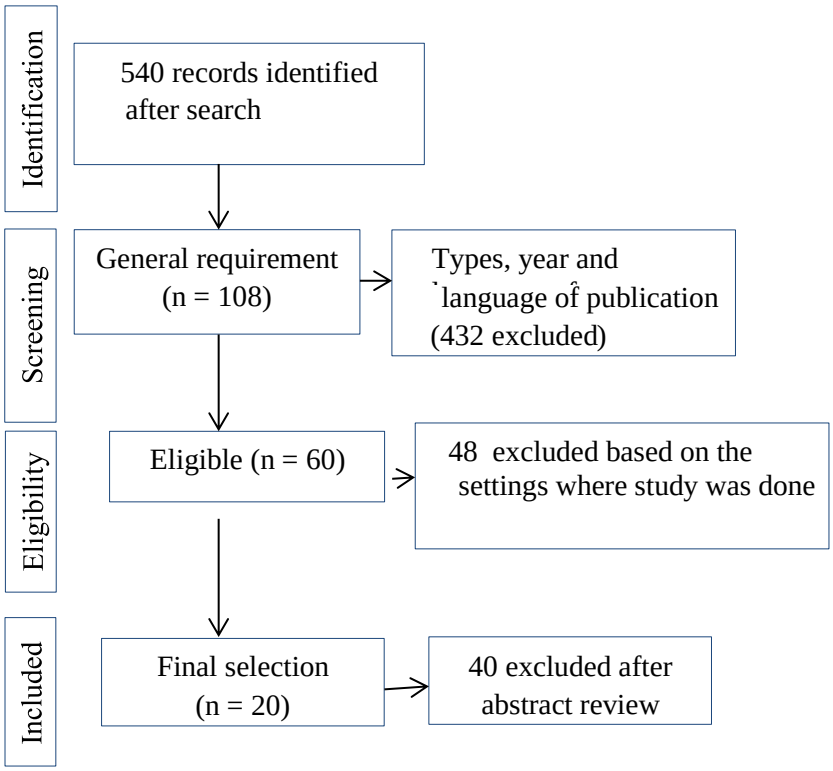
In selecting the corpus for this review, the exclusion criteria that were used are;

a. Studies that are not related to research variables and objectives were excluded.
b. Studies that were related to the research variables and objectives but not published in peer reviewed journals were excluded.
c. Studies that provide only the abstract without access to the full materials were excluded.
d. Studies that were not published in English Language were excluded.
e. Newspaper, Blog posts and other related materials were excluded.
f. Papers that were not published between 2012 and 2022 were excluded.

However, Goggle scholar were used to search for relevant publications. Key words such as "assistive technology" "special education" "assistive technology and how it relates to sustainable development goals in school settings" were used to search for articles.

Criterial for Literature Selection and Inclusion

In adapting PRISMA model to search, select and include literature to be reviewed, the following steps were undertaking;



a. Articles that have potential of being useful in the study were identified. This identification means that the articles are related to school setting and the major variables in the study. In total 540 papers were identified
b. After this, the papers were screened based on these following criteria: (a) the relevant studies must have been published in Peer-reviewed journals or conference papers, master and doctoral dissertations(b) papers should have been published between 2012 and 2022, and (c) papers must have been written in English language. However, studies that does not relate to assistive technology (AT) and special education were eliminated from pool of academic document that was found. In total 432 articles were screened out.
c. After the screening stage, studies were subjected to eligibility criteria. That is, study that were conducted at basic level of education that were found to be explicitly relevant and eligible for the review. In total, 60 studies were found to be eligible.
d. Finally, 20 studies were selected and found to be coherent, cohesive and suitable for the review out of 60 studies that were found to be eligible. This was done by carefully reading through the study abstract which contains a detail summary of the study objectives, methods, results, conclusions and recommendation. This is consonant with the thought of Jesson and Lacey (2006) that reviewing the abstract is imperative since it serves as a concise description of the study that enables the reviewer to fully comprehend the study's objectives and results.

Table 1:Demographical Representation of corpus (study) selected for Review

NO	Author	Year of publication	Place of publication
1	Alshabeb, et al	2019	United Kingdom
2	Alimi et al	2022	Nigeria
3	Alkahtani	2013	Saudi Arabia
4	Alshurman et al	2020	Jordan
5	Anyaoha et al	2022	Nigeria
6	Ayon et al	2021	USA
7	Ebuenyi	2021	Nigeria

8	Genc, et al	2021	Cyprus and Russian
9	Banozic, et al	2022	Singapore
10	Ikwen, et al	2021	Nigeria
11	Krasniqi, et al	2022	Switzerland
12	Njikem	2020	Sweden
13	Nordström, et al	2018	Sweden
14	Omede	2012	Nigeria
15	Ripat, et al	2017	Cannada
16	Svensson, et al	2021	Sweden
17	Tebbutt, et al	2016	Switzerland
18	Tony	2019	Sweden
19	Ezeani	2020	Nigeria
20	Wahome	2020	Sweden

Table 1 shows name of authors, year and place of publication. Among the 20-text corpus, 17 were peer reviewed publication while 3 (three) were master's thesis. However, year of publication was not used as a criterion for exclusion or inclusion.

Table 2: demographical distribution of studies from 2012-2022

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Study No:	1	1	0	0	1	2	1	2	2	6	4

Review of Related Literature

The 20-text corpus that were chosen for this study were explored in this section. This focused on the role of assistive technology in special education towards the attainment of sustainable development goals. Therefore, the following relevant themes as it relates to the research topic was considered for review;

Assistive technology in Special Education

Many studies have been conducted to affirm the imperative role of AT in special education. Across the globe, studies on AT have focused on different aspects of how relevant AT is to

children living with disabilities. For instance, the study by Aldeham (2022) on "Assistive Technology in Special Education Students and its Impact on Engagement into Education" considered AT to be essential and fundamental because it enables school children with disabilities to play an active role in the most general education settings possible while also assisting the children with disabilities meet their needs and also accomplish IEP goals. Similar to this, a study based on teachers' perspective by Wahome (2021) stated explicitly that assistive technology encouraged and motivated the children and made it easier for the teachers to present information to the children. Although, the study accounted for the downside of AT usage as the study reported that too much use of AT could create an unnecessary dependency for the students, and also AT has a risk of being emotionally harmful to the children. Nevertheless, the imperative role of AT has continued to dominate previous researches outcome. A Swedish study done by Svensson, et al (2021) was not in consonant with findings of Wahome (2021) that AT is can be harmful. In their experimental study, which contained 149 (53 girls, 96 boys) participants, according to the study's findings, the usage of AT has positive effects on reading ability and also helpful, particularly for children who are experiencing the greatest difficulty. Additionally, it boosts motivation for all aspects of academics. Even though, the study of Svensson, et al (2021) emphasized the imperative role of AT in special education, the interest of the study is in contrast to the current study. Also, comparing this study to the present study, the method for data collection that was used is different (quantitative) and the perspective of teachers was not represented. Moreoso, the study did not state explicitly the ethical consideration that was taken during the course of the study even though parent of the student were aware of the study.

Similarly, Alshurman et al., (2020) study was of the view that AT is very significant if children with disabilities must attain success in their education. Specifically, the study examines the role of AT in the success of the individual education program for disabled students in Jordan. In the same vein, Ripat et al (2017) was of the view that AT is relevant and can enhance performance. These two studies are in solidarity about what AT can contribute in the academic pursuit of children with disabilities. Just like the current study, Alshurman et al.'s (2020) study focused on teachers in charge of IEPs for special students and adopted the purposive sampling technique to draw its sampled population. However, the study, aside from being carried out in a location

outside Nigeria, also employed the use of quantitative methods. Alshurman et al.'s (2020) study, unlike the present study, made use of a 45-item questionnaire in gathering data for the study. Due to the nature of the data gathered, the study analyzed it with a descriptive approach consisting of multi-variance analysis, mean values, and standard deviations. It can be said that the method used in the study is not suitable enough unlike using a qualitative approach since the goal of the study is to know how AT influence the success of student from the teacher's perspective. The data elicited would been more detail, specific and rich if qualitative approach was used, for example using thematic analysis to interpret the data gotten.

Furthermore, Omede (2012) explicitly carried out a narrative review on the use of AT among individuals with learning disabilities in Nigeria. The objectives of the study were primary on how AT is being used in the context of classroom. The study concludes that the potential of a technologically oriented education for teaching impaired children would only be achieved if the assistive technology gadgets are made available, less expensive, and adequately taught to the teachers, parents, and people with learning disabilities. Similarly, Alimi et al (2022) shared the same rhetoric even though their study is quantitative in nature. The study believed that as a result of the significant role of AT in special education, it necessary for it to be made available in Nigeria because AT is a major tool that can be used to make leaning meaningful and accessible to school children with disabilities. On the contrary, Ebuenyi (2021) also discussed AT in special education from the Nigeria context. Although the study acknowledged that AT is fundamental in classroom for learning to be effectual among school children with disabilities, however the researcher opined that a functional AT policy is what Nigeria need, as such major stakeholder should be talking about it and not otherwise. Also, the study conceptualized that there is a need to domesticate and localized many of the policy to the classroom settings, so that the goal of inclusivity and learning opportunities can be promoted. This principle is in line with this present study but however, the study of Ebuenyi (2021) was only critical but lack any form of perspective. Likewise, the study of Omede (2012) and Alimi et al (2022) were carried out in Nigeria but they didn't explain explicitly the precise of role AT in special education most especially with the peculiarity of Nigeria context.

Teachers Perspective as It Relates to Assistive Technology

In order to obtain a detail, specific and rich perspective about the role of assistive technologies in the field of special education most especially about school children with disabilities, teachers' perception is very essential. In regards to this, previous studies that sampled the opinions of teachers on the role of AT on school children with disabilities were explored. For example, Genc et al. (2021) research was directed towards examining the opinions and thoughts of pre-service teachers in special education department. The study made use of a semi-structured interview to elicit data form 41 pre-service teacher in Cyprus and Russian universities. The study conclusively highlighted the following "Facilitating education, individualizing teaching, increasing their competencies, Fun content, and Developing communication skills" after seeking the perspective of teachers on the role of AT. Just like this study, the work of Nordström et al.'s (2019) which was conducted in Sweden, shared a similar view after seeking the perspective teachers in their study. The outcome of the study indicated that children who have reading and writing disabilities appears to be able to utilize AT to comprehend text and to write text; as a result, AT was reported to have the probable of increasing participation in conventional education. On the contrary, Alshabeb et al. (2019), study noted that teachers have reported that many students misuse assistive technology because they place little focus on continuing their education. The study also covered other topics, such as how there might be fewer human interactions with the person because they won't need as much immediate physical support. Due to their social isolation, disabled school may suffer from poor emotional health. The study also noted that teachers frequently seem to lack knowledge of various assistive technology use strategies that can produce the best results.

However, the studies of Genc et al. (2021) and Nordström et al.'s (2019) have similar objectives and outcome in common, but they are quite different from the current study. For example, the pre-service teachers that form the study sample of Genc et al. (2021) might have little experience on the use of assistive technology for special needs children because they are still training teachers. Unlike the Genc et al. (2021) study, which investigated mere opinions and thoughts towards the use of AT for special education, the present study focused on the perspectives of teachers on the role of AT to solve learning difficulties and increase learning opportunities among children with disabilities. In addition, while Genc et al. (2021) study draws

samples from pre-service teachers, the current study draws participants based on a six-year professional teaching experience criterion. This is because it is believed that experienced teachers have more in-depth knowledge and better insight into the phenomenon under study. Also, contrary to the Nordström et al. (2019) study that was quantitative in nature, the current research will employ qualitative method, since qualitative methods give teachers the avenues to wholesomely express themselves.

Furthermore, Tony (2019), carried out a systemic review using teachers' perspective on "the effectiveness of assistive technology to support children with specific learning disabilities" the study data was drawn from previous studies. The study's findings demonstrated that teachers believed that AT is significant in the classroom, but it also came to the conclusion that teachers must feel comfortable to be able to use and implementing AT. In furtherance to this, a Swedish study by Njikem (2020) have also shown that teacher's perspectives are more general and similar; that is, teachers have a positive attitude towards the use AT because of its relevance in the classroom but many of the teachers lack some pedagogical competence in the use of AT. In regards to this, it is important that when carrying a study that has to do with teachers' perspective about a research problem, it is important to sample teachers that has the requisite knowledge and experience. In light of this, the current study is of the opinion that to elicit a rich data, it is imperative to use participants that have solid training and five years of experience about the role of AT so that the objectives of the study will be well articulated.

Assistive Technology and Sustainable Development Goals

In this context, previous studies that demonstrated how AT can be used to advance the tenet of SDGs as it relates to the objectives of this present study were critically discussed. Furtherance to this, a study by Krasniqi et al (2022) investigated one of the objectives that is present in this current study which is the role of AT in facilitation of inclusivity among school children with disabilities. Although, Krasniqi et al (2022) was interested on the "Impact of Assistive Technologies to Inclusive Education and Independent Life of Down Syndrome Persons" however, the outcome of the study shows how AT is key to the attainment of one the principle of AT when the study concluded that the combination of inclusive education and AT has the capacity to be a very successful technique for helping people with disabilities live independent lives. Similarly, the study of Tebbutt et al (2016) was of the view that assistive devices can help

to achieve each of 17 SDGs. It also revealed the dual roles that assistive products can play in mediating and regulating SDG accomplishment. To support its claim, the study authoritatively created an explicit conceptual model of implementing and using AT product to achieve SDG. Contrastingly, the study of Ayon et al (2021) on AT in Education which provides a socio-technical framework for the design of AT for use in the classroom to help people with disabilities understand better on how to increase their educational chances and achievements identified shortcomings and flaws that exist in the application of AT in educational settings in the United States of America and these flaws can impede the role of AT in the attainment of relevant SDG principles. Considering the first two studies, it has been shown that AT has the potential of enhancing the tenets of SDG, even though the latter studies revealed that AT does not automatically translate to SDG attainment as a result of constraint that comes with the implementation, therefore it is imperative for this current study to investigative the role of AT from the perspective of teachers from Nigeria context to ascertain the correctives of AT in the attainment of SDG as it relates to disabled school children in Nigeria.

In addition to the foregoing, Banozic, et al (2022) reported that in Singapore, AT usage has been fully ratified because it is believed that it can provide disabled school Children access to quality education, enhance their wellbeing and reduce Reducing Inequalities. All these following are principles of SDG and they are relevant to the objectives of this current study. However, Ikwen et al (2021) carried out their study in Nigeria and the study is of the views that AT poor implementation has created uncertainty about the effectual role of AT in school. Ezeani, et al. (2017) concurred with the findings of Ikwen et al (2021). In particular, the report claimed that implementing inclusive information access for impaired students using AT in underdeveloped nations like Nigeria is fraught with difficulties. Consistency issues and resource shortages, particularly in underprivileged communities, were noted. Similarly, Alkahtan (2013) acknowledged that there many challenges children with disabilities face when learning using AT and this has been alluded may thwart the purpose of using AT. Problems such as; teachers lack of necessary depth of assistive technology knowledge and proficiency was indicated. However, the present study differs from Alkahtan's (2013) research in that the present study want to investigate the roles of AT usage in solving learning difficulties and increasing learning opportunities among children with disabilities. In terms of methodology,

the present study sticks with the qualitative methods since it is adjudged to allow participants to give better and more in-depth responses and opinions about the subject under investigation. Despite the fact that the objectives of both studies are not the same, it can be said that the present study builds on the findings of Alkahtan's (2013) study. This is because the study revealed that teachers do not have an adequate level of knowledge and skills for using assistive technology and thus need pre-service and in-service training. However, a decade worth of findings cannot be said to remain the same, as teachers would have acquired the necessary skills.

Discussion and conclusion

Considering the different scholarly literature that has been examined in this study, it has been shown that assistive technology is a relevant tool that can be used in classroom most especially among school children with disabilities (Svensson, et al, 2021; Aldeham, 2022). Although, studies have shown that AT has it own down side such as isolation, overdependence and emotionally being harmful (Alshabeb et al, 2019; Wahome, 2021) but studies have conspicuous portrayed the relevance of AT in special education. However, some previous studies reviewed have shown to have close or similar interest just like the objectives of this current study even though they were carried out outside Nigeria (Wahome, 2021; Svensson, et al, 2021). However, the Nigerian studies that were reviewed were either focusing on availability of AT or AT policy implementation in special education (Ebuenyi, 2021; Ikwen, et al, 2021; Anyaoha, et al, 2022), this is so because these Nigeria studies asserts that AT are not readily accessible to teachers and likewise there is a poor implementation of AT policies. However, no Nigeria study has investigated explicitly how AT can be used to solve learning difficulties, facilitate inclusive learning and increase learning opportunities; and these are the objectives of this current study. Therefore, these are research gaps that must be filled. Furthermore, getting teachers' perspective in regards to the objectives of this current study is very imperative. This was necessary because the study that has a very similar objectives as the current study which sampled teachers' perspective were carried out outside of Nigeria (Wahome, 2021), and the one that was carried out in Nigeria made use of quantitative method to elicit information, that is, perspective of teachers was absent in most of the Nigeria studies. However, perspectives of teachers are very imperative because it present the opportunity to get a detail, precise and rich data using a qualitative approach. As a result of this, there are methodological differences in

the way these studies were conducted when compare to the ongoing study. Moreso, the current study draws participants based on a six-year professional teaching experience criterion. This is because it is believed that experienced teachers have more in-depth knowledge and better insight into the phenomenon under study. This way of sampling participants is absent from every previous study that made use of teacher's perspective.

Furthermore, some Nigeria studies have asserted that poor implementation has created uncertainty about the effectual role of AT in special education (Ikwen et al, 2021; Ezeani, et al, 2017). This rhetoric calls for deeper introspection and research such as this present study is necessary to ascertain the present role of AT in special education as it relates to the objectives of this current study most especially from Nigeria context.

CHAPTER FOUR

METHODOLOGICAL FRAMEWORK

This chapter focused on the method that was used by the researcher to investigate role of assistive technology in special education in enhancing quality access to basic education from teachers' perspective. This chapter comprised the research design, the sample population and sampling technique, data collection procedure and the data analysis technique. Teachers were the main research sample used in collecting data in this study and different ethical considerations to protect them were also considered

Research Design

The research design that was adopted for data collection and analysis is a qualitative approach. According to Mack et al (2005), qualitative approach is mostly suitable in finding out about culturally specific values, opinions, behaviors, and social contexts of specific populations. Also, it aims to comprehend a specific research issue or topic from the viewpoints of the community it involves. Similar to this, Elmusharaf (2019) avowed that qualitative research methods are utilized to address research issues thoroughly and with a focus on individual experience and the ways that people construct meaning in their lives. However, this approach is suitable for this study because this research is interested in the perspective of teacher in regards to how assistive technology can be used to enhancing quality access to basic education as it has been specifically stated in the research questions

Sampling

The research participants in this study were sampled purposively. According to Cresswell and Plano Clark (2011), purposive sampling involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest. In this way, special education teachers with six (6) years working experience and a certification in the use of Assistive Technology will form the study sample. Therefore eight (8) teachers were sampled for this study. Due to the nature of the study, only teachers will make up the study sample, despite the fact that disabled children's perspectives are frequently ignored when decisions are being made that could have an impact on their everyday lives and education. It is not therefore ideal that impaired children are not directly

involved in this study. The objective of this research however, is to examine how teachers perceive the role of AT in ensuring inclusive education, solve the problem of learning difficulties and also improve independent learning opportunities in the classroom among disabled children. As a result of these research objectives, teachers are more qualified to respond to this question in a professional manner. Also, as a result of time constraint and the size of this study, it will not be possible to include both the children and teachers as sample, it is therefore pertinent to have the perspective of teachers only in order to accomplish the required depth of the subject of this thesis.

However, in order to get through to the research participants, the head of the regulatory government agency that is responsibile for supervising teachers (Teaching Service Commission) was contacted via mail. The objective of the research was made known to them and also permission of their staff (teachers) was sought so that they can participate in the study. From there, teachers that meet up with the requirement of participating in the study were also requested from the commission. This form of sampling is synonymous to snowball sampling techniques. This method is employed when it's challenging to locate research participants who fit the desired criteria (Naderifar et al, 2017). In addition to being time friendly, the snowball method gives the researcher the chance to interact with the samples more effectively because they know the first sample and are connected to the researcher (Polit et al, 2006). This method was however used because it is believed that the regulatory commission will have access to teachers' qualification portfolios and also their years of experience. After this has been done, the teachers were contacted through email and their consent to participate in the study was sought.

Data collection

To collect data for this study, an in-depth interview was used. This type of data collection is the best for collecting data on individuals' personal histories, perspectives, and experiences, particularly when sensitive topics are being explored (Mack et al, 2005). According to Boyce et al (2006), it is a qualitative research method that entails conducting lengthy one-on-one interviews with a select few respondents to gain insight into their perspectives on a given concept, initiative, or circumstance. The in-depth interviews that were used in this study to collect data contain unstructured sections with open questions (Walliman, 2015). This was done

in order to elicit a rich perspective from the teachers and not to restrict the research participant in their response. In order to conduct the interview, an interview guide was created according to the constructs of universal design for learning theory and the research questions. The interview was conducted virtually via mobile application (Zoom) that is suitable for the participants. However, during the sessions every of the conversations was recorded.

Conducting a virtual interview can occasionally be difficult due to a slow internet connection which can make computer audio communication a bit difficult. Because of this, the researcher made the environment as cozy as possible by first conversing with the teacher informally about their feelings and off-the-record subjects. After which, the participant informed them when the interview recording that will form the research data started. The interviews were recorded via zoom in-app recording software and it was saved on the computer for backup. Furthermore, towards the end of the interview, there was five minutes break, after this, a follow-up question was asked, this was done to ensure if the participant have anything else to add to their perspective. English language was used as the means of communication during the interviews because English is widely recognized as the lingua franca used officially in Nigeria. Also, each of the interview session lasted for forty (40) minutes

Data analysis

Thematic analysis was used to analyzed the set of data that was collected from the study sample. It is a method that is being used to analyze qualitative data that involves looking through a data collection to find, examine, and report recurring themes. (Braun & Clarke 2006). Also, it is a technique for categorizing data, and interpreting them using codes and themes (Kiger et al, 2020). The most suitable method for any research that aims to find perspectives is thought to be thematic analysis. It adds a methodical component to data analysis. It enables the researcher to link a frequency distribution of a theme to a content study of the entire text. And this will add precision and complexity and strengthen the overall meaning of the research (Alhojailan, 2012).

Specifically, deductive thematic method was used to organize the collected data. Deductive technique is a specific kind of thematic method where analysis is frequently directed by the analyst. Likewise, the theoretical model and research interests of the researcher are more important drivers of deductive technique (Majumdar, 2022). Similarly, Braun et al (2006)

asserted that deductive approach is completely researcher-driven and enables researchers to analyze data in light of their theoretical interests in the topics under investigation. The themes chosen by the researcher via a review of available literature are often where the analysis is started by the researcher utilizing this technique (Dawad, 2020). In relation to this, a latent approach was employed in analyzing the theme. Latent approach according to Majumdar (2022) analyzes data at a much deeper level of the content. The latent approach has a tendency to locate and investigate the underlying meaning, concept and ideology of the data set. As a result, the interpretative process in latent thematic analysis is far more thorough and rigorous in nature, involving not just description but also justification through theoretical framework (Majumdar, 2022).

To carry out the theme process, the recorded online interviews were transcribed using the transcribing application 'Microsoft online'. After this, the research questions was reviewed and also the transcripts was read properly multiple times while juxtaposing it with the zoom recordings. This was done in order to check the transcripts for accuracy. This back-and-forth was beneficial because it offered a deeper comprehension and familiarization with the data. This was follow by submitting the data into NVivo 2020, a computer assisted qualitative data analysis software. The software package was then used to compile all the interview transcripts for easy access and coding. After this step, themes were created based on the research questions and the issues that are anticipated to receive an answer and the researcher was able to examine the sections that fit into a theme that is helpful in answering the research question. The depth and intricacy of the data is always maintained using this methodology (Kiger et al, 2020).

The following number of recurring themes emerged from the interviews while going through the data, and it is summarized in the Table below.

Table 3

Themes and sub-themes that emerged from the interviews

Theme 1	**Theme 2**	**Theme 3**	**Theme 4**
Facilitating Inclusive Learning	**Address Learning Difficulties**	**Independent Learning**	**Challenges**
Access to educational resources	Reading problems	0ffering access to digital materials	Lack of training and re-training
Alternate communication methods	Writing Problems	Customized Learning	Limited access to technology
Accommodating physical and learning challenges	Arithmetic problems	Increasing self-advocacy	Cultural barriers,
Customized learning.		Providing opportunities for inquiry and discovery.	Inadequate Infrastructure,
			Lack of awarenes

Ethical Consideration

Ethical practice in research has been described as a collection of guidelines that serve as a guide for study designs and procedures. Additional, when any study is been conducted it is important to bear in mind sound ethical practice most especially when the research has to do with children (Wahome, 2021). According to Vetenskapsrådet (2017), ethical concern in research is very important because it is about how people who participate in research as subjects, participants or study sample are treated. Similarly, Midgley et al (2012) avowed that when conducting educational research, it is imperative for the researcher to consider variables such as voluntary participation, informed consent, anonymity or confidentiality and every other thing that can harm the participant. Concerning the more general protocols and techniques of data collection and analysis, certain safety measures was used to preserve the research sample integrity and the handling of the data.

Confidentiality

All research sample right to confidentiality was completely maintained during the data collection process for this research, and all regulations regarding data protection were followed. Hence, to protect the participants' privacy in this study, names of the participants were made anonymous. To keep their names anonymous, pseudonyms labelling was used. This is in keeping with a general code of behavior that discourages harming participants and fosters their trust in the researcher, which will ultimately result in more reliable research outcome

Informed Consent

In the same vein, in order to ensure a proper ethical standard, before conducting the interview, the participants were informed about the aim of the study. The participants were also be given a consent letter asking for their voluntary participation and securing their consent for the audio recording of the interview. To recall the information, transcribe and analyze the data, the conversations was recorded. Confidentiality, anonymity and privacy of the participants was ensured. To keep their names anonymous, pseudonyms was used. This is in keeping with a general code of behavior that discourages harming participants and fosters their trust in the researcher, which will ultimately result in more reliable research outcome. To ensure the credibility, member check can be done by asking participants to comment on the transcribed interview themes and check if the identified themes reflect exactly their views and opinions.

Voluntary Participation

All the research participants that were used in this study participated voluntarily, which implies that they were not under any duress from the researcher to take part. As a result, each participant had the freedom to stop taking part in the study at any moment. It was also made clear to each of the participant that declining to participate would have no detrimental effects. In addition to this, several ethical concerns were taken into consideration during this research, such as the need to avoid gathering harmful information and plagiarism. Deception of study subjects was absolutely was avoided as well

Limitations

The principal limitation of this study is time, problems of getting through to the research participant and resource restraints. In order to gain a wide-ranging understanding, more time

and financial resources would have been needed to broaden the objectives of the study by seeking the perspective of children and increase the study sample. The results are however unique and may be applicable to Nigeria context in relation to the four objectives of the study because the teachers that were interviewed were sought from different background and schools. However, further studies might like to consider a comparative analysis of teachers' perspective in urban and rural areas. Another limitation is that there was no even distribution of participants that were interviewed, majority of them were male. It might be time consuming if the researcher attempts to balance the gender representation of the participant. It would been nice to have more female participants for more diverse perspectives. Moreso, getting through to the participants was a major challenge because of their various individual commitment and busy schedule. Likewise, there was no familiarity between the participants and the researcher, and this may be due to the fact that the interview was conducted virtually on zoon instead of the traditional face-to-face method.

CHAPTER FIVE

RESULT PRESENTATION AND ANALYSIS

In order to answer the research questions formulated, an in-depth interview was conducted with an open-ended question. The results revealed the diverse response from the teacher's perspective on the research questions that has been formulated and it was put under four themes.

In order to generate subthemes, four themes were created based on the research questions and the issues that are anticipated to receive an answer and the researcher was able to examine the sections that fit into a theme that is helpful in answering the research question. After this, the recorded online interviews were transcribed using the transcribing application 'Microsoft online'. This was follow by submitting the data that was transcribed into NVivo 2020, a Computer Assisted Qualitative Data Analysis software. The software package was then used to compile all the interview transcripts for easy access and coding. After this step, sub-themes were created for each of the four themes that was formed based on the research questions. The depth and intricacy of the data is always data maintained using this methodology (Kiger et al, 2020).

Themes Identified from The Collected Data

This first theme addresses the role of classroom assistive technology in facilitating inclusive learning for children with disabilities from the perspective of teachers. Several of the teachers who participated in the study gave similar comments. Based on the teachers' views, the function of assistive technology in the promotion of inclusive learning provides access to educational resources and alternate communication methods. Participants also highlighted that it provides a medium for accommodating physical and learning challenges, as well as facilitating customized learning.

The second theme examines how classroom assistive technology can be utilized to address learning difficulties in children with disabilities. The teachers expressly outlined three methods for using assistive technology to solve learning challenges. This encompasses reading problems, writing problems and arithmetic problems.

The third theme examined how teachers in Nigeria use classroom assistive technology to improve independent learning among children with disabilities. Participants identified that assistive technology can be utilized to improve autonomous learning by offering access to digital materials, customized learning, increasing self-advocacy, and providing opportunities for inquiry and discovery.

The final theme focused on the challenges of using classroom assistive technology from the perspective of teachers in Nigeria. Despite the fact that the study selected teachers with prior experience using assistive technology, participants stated that a lack of training and re-training is a significant difficulty they confront. Additional cited problems include limited access to technology, cultural barriers, inadequate infrastructure, and a lack of awareness.

Classroom Assistive Technology Facilitate Inclusive Learning for Children with Disabilities

From the findings, the participants responded to the question regarding the role of classroom assistive technology in facilitating inclusive learning for children with disabilities differently. However, the common thread of thought they displayed is that assistive technology can play a critical role in facilitating inclusive learning for children with disabilities by providing them with the tools they need to access education and participate fully in the learning process.

Access to instructional materials

In regards to response that was gotten from the teachers, they unequivocally stated that the use of assistive technology in schools can make instructional materials more accessible for children with disabilties.

For example, one of the teacher said that;

"I have been teaching and dealing with children with disabilities for many years and I can say categorically that AT has the potential to improve the academic performance and provide children with equal access to education (ST2)"

Another the teacher was explicit with example in his response, the participant said that;

"Assistive technology can make make instructional materials, such as textbooks and digital content, accessible to children with disabilities. For example, text-to-speech software can be

used to read aloud digital text for schoolchildren who struggle with reading, while screen readers can provide audio descriptions of images for schoolchildren who are visually impaired (ST5)"

Going forward the teacher were asked to give examples of real life situation where they have used assistive technology in regards to inclusiveness in the classroom. Specifically, teachers were able to narrate with example how AT can promote inclusiveness among school children with disabilities. These examples are;

"There was a *child who has visual impairments and this made it difficult for the child to read printed text. In order to help the child, text-to-speech was used to read aloud the written material and the child was able to participate in class (ST3)"*

*A*nother participant reported that;

"*I have a pupil in my class who used to attend a school when they have no access to AT. The parent withdrew him from the school and brought him to the school I worked. The child was having a visual* disabilities. *After the child was enrolled in my school, I began to use a device called Braille, from there she was able to participate in class and learning stated becoming interesting to the child as he began to read words (ST1)*"

Additionally, a participant pointed out that assistive technology have been very helpful in stimulating inclusiveness in the classroom but with a caveat, he said;

"*Presently I have a couple of school children who I manage. They all have hearing* disabilities. *Anytime I wanted to teach them in class with their other peers, I will use visual devices with proper tutoring and this has actually help them to learn and participant in class. However, many of them feel isolated sometimes in class and pace of learning can sometimes be slow compared to their peers (ST1)*"

Furthermore, the teachers were also asked to name the different types of assistive technology they are familiar with and how it works. Every one of them was asked this question but few of their responses are stated below;

"I am familiar with screen readers and it is a software programs that read the text on a computer screen aloud. This can be particularly helpful for pupils with visual disabilities*, dyslexia, or other reading difficulties (ST1)*"

Another respondent also said this:

"I have used Augmentative and Alternative Communication (AAC) devices many times and it is a device designed to help schoolchildren with communication disabilities to express themselves more effectively. It is a device that can also be used to support speech, writing, or other communication methods (ST2)"

Furthermore, a participant commented about his fast experience and familiarity with AT the devices and he said

"One of my favorites AT facilities as love to call it is closed captioning and Alternative input. Precisely, closed captioning on videos is good for students who are deaf or hard of hearing because it can used to provide access to spoken content. Also, for schoolchildren with physical disabilities with the inability to use a keyboard or mouse, alternative input devices such as voice recognition software or specialized switches can be used to provide access to computers and other technology (ST7)".

No doubt, the use of assistive technology in schools can make instructional materials more accessible for children with disablities as it was avowed by the sampled teachers. This will definitely improve their academic engagement, performance and provide them with equal access to educational instructions. That is why it is important for schools to provide access to assistive technology to ensure that all school children can participate fully in the educational process.

Alternative modes of communication

Many of the respondents underlined the importance of assistive technology in assisting children with communication issues, such as speech and language disorders or autism spectrum disorder, to communicate more effectively with teachers and classmates.

For example, the sixth teacher that was interviewed bared her mind in this way;

"Assistive technology has made my teaching easy. For example, there is a device called AAC that I normally use in the classroom to teach, this device was developed to help children with nonverbal or limited verbal communication express themselves using pictures, symbols, or text (SP6)"

In regards to the foregoing extract, teachers believe that assistive technology can play an important role in facilitating alternate means of communication for children with disabilities since these technologies can enable children with disabilities communicate effectively and engage more completely in their daily lives.

In addition, three teachers in their response displayed relevant instances of how assistive technology might support alternative means of communication for pupils who have disabilities, which are included below.

"Having a child who has disabilities problems related to communication, although they can be a bit challenging to manage but devices such as communication boards which is a visual aids can help the child to communicate using pictures, symbols, or words. Even, these boards can be used to facilitate communication in a wide range of settings, aside school. For example homes, and hospital (ST7)"

Another participant also bared her opinion;

"There is no doubt that there are many AT out there that can be used to assist child with disabilities. For me, eye-tracking technology is very helpful when you have an instance of a child with disabilities who is unable to use his hands or fingers. The technology can allow the child to communicate and control a computer or other device by simply looking at the screen. It can also be used to help children with disabilities interact with their environment and participate in games and activities (ST6)"

Just like the other participant have mentioned about the relevance of AT when it comes to communication, however, one participant was of the perception that AT is imperative in stimulating communication but it has it downside. The participant responded this way;

"There are many mobile apps that are easy to use and available which can help children with disabilities communicate more effectively. These apps include text-to-speech software, picture communication systems, and speech recognition software. However, some children have been seen abusing it by using it for other purposes that is deviant in nature (ST5)"

Considering this aforementioned narratives by the participants of this study, it can be said that AT is very fundamental in ensuring children with disabilities live a meaningful live.

Accommodations for physical disabilities

Four teachers reiterated that assistive technology help children with physical disabilities access the classroom environment and participate in class activities when were asked how AT can be used to enhance inclusiveness. For example one of the participants commented that

"*a schoolchild who uses a wheelchair will benefit from an accessible desk or table, while a student with fine motor difficulties will benefit from a specialized keyboard or mouse". If I must tell you, assistive technology assist and make the learning environment more accessible to school children with physical disabilities. For example, electronic ramps, automatic doors, and wheelchair-lifts make it easier for pupils with mobility impairments to navigate the school building. Similarly, text-to-speech software and other assistive technology tools help schoolchildren with visual* disabilities *to access printed materials (ST2)"*

Furthermore, another participant noted that school children who have physical disabilities will require additional support to move around the classroom and participate in physical activities. The participant commented that;

"Assistive technology devices such as wheelchairs, crutches, and orthotics will provide support and facilitate mobility, allowing the physically challenged school children to participate in activities that may have been challenging otherwise (ST8)"

Similarly, assistive technology was also said to help children with physical disabilities to learn and participate in classroom activities;

"What I can tell you about what you asked is that a device such as specialized keyboards and mouse devices can help schoolchildren with limited dexterity to complete tasks on a computer.

Additionally, digital devices and software can provide interactive learning experiences, helping schoolchildren with physical disabilities to engage with the curriculum in new ways (ST4)"

Personalized learning

Four participants avowed that assistive technology help them to differentiate instruction to meet the unique needs of individual students. Below is an extract from one of the participant submission;

"If you have a scenario where in class there is a learner who struggles with math. In order to find solution to this problem, a digital math tool which provides interactive and visual representations of concepts is used to teach such learner to simplify learning (ST6)"

To describe personalized learning, it is an approach to education that tailors instruction to the unique needs, strengths, and interests of each learner.

Another participants so much believed that when it comes to school children with disabilities, assistive technology play a crucial role in facilitating personalized learning;

"When we talked about inclusiveness in school, then a customized learning should come to mind and without assistive technology it will difficult to customize learning materials to suit the needs of every school child with disabilities. For instance, text-to-speech software can be used to convert written materials into audio format, which is beneficial for school children with visual disabilities. *Similarly, speech recognition software can be used to convert spoken language into written format, which will help a child with hearing* disabilities *(ST1)"*

Similarly, another participants opinionated that assistive technology help to bridge this gap and provide feedback;

"One of the merit of AT i have seen in my few years of practice is that it provide learner a customized ways to express themselves more effectively and engage more fully with their teachers and peers. Another is that was it help to provide reel-time feedback. For instance, a child with dyslexia can use software that reads their written work back to them, allowing them to catch errors and make corrections in real-time (ST7)"

Classroom Assistive Technology is used to Address Learning Difficulties

All the teachers that were interviewed shared their different perspective on how they have employed AT to solve the problem of learning difficulty with typical example. Although AT has been known to be a powerful tool to help children overcome leaning difficulties, and can help to level the playing field for children with disabilities in the classroom. This is consonant with the study of Nordström et al.'s (2019) after the outcome of their study indicated that children who have reading and writing disabilities appears to be able to utilize AT to comprehend text and to write text; as a result, AT was reported to have the probable of increasing participation in conventional education. Similarly, Svensson, et al (2021) opined that the use of AT has positive effects on reading ability and also helpful, particularly for children who are experiencing the greatest learning difficulties. Some typical instances of how AT has been used in the classroom by teachers to address learning problems is summarized with the following sub-themes

Reading difficulties

Two participants narrated how learner with reading difficulties, such as dyslexia, are exposed to text-to-speech software or screen readers, which can read aloud digital text and provide audio descriptions of images. And helps such learner to better comprehend text and improve their reading skills.

”*there are students that I have taught overtime who have* disabilities *called dyslexia, a condition characterized with reading and writing difficulties. In helping such child, relevant assistive technology such as screen readers is provided and used*”

“Some children have a reading difficulty problem and to help them overcome these challenges, screen readers was used to solve such difficulties. It is a software programs that can read text on a computer screen out loud”.

Writing difficulties

Writing difficulties was been identified as one of common challenge faced by children with disabilities, including those with physical, cognitive, or learning disabilities. Three participants of this study in their various perspective reported that assistive technology plays an important role in helping these children overcome their writing difficulties and improve their writing

skills. Here are some examples of how assistive technology was identified and used to address writing difficulties among children with disabilities;

"*As a teacher, what I have learnt over the years of working as a special educator is how to use word prediction software to assist children with disabilities such as dyslexia or dysgraphia because these categories of children struggle with spelling, grammar, or word retrieval. The word prediction software specifically helps by suggesting words as the child types, reducing the cognitive load and improving accuracy. The software also offers a range of synonyms, improving vocabulary and language skills (ST3)"*

Another on commented that;

"Knowing the problem of child will facilitate the type of solution to use. For example, speech recognition Software has been very useful to me in teaching children with physical disabilities who have challenges with writing. This technology converts spoken words into text, allowing the child to dictate their writing without needing to write or use a pen or pencil (ST2)".

Furthermore a participant opined that;

"Electronic writing aids is very helpful to children with physical disabilities who have challenges such as motor skills, These tools use touchscreens, large buttons, or special grips to help the child write more easily and accurately (ST6)"

Arithmetic difficulties

According to five (5) participants that was interviewed, they explicitly expressed how assistive technology can be helpful to children in solving mathematics problem. It was noted that children with math difficulties benefited from digital math tools that provide interactive and visual representations of math concepts. These tools help children with disabilities better understand math concepts and improve their problem-solving skills. Noting with examples, the following instances were given;

"*Mathematics problems among my pupils are noticeable and tools like Audio and visual calculators have proven to be useful. These types of calculators help children with disabilities to perform arithmetic calculations. The calculator can read out the numbers and equations and display the results visually* (ST5)"

Another participant said;

"*Another tools that I have found good is "Math apps and games". This is used during lessons and there are many math apps and games that I believe can help children with disabilities to learn arithmetic (ST4)"*

A participant also stressed that;

"learner with disabilities can be confronted with many learning difficulties but for instances of a case of difficulties in learning mathematics, tools such as Braille rulers, number lines, and "manipulatives, have been helpful to me while teaching Similarly graphing calculators is used by children with disabilities to graph equations and understand mathematical relationship (ST8)"

Assistive Technology Facilitate Independent Learning

According to the research participants, their perspective shows that assistive technology (AT) can play a crucial role in facilitating independent learning among children with disabilities. For example, independent learning allows children to take control of their learning and develop self-reliance, leading to improved academic outcomes, self-esteem, and confidence. This is in agreement with the findings of Krasniqi et al (2022) when they concluded that AT is a successful technique for helping children with disabilities live independent lives. However, the result of the teachers' response in regards to how AT can be used to achieved independent learning, the following sub-themes were generated

Providing access to digital materials

In one of the questions asked about the how AT can be used to enhance independent learning, two participants shared a common line of thought. There extract is well represented below;

"One thing I can say is that assistive technology is so good because it provides learners with disabilities access to digital materials, such as e-books, digital textbooks, and online learning platforms. it allow them to access materials at their own pace, review information when needed, and take control of their own learning (ST1)"

"*Sometimes in my class, I will expose my learner to some learning content via YouTube and other digital platforms that the school are affiliated to. I also encourage many parents to also*

allow their children practice on this digital platform most especially to solve their homework (ST5)"

Customized learning

From the interview, three participants believed that assistive technology can be used to promote independent learning while being used for personalize learning for children with disabilities-

One of them said;

Many of the software that adapts to a child's individual learning needs and provides feedback based on their progress can help them take control of their learning and work independently (ST8).

It was also stated that;

"There is no way you will personalized learning for a learner as a teacher and it won´t afford the learner to learn at his own pace, because before a teacher personalized learning, he would have taken into account the child's strengths and weaknesses, as well as their learning style and preferences (ST7).

In regards to this, providing children with disabilities with access to assistive technology, educators can help to ensure that every child has the opportunity to learn and grow in a way that is tailored to their unique needs and abilities. This can lead to improved academic outcomes and increased confidence and independence for these children

Promoting self-advocacy

Also, three participants explained that assistive technology help pupils with disabilities become more self-aware and learn how to advocate for themselves. Stating this categorically, the following responses were gotten

"*It is true that assistive technology helps children. For example, some children with disabilities may have difficulty with social interactions and building relationships with others. In light of this, assistive technology tools such as social skills training software, virtual reality training programs, and video modeling help them to develop social skills and build confidence in advocating for themselves in social situations (ST3)"*

Another participant also said this;

"If I will say, my response is based on my experience as a teacher, children with physical disabilities sometimes require mobility aids such as wheelchairs, crutches, or prosthetic devices and these devices help them to move around more independently and participate in activities that they may not have been able to before. With increased mobility, these children can advocate for themselves and participate more fully in their environment (ST4)"

"*Even though, some of our children don't have access to some AT tools, however, it is true that children with disabilities may have difficulty controlling their environment, such as turning on lights or adjusting the temperature. Assistive technology devices such as voice-activated switches or remote controls can help them to control their environment and promote independence and self-advocacy (ST1)*"

In regards to foregoing, it can be said that assistive technology can be a powerful tool for promoting self-advocacy among children with disabilities. By providing them with tools and devices that can help them to communicate, learn, move around, control their environment, and build social skills, they can become more independent and confident in advocating for their own needs and preferences.

Providing opportunities for exploration and discovery

This was also part of the responses gotten when teachers were asked on how AT can used to facilitate independent learning. Going by the teachers' responses, it can be deduced that assistive technology can provide children with disabilities opportunities to explore and discover new information on their own.

Some of the responses were stated below:

"Children with sensory processing difficulties can benefit from assistive technology that provides sensory stimulation and support. This might include specialized equipment for sensory integration therapy, or devices that provide tactile or auditory feedback to help children explore and engage with their environment (ST2)".

Another participant was of the opinion that by providing specialized devices and software, assistive technology can help level the playing field for children with disabilities, allowing them to engage in exploration and discovery activities alongside their peers;

"The truth is that assistive technology is very imperative because it can be used to support play and social interaction among children with disabilities. To achieve this, tools like specialized toys and games that are adapted to the child's needs, or communication and collaboration tools that facilitate social interaction and teamwork can be employed (ST6)"

"AT is very fundamental because it has proved to be useful in supporting learning and exploration in the classroom. For example, audio and visual aids can be used to present information in a way that is accessible to children with hearing or visual disabilities, *while adaptive software and devices can help children with learning disabilities access and engage with educational materials (ST3)"*

Challenges of Using Classroom Assistive Technology

From the responses of teachers that formed the participant of this study, several challenges that are associated with the use of classroom assistive technology to support schoolchildren with disabilities were stated and explained explicitly. The challenges that were reported was in line the study of Ezeani, et al. (2017) which that claimed that implementing inclusive information access for children with disablities using AT in underdeveloped nations like Nigeria is fraught with difficulties such as consistency issues and resource shortages, particularly in underprivileged communities. Similarly, Alkahtan (2013) acknowledged that there many challenges children with disabilities face when learning using AT and this has been alluded may thwart the purpose of using AT. Problems such as; teachers lack of necessary depth of assistive technology knowledge and proficiency was indicated.

Here are some of the sub-themes that was generated as common challenges:

Lack of training and re-training

Teachers were of the opinion that the limited availability of training programs for them is a significant challenge. The following extract was gotten from the participant

"Once in a while, the school I work exposed some us to training and refresher courses but it is very limited because the school lack the resources to provide specialized training for me and other school staff on how to use assistive technology effectively (ST6)"

This can however result in teachers feeling unsure about how to integrate assistive technology into their lessons or how to troubleshoot technical issues that may arise.

Another participants said;

It true that many special educator like lacks adequate training but it is due to inadequate funding for assistive technology training programs. Even when training programs are available, the cost of attending these programs is always prohibitively expensive for the school (ST4)

Limited access to technology

Some of the teachers reiterated that the cost of acquiring assistive technology devices is high in Nigeria, and this make it difficult for parents and schools to purchase them.

"In most cases, the cost of AT is often beyond the means of most families, particularly those with low-income earners. Similarly, there is inadequate of infrastructure, particularly in rural areas, and it makes it difficult for schools to provide access to AT (SP8)"

Another participant mentioned lack of expertise in assistive technology as cause for limited accessibility;

"There are only a few consultants in Nigeria who specialize in assistive technology, and this makes it difficult for schools to engage them for re-training of their staffs who uses these technologies. As a result, there is a limit in access to the use of AT (SP1)"

Furthermore, many parents are said to have limited awareness about the benefits of assistive technology for children with disabilities. This lack of awareness limits the integration and use of AT.

Many parents do not have it at home for these children to complete their homework and complement the teachers work after the children have returned from school. Also, there is limited availability of assistive technology devices because most of the available technologies

are imported, making them more expensive due to import taxes and other fees. This further limit access to these devices (SP4).

Poor infrastructure

Four of the teachers that were interviewed were very particular about how poor infrastructure in Nigeria has been a significant challenge to the use of assistive technology among school children with disabilities.

"Let me tell you, Nigeria, like many developing countries, has inadequate infrastructure, including poor transportation systems, unreliable power supply, and inadequate communication networks. These challenges significantly impact the provision and usage of assistive technology in schools, particularly for children with disabilities (SP7)"

Another participant said this;

"Lack of reliable power supply is very detrimental because assistive technology devices such as wheelchairs, hearing aids, and communication devices require a constant power supply to function correctly. Also, challenge is inadequate transportation systems, which make it difficult for children with disabilities to attend school, children with disabilities often require special transportation services to and from school, which are not readily available in Nigeria (SP1)"

A participant *also added this;*

"Nigeria's inadequate communication networks make it difficult for children with disabilities to communicate and access online resources. Many assistive technology devices rely on the internet to function correctly, and the lack of reliable internet access in many parts of Nigeria makes it challenging for children with disabilities to access educational resources and communicate with their peers and teachers (SP4)"

Cultural barriers

Three out of the teachers that was interviewed revealed that stigma and discrimination still persist in the society and it is a major challenge.

"Till today I can tell you that disability is still seen as a curse or a punishment for wrongdoing, and people with disabilities are often shunned, excluded, or even abandoned by their families

and communities. This stigma make it difficult for children with disabilities to attend school, participate in social activities, or access healthcare and other services, including assistive technology (SP6)"

Another participant talked about the role of family in relation to cultural barriers;

"Traditional healing practices and spiritual remedies still exist in our society, and mostly it is preferred over modern medicine and technology. Many families in Nigeria don't see the value in assistive technology and instead seek alternative forms of healing or treatment, and this will normally prevent access to appropriate assistive technology.

Limited awareness

Limited awareness was also revealed by participants as a significant challenge to the use of assistive technology among school children with disabilities.

One of the participant said this;

"Let me be Specific, the main reasons for limited awareness is the lack of education and training on assistive technology for teachers, parents, and caregivers. Many people in Nigeria are not aware of the different types of assistive technologies available or how they can be used to support individuals with disabilities. This lack of knowledge and understanding have created misconceptions about assistive technology and create barriers to its use (SP1)".

Another participant commented that;

"Many school children with disabilities in Nigeria live in rural areas or impoverished communities, where access to technology is limited. Couple with this, there is a cultural stigma associated with disabilities in Nigeria, which has lead to a lack of acceptance of assistive technology. Some people are said to view the use of assistive technology as a sign of weakness or inability, and this make it difficult for children with disabilities to receive the support they need (SP5)"

Furthermore, the teachers were asked to suggest relevant solution to lingering problem. One them said avowed;

“To solve this problem, it is important to increase education and training on assistive technology for teachers, parents, and caregivers. Because this will help to dispel misconceptions and increase acceptance of assistive technology. Additionally, efforts should be made to increase the accessibility of assistive technology, particularly in rural areas and impoverished communities. Cultural attitudes towards disabilities should be addressed through awareness campaigns and education, to increase acceptance and support for individuals with disabilities (SP1)”

CHAPTER SIX

DISCUSSION

The implication of this study is plausible and relevant in the academic environment of Nigeria. As it has been reported in the study, that AT is very imperative towards enhancing access to basic education for children with disabilities. This is a very peculiar findings for relevant authorities that are concerned with special education curriculum development, since it has discovered that AT has the potential to enhance learning opportunities and promote the inclusion of learners with disabilities in Nigeria educational settings. Similarly, these attributes can be likened to the assertion of Roberts et al (2008) which opined that effective integration of technology can assist all learners to access the general education curriculum by giving them various ways to finish their tasks and enhance their independence in executing things that they were previously unable to finish or had a lot of trouble completing. In regards to this, teachers must be able to utilize AT to the advantage of learners with disabilities in Nigeria so that they will not be isolated and left behind in the classroom and likewise they will be able to participate in class like their peers. Similarly, Estrada-Hernandez et al (2003) reiterated that AT integrates a learner's cognitive capabilities to an educational opportunity which might not be attainable because of their disabilities. This assertion shows that a well-developed AT policy in Nigeria will cater for the problem of exclusion and make academic instruction more accessible to learners with disability. In a broader perspective, it can be concluded that the findings of this study has shown that AT can help learners with disabilities to participate fully in classroom activities, engage with their peers and teachers, and access the same educational materials as their non-disabled peers. At the same time it can help to reduce the stigma associated with disability by promoting a more inclusive environment where all learners can access the same opportunities.

Having been discovered that AT can be used to solve learning difficulties related to writing and reading difficulties and also mathematics problem faced by children with disabilities. It is therefore left for teachers to know the exact AT that needs to be used to address the specific learning problem a learner is confronted with. Empirically, study of Raskind (1994) have recommended different AT that can assist children with disabilities overcome their different learning difficulties: “word processors, spell-checking address learning difficulties programs,

proofreading programs, outlining (Brain Storming), speech recognition, abbreviation expanders, speech synthesis, optical character recognition systems, Free-Form Databases, and talking Calculators". In the same vein, Cutler (1990) noted that spellcheckers were beneficial for helping children with disabilities make up for their spelling problems. Collins (1990) discovered that word processor use aided in the development of children with writing disabilities. Brown (1987) discovered that using speech recognition technology in combination with word processing improved pupils' ability to produce written language.

However, it is important to note that assistive technology is not a one-size-fits-all solution. Different students may have different needs, and the type of assistive technology that is most helpful for one learner to solve a particular learning problem may not be as useful for another. Therefore, it is important for teachers and other educators to work closely with students, their families, and specialists to determine the most appropriate assistive technology for each individual learner. In addition, while assistive technology can be a valuable tool for students with learning difficulties, it is not a replacement for good teaching practices. Teachers still need to provide engaging, challenging, and relevant learning experiences for all students, regardless of their abilities or disabilities. Assistive technology can support and enhance the learning process, but it should not replace effective teaching and learning strategies

In addition, AT has been shown to be very integral and fundamental in enhancing independent learning among children with disabilities. Specifically, independent learning has been postulated to be possible through use of AT because it facilitates access to digital materials, customized learning, self-advocacy and opportunities for exploration and discovery. These aforementioned variables can be considered very significant most especially in this present contemporary era. In relating this explicitly to the academic environment in Nigeria, with assistive technology, it will be possible for special educators to remove barriers to learning and help students become more independent and self-sufficient. Similarly AT can help learners with reading, writing, note-taking, organization, and communication, among other things. In the assertion of Rabonye (2020), AT will enable children with learning disabilities gain to access information and complete tasks effectively, thereby enabling them to achieve the highest level of independence and academic attainment. Also, it was deduced that AT provides more independent learning chances and various practice drills (Zayyad, 2019). In regards to this, AT

maybe regarded as the nucleus for independent learning most especially among children with disabilities ' in the Nigeria context. As a result of this, if relevant AT can be provided in school children with disabilities will enjoy learning freedom and total inclusion.

However, many challenges encountered while using assistive technology in Nigeria have been reported. Even though, it is a common phenomenon that technology has its shortcoming while using them. However, the peculiarity of the challenges that was reported was as a result of the fundamental problem Nigeria is facing as country. Just like the study reported that the challenges are multifaceted and it includes lack of training and re-training, limited access to technology, poor infrastructure, cultural barriers, and limited awareness. More this, some previous studies have shared the same rhetoric. Specifically, Addis et al (2020) avowed that physical and environmental barriers, monetary constrain and lack of access to AT Service, policy implementation gap, poor social awareness information gap are the main challenges facing the use of AT in Africa. It was further emphasized by Visagie et al. (2017) that poor AT coverage and availability in resource-constrained countries can be as a result of poverty, environmental barriers, subpar procurement processes, a dearth of support services, and also a paucity of service providers and insufficient training of the service providers that are present. Coleman (2011) also noted that the majority of teachers and other support personnel do not receive sufficient training on how to use contemporary, high-tech AT. Lack of finance is another factor cited as a key obstacle to offering AT services in schools.

To move away from this peculiar problem in Nigeria, it will require a concerted effort from government, educators, and society as a whole to prioritize the needs of learners with disabilities and provide the necessary resources and support for their education.

Theoretical Discussion

In this study, the social model of disability was used to operationally explain the construct of disability among children living with disabilities in Nigeria. The social model is a perspective that emphasizes how societal barriers and attitudes create disability by excluding or marginalizing children living with disabilities. Similarly, it posits that disability is not solely a result of an individual's disability but is largely influenced by social, environmental, and attitudinal factors (Barnes et al., 2008). For example, it was mentioned that In Nigeria, having an inclusive education through the enactment of a known clear policies on the provision of

assistive technology has been seen as lip service (Agbakuribe et al, 2021). Likewise, there is poor level of appreciation of assistive technology usage among educational stakeholders in Nigeria (Omede, 2012). All these can be considered as barriers created by society which can limit children living with disabilities from accessing basic education.

Considering the major findings that were found out in this study, assistive technology plays a crucial role in supporting the social model of disability by removing barriers and promoting inclusivity. For example, it was reported in this study that a child who has visual impairment will find it difficult to read, a text-to-speech device will remove any barriers that can prevent the child from accessing learning materials. Similarly, a school child who has mobility problem, a wheelchair will assist the child to access and navigate the school environment, while a child with fine motor difficulties will benefit from a specialized keyboard or mouse. In relation to the findings of this study, assistive technology has been shown to be a tool for removing social obstacles through increasing access to inclusive learning, addressing learning difficulties, enhancing independent learning, and empowering children with disabilities. With this, assistive technology plays an important role in furthering the rights, opportunities, and equality of children with disabilities by recognizing and addressing the systemic issues that lead to disability. ´

However, in order to fully understand the role of assistive technology in enhancing participation of children with disabilities in basic education in Nigeria, Universal Design for Learning (UDL) model was adopted in this study. This model is designed with a framework that is geared towards the facilitation of an equitable learning environment that can benefit all learners, including those with disabilities. Regarding this, universal design for learning was considered while designing the objectives of this study. As a result of this, the result obtained in this study can be related to the analytical components of UDL. According to Brand et al (2012), the universal design for learning model is a framework founded on three core principles, which are Multiple means of representation; which means providing learners with multiple ways to access and understand information, multiple means of expression; which connote providing learners with multiple ways to express their understanding and demonstrate their knowledge and also multiple means of engagement; which simply means providing learners with multiple ways to

stay engaged and provide positive learning environment which encourage independent learning, exploration and discovery.

Specifically, the finding of the study indicated that assistive technology can be used to facilitate inclusive learning. This was revealed when the special education teachers who formed the study sample reported that, the use of AT can enhance access to instructional materials (for example, the use of braille to present learning instruction to a child with visual disability), provides alternative modes of communication (for example, the use of visual aids for a child who has a communication disability), accommodate physical disabilities and promote personalized learning. This can be related to the *Multiple means of representation (*Freund et al, 2019). According to Rose et al (2002), *the* principle provides means for flexible and multiple ways of presenting learning instruction. Kurtts et al (2006) avowed that multiple means of representation is a principle that provides framework for offering content in diverse modes such as visual, graphic and auditory, so that all learners can have different ways to access information. Similarly, it is a structural component utilized to implement curriculum by aiding learners in conquering physical, emotive, or psychological obstacles without learners feeling marginalized or alienated (Pisha et al, 2001)

Additionally, the sampled teachers reported that assistive technology can be used to solve learning difficulties. The three major learning difficulties areas that were identified by the teachers were writing, reading and arithmetic. For example, screen readers were identified by teachers to be helpful to children with reading and writing problems. Also, audio and visual calculators were pointed out as assistive technology that can be used to solve arithmetic difficulties among children with these varying disabilities. All these attributes can be ascribed to *multiple means of action and expression (*Howard, 2003). According to Kahn (2017), school children with learning difficulties may face challenges in expressing their thoughts, ideas, and emotions through traditional means of communication, such as writing or speaking. Providing multiple means of action and expression can help these students to engage with the learning process and demonstrate their understanding in different ways by using relevant assistive technology. Similarly, Howard (2003) stated that the component of UDL, multiple means of action and expression account for diverse ways to express knowledge in order to support learners who struggle with basic problem of literacy.

Furthermore, this study revealed that assistive technology can be used to stimulate independent learning among children with disabilities. To explain this, the teachers disclosed that the use of assistive technology can better enable children with disabilities access digital materials and provide different method for children to have customized learning, these two findings can be linked to *multiple means of representation (*Rose et al, 2002). Teachers also reported that AT can be used to facilitate self-advocacy, self exploration and discovery among children with disabilities. These attributes can be linked to *multiple means of engagement.* Because the principal description of this principle is that it is a framework that provide learners with multiple ways to stay engaged in learning and foster a positive learning environment that encourage independent exploration and discovery (Brand et al, 2012). The principle recognizes that learners are more likely to be independent when they are interested, motivated, and have a sense of ownership over their learning. According to Khan (2017), when school children are engaged in learning, they will take ownership of their learning and develop the skills needed for independent learning. Children who are engaged are more likely to ask questions, seek out resources, and take an active role in their own learning. This can lead to increased self-confidence and self-efficacy, which are important factors in developing independent learners.

Overall, the integration of UDL and assistive technology can help to create more inclusive learning environments for children living with disabilities, providing them with equal access to educational opportunities and improving their overall educational outcomes. As a result, the limitation created by the society which inhibit children with disabilities from acessing basic education in Nigeria will be competely eliminated

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

Conclusion

Basic education is crucial to the development of all children, including those with disabilities. Education is not only a fundamental human right but also a key factor in promoting personal growth, social inclusion, and economic independence. For children with disabilities, basic education is particularly important because it provides them with the necessary skills and knowledge to live a fulfilling life and become active members of their communities. In regards to the imperative role of basic education most especially for children living with disabilities, assistive technology has been considered to be the major catalyst in achieving this among children with disabilities. Assistive technology will support children with disabilities in many ways, such as improving communication, promoting independence, and facilitating access to learning materials. Also, it helps to customize learning materials to suit the individual needs of children with disabilities. Moreso, assistive technology will help to foster inclusion in the classroom, as it enables children with disabilities to participate in learning activities alongside their peers. This, in turn, can enhance their self-esteem and sense of belonging, promoting positive social and emotional development.

Furthermore, assistive technology (AT) plays a crucial role in facilitating quality access to basic education for children living with disabilities by enhancing learning experiences for children with disabilities by making it easier for them to access information, participate in activities, and interact with their peers and teachers. Likewise, with the help of AT, schoolchildren with disabilities feel more included in the classroom and improve their overall engagement in learning. Moreoso, assistive technology can help children with disabilities become more independent learners and it helps to bridge the gap between the child's abilities and the curriculum, providing them with the necessary support to learn. All things considered; assistive technology is a vital tool that guarantees children with disabilities have an even playing field while providing them with the motivation they require to succeed. However, it is important to carefully consider the specific needs of the child and their individual differences before employing AT in school. Also, accessibility to AT must be ensure and likewise proper training.

Also, it is necessary to address every challenge that comes with usage of assistive technology in Nigeria for seamless implementation in schools.

Recommendation

Assistive technology has been shown in this study to be a powerful tool that can be used support children with disabilities in Nigeria. Therefore, a strong policy may be put in place by relevant government agency in Nigeria to promote the usage of assistive technology in basic school so that children with disabilities will be fully accommodated and have equal access to educational opportunities. Furthermore, through this teachers will be aware that AT can help promote independent learning among children with disabilites, as result, teachers may explore this option to further give more learning oppurtnities to children with disabilities. Similarly, a curriculum which will make provision for the use of assistive technology in solving the problem of learning difficulties may be adopted across all basic school in Nigeria.

Accessibility is a major issue in Nigeria, and it is important to ensure that the assistive technology is accessible and affordable to the child and their family. Consideration should be given to factors such as cost, availability, and ease of use. Also, the effective use of assistive technology requires proper training and support. It is important to provide training to the child, their caregivers, and teachers on how to use the assistive technology, and to provide ongoing support to ensure that the technology is being used effectively. In the same vein, It is important to consider cultural factors when recommending assistive technology. For example, some families may be hesitant to use technology that is perceived as "Western," so it may be important to recommend technology that is culturally appropriate in Nigeria.

Recommendations for Future Research

In order to examine and recognize various ways in which assistive technology can be used to support and promote an enabling and accommodative academic environment for children with disabilities, more research may be conducted in this area.

In future research, it might be beneficial to take into consideration the perspective of children, parent and policymakers on how assistive technology can be used to promote inclusivity, independent learning and solve learning disabilities in Nigeria. Similarly, a quantitative study may be replicated where a larger sample can be considered. Additionally, future studies may

also focus on a particular disability and investigate how assistive technology maybe be beneficial to their learning. Other areas such as policy analysis and implementation of the present policy on the use of assistive technology in Nigeria maybe investigated. Likewise, teachers' knowledge and perception about the use of assistive technology may be explored. Other areas in which assistive technology can be used such as learners with disabilities in higher education may be examined. Finally, future studies may also consider using other theories such as self-determination theory, cognitive load theory to critical discuss the imperative role of assistive technology among learners with disabilities within the Nigerian context.

REFERENCES

Addis, B. M., Britton, J., & Davies, T. C. (2020). Challenges and barriers to the use and provision of assistive technology in Africa: A systematic review.

Adebisi, R. O., Liman, N. A., & Longpoe, P. K. (2015). Using Assistive Technology in Teaching Children with Learning Disabilities in the 21st Century. *Journal of Education and Practice*, *6*(24), 14-20.

Agbakuribe, B. C., & Agbakuribe, E.O. (2021) Educational Inequality And Gendered Disability in Nigerian Community: What Guidance Counsellors And Mass Communicators Must Do For Concerned Pupils. *International Journal of Education, Learning and Development* 9, (1),e15-29

Alhojailan, M. I. (2012). Thematic analysis: A critical review of its process and evaluation. *West east journal of social sciences*, *1*(1), 39-47.

Alimi, A. E., Babalola, E. O., Aladesusi, G. A., Issa, A. I., & Omolafe, E. V. (2022). Availability and Utilization of Assistive Technology for Learning among Students with Special Needs in Ilorin, Kwara State. *Indonesian Journal of Community and Special Needs Education*, *2*(1), 17-28.

Alkahtani, K. D. (2013). Teachers' knowledge and use of assistive technology for students with special educational needs. *Journal of Studies in Education*, *3*(2), 65-86.

Alnahdi, G. (2014). Assistive technology in special education and the universal design for learning. *Turkish Online Journal of Educational Technology-TOJET*, *13*(2), 18-23.

Alshabeb, A. M., & Alharbi, O. (2019). Critical analysis of the benefits and drawbacks of assistive technology with special needs. *Advances in Social Sciences Research Journal, 6*(8) 210-215

Alshurman, W. M., Al-Saree, I. I. A., & Amreet, K. (2020). The role of assistive technology in success of the individual education program for disabled students in Jordan. *International Journal of Advanced Science and Technology*, *29*(7), 825-837.

Anyaoha, A. C., Bosah, I. P., & Oluwatayo, J. C. (2022). Availability Of Assistive Technologies for Teaching Pupils with Learning Disabilities in Special Education Centres In Anambra State. *South Eastern Journal of Research and Sustainable Development (SEJRSD)*, *9*(1), 18-36.

Assistive Technology Industry Association (2020). What is AT? https://www.atia.org/home/at- resources/what-is-at/ AT ELEMENTARY LEVEL

Ayon, V., & Dillon, A. (2021). Assistive Technology in Education. *The International Journalof Information, Diversity, & Inclusion*, *5*(3), 174-184.

Bampi, L. N. D. S., Guilhem, D., & Alves, E. D. (2010). Social model: a new approach of the disability theme. *Revista latino-americana de enfermagem*, *18*, 816-823.

Banham, L., & Papakosta, E. (2018). Disability and Inclusive Education; A Stock take of Education Sector Plans and GPE-Funded Grants. *Global Partnership for Education, Washington, DC, USA. Available at*.Banozic, A., Shi, G., & Ke, S. (2022). The role of Assistive Technology in advancing Sustainable Development Goals. *Frontiers in Political Science*, 24.

Barik, N. (2018). Special Education. *Bhubaneswar: DDCE Utkal University*.

Barnes, C., & Mercer, G. (Eds.). (2004). *Implementing the social model of disability: Theory and research*. Leeds: Disability Press.

Bourdieu, P. (1989). Social space and symbolic power. *Sociological theory*, *7*(1), 14-25.

Boyce, C., & Neale, P. (2006). Conducting in-depth interviews: A guide for designing and conducting in-depth interviews for evaluation input. Pathfinder International. *Monitoring and Evaluation*, *2*, 1-12.

Brand, S. T., & Dalton, E. M. (2012). Universal Design for Learning: Cognitive Theory into Practice for Facilitating Comprehension in Early Literacy. In *Forum on Public Policy Online* (Vol. 2012, No. 1). Oxford Round Table. 406 West Florida Avenue, Urbana, IL 61801.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Brown, C. (1987). Computer access in higher education for students with disabilities. *Washington, DC: US Department of Education, Fund for the Improvement of Postsecondary Education* .

Brown, C. (1992). Assistive technology computers and persons with disabilities. *Communications of the ACM*, *35*(5), 36-45.

Bruce, C. S. (1994). Research students' early experiences of the dissertation literature review. *Studies in Higher Education*, *19*(2), 217-229.

Carson, G. (2009). *The social model of disability*. Stationery Office.

Casbarro, J.,(2012). CCSS and udl: Common core state standards and universal design for learning. Port Chester. National Professional Resources

Chinn, P. , & Kramer, M. (1999). *Theory and nursing: A systematic approach* (4th ed.). St. Louis, MO: C. V. Mosby.

Coleman, M. B. (2011). Successful implementation of assistive technology to promote access to curriculum and instruction for students with physical disabilities. *Physical Disabilities: Education and Related Services*, *30*(2), 2-22.

Collins, T. (1990). The impact of microcomputer word processing on the performance of learning disabled students in a required first-year writing course. *Computers and Composition*, *8*(1), 49-67.

Coyne, P., Pisha, B., Dalton, B., Zeph, L., & Cook Smith, N. (2010). Literacy by design: A universally designed digital reading approach for young students with significant intellectual disabilities. *Remedial and Special Education*.

Cresswell, J. W., & Plano Clark, V. L. (2011). Designing and Conducting Mixed Method Research; 2nd Sage: Thousand Oaks. *Search in*.

Cutler, W. B. (1990). Beyond the hearing aid: Assistive listening devices and systems. *International Journal of Technology & Aging*.

Dawadi, S. (2020). Thematic analysis approach: A step by step guide for ELT research practitioners. *Journal of NELTA*, *25*(1-2), 62-71.

Durkheim, E. (1895). The normal and the pathological. *Criminological Perspectives: Essential Readings*.

Ebuenyi, I. D. (2021). Commentary: A Case for An Assistive Technology Policy in Nigeria;Leaving No One Behind. Niger *Delta Medical Journal* 4(4): 24-26

Engeström, Y. (1999). Activity theory and individual and social transformation. *Perspectives on activity theory*, *19*(38), 19-30.

Estrada-Hernandez, N., & Dawson, RD (2003). Meeting the needs of students and consumers through infusion of assistive technology into the rehabilitation curriculum. In *3rd Annual Conference of the National Council on Rehabilitation Education, Tucson, AZ* .

Ezeani, C. N., Ukwoma, S. C., Gani, E., Igwe, P. J., & Agunwamba, C. G. (2017). Towards Sustainable Development Goals: What Role for Academic Libraries in Nigeria in Assuring Inclusive Access to Information for Learners with Special Needs?.

Federal Republic of Nigeria (2013), National Policy on education, Revised Edition, Lagos, NERDC Press.

Francisco, M. P. B., Hartman, M., & Wang, Y. (2020). Inclusion and special education. *Education Sciences*, *10*(9), 238.

Freund, D., Cerdan Chiscano, M., Hernandez-Maskivker, G., Guix, M., Iñesta, A., & Castelló, M. (2019). Enhancing the hospitality customer experience of families with children on the autism spectrum disorder. *International Journal of Tourism Research*, *21*(5), 606-614.

Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental innovation and societal transitions*, *1*(1), 24-40.

Genc, Z., Babieva, N. S., Zarembo, G. V., Lobanova, E. V., & Malakhova, V. Y. (2021). The Views of Special Education Department Students on the Use of Assistive Technologies in Special Education. *International Journal of Emerging Technologies in Learning*, *16*(19).

Hartmann, E. (2015). Universal design for learning (UDL) and learners with severe support needs. *International Journal of Whole Schooling*, *11*(1), 54-67.

Hernandez, A. (2003). Making content instruction accessible for English language learners. *English learners: Reaching the highest level of English literacy*, 125-149.

Hitchcock, C., & Stahl, S. (2003). Assistive technology, universal design, universal design for learning: Improved learning opportunities. *Journal of Special Education Technology*, *18*(4), 45-52.

Hitchcock, C., Meyer, A., Rose, D., & Jackson, R. (2002). Providing new access to the general curriculum: Universal design for learning. *Teaching exceptional children*, *35*(2), 8-17.

Howard, J. B. (2003). Universal design for learning: An essential concept for teacher education. *Journal of Computing in Teacher Education*, *19*(4), 113-118.

Ikwen, E. U., Aderigbe, S. A., Eburikure, O. J., Orim, O. S., Abua, E. J., & Kayode, O. M. (2021). Level Of Planning Towards Implementation Of Technology-Based Education For Learners With Special Needs In Upper Basic Public Schools In Cross River State, Nigeria. *PalArch's Journal of Archaeology of Egypt/Egyptology*, *18*(08), 3972-3992.

International Computer & Instructional Technologies Symposium, October 4th - 6th 2012 GaziantepUniversity, Gaziantep- Turkey!

Islim, O. F., & Cagiltay, K. (2012). Disabilty And Assistive Technology. 6th International Computer & Instructional Technologies Symposium, October 4th - 6th 2012 Gaziantep University, Gaziantep- Turkey

Itulua-Abumere, F., & Page, K. (2019). Childhood disability in Nigeria, its effects in later life and how they can be helped. Retrieved from https://www.flourishabumere.com/

Jesson, J., and Lacey, F. (2006). How to do (or not to do) a critical literature review. *Pharmacy Education*, 6(2): 139—148.

Kelly, S. M., & Smith, D. W. (2011). The impact of assistive technology on the educational performance of students with visual impairments: A synthesis of the research. *Journal of Visual Impairment & Blindness*, *105*(2), 73-83.

Khan, N. H. (2017). Universal Design For Learning (UDL): Its Usefulness And Implementation At Elementary Level. South *Asia Journal of Multidisciplinary Studies SAJMS*. (3),6

Kiger, M. E., & Varpio, L. (2020). Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical teacher*, *42*(8), 846-854.

Krasniqi, V., Zdravkova, K., & Dalipi, F. (2022). Impact of Assistive Technologies to Inclusive Education and Independent Life of Down Syndrome Persons: A Systematic Literature Review and Research Agenda. *Sustainability*, *14*(8), 4630.

Kurtts, S., & Kurtts, S. A. (2006). Universal design for learning in inclusive classroom. *Electronic Journal of Inclusive Education*, *1*(10).

Lashley, L. (2017). School culture and teachers' perspectives on Special Education Needs (SEN) and disabilities within Guyana's mainstream elementary school system. *Social Science Learning Education Journal*, *2*(8), 1-17.

Lawal, S. (2022). Implementation of Inclusive Education in Nigerian Schools: Challenges and Way Forward. *International Journal of Formal Education*, *1*(3), 32-41.

Leont'ev, A. N. (1978). Activity, Consciousness, and Personality. Prentice-Hall Englewood Cliffs, Nj.

Mace, RL, Hardie, GJ, & Place, JP (1996). Accessible environments: Toward universal design. Raleigh, NC: North Carolina State University. *The center for universal design*.

Mack, N., Woodsong, C., MacQueen, K. M., & Guest, G. (2005). *Qualitative research methods*. Family Health International.

Majumdar, A. (2022). Thematic analysis in qualitative research. In *Research Anthology on Innovative Research Methodologies and Utilization Across Multiple Disciplines* (pp. 604-622). IGI Global.

Matthews, N. (2009). Teaching the 'invisible'disabled students in the classroom: disclosure, inclusion and the social model of disability. *Teaching in higher education*, *14*(3), 229-239.

Midgley, W., Danaher, P. A., & Baguley, M. (Eds.). (2012). *The Role of Participants in Education Research: Ethics, Epistemologies, and Methods*. Routledge. https://doi.org/10.4324/9780203078389

Moher, D. (2018). Reporting guidelines: doing better for readers. *BMC medicine*, *16*(1), 1-3.

Monkelbaan, J. (2019). Overview of governance theories that are relevant for the SDGs. In *Governance for the Sustainable Development Goals* (pp. 21-48). Springer, Singapore.

Naderifar, M., Goli, H., & Ghaljaie, F. (2017). Snowball sampling: A purposeful method of sampling in qualitative research. *Strides in development of medical education*, *14*(3).

Ngwoke, A. N., Aneke, A. O., & Ibiam, J. U. (2020). Inclusive Education and Learning Difficulties among Special Needs Children in Nigeria: The Case of the Visually Impaired. *Journal Of The Nigerian Academy Of Education*, *15*(1).

Njikem, J.(2020). Investigating teacher's use of assistive technology for teaching children with learning disabilities in Gothenburg. Master thesis. University of Gothenburg

Nordström, T., Nilsson, S., Gustafson, S., & Svensson, I. (2018). Assistive technologyapplications for students with reading difficulties: special education teachers' experiences and perceptions. Disability and Rehabilitation: Assistive Technology, 14:8, 798-808.

Nunan, D. (1992). *Research methods in language learning*. Cambridge university press.

Nwabueze, J. N., & Adama, G. N. (2018). Access to quality education by children with disabilities in Nigeria. *The Intuition*, 8 (1), 1-10

Nwahunanya, I., Ede, E. O., Abiamuwe, N. O., Attah, O. K., & Asogwa, U. U. (2020). Assistive for Inclusive Education Among Vocational Education Students with Physical Disabilities in Colleges of Education in South West, Nigeria. *International Journal of Innovative Science and Research Technology*, *5*(6), 522-527.

Obaka, A. I. (2017). Education Of People with Special Needs. The 3rd International Conference on Social Science held At: The Nile University, Abuja, Nigeria

Obim, I. E., & Akpokurerie, A. O. (2022, November). Utilization of Assistive Technology for Effective School Library Service Delivery to Students With Disabilities in Nigeria. In *IASL Annual Conference Proceedings*.

Olumorin, C. O., Babalola, E. O., & Amoo, B. K. (2022). Availability and use of assistive technology for learning amongst special students in Kwara State School for Special Needs. *Indonesian Journal of Community and Special Needs Education*, *2*(2), 79-88.

Omede, A. A. (2012). The use of assistive technology for persons with learning disabilities in special needs education in Nigeria. *Research journal in organizational psychology and educational studies*, *1*(4), 261-265

Orkwis, R., & McLane, K. (1998). A Curriculum Every Student Can Use: Design Principles for Student Access. ERIC/OSEP Topical Brief.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Systematic reviews*, *10*(1), 1-11.

Parker, S., Buckley, W., Truesdell, A., Riggio, M., Collins, M., & Boardman, B. (1990). Barriers to the use of assistive technology with children: A survey. *Journal of Visual Impairment & Blindness*, *84*(10), 532-533.

Pisha, B., & Coyne, P. (2001). Smart from the start: The promise of universal design for learning. *Remedial and special education*, *22*(4), 197-203.

Polit, D. F., & Beck, C. T. (2006). Using research in evidence-based nursing practice. *Essentials of nursing research. Methods, appraisal and utilization. Philadelphia (USA): Lippincott Williams & Wilkins*, *12*, 457-94.

Rabonye, H. (2020). Role of Assistive Technology in the Education of Students with Special Needs. *Available at SSRN 3568245*.

Raskind, M. H., & Scott, N. G. (1994). Technology for postsecondary students with learning disabilities. *Success for college students with learning disabilities*, 240-279.

Ripat, J. D., & Woodgate, R. L. (2017). The importance of assistive technology in theproductivity pursuits of young adults with disabilities. *Work*, *57*(4), 455-468.

Roberts, J. M., Keane, E., & Clark, T. R. (2008). Making inclusion work: AutismSpectrumAustralia's satellite class project. *Teaching Exceptional Children*, *41*(2), 22-27.

Rose, D. H., & Meyer, A. (2002). *Teaching every student in the digital age: Universal design for learning*. Association for Supervision and Curriculum Development, 1703 N. Beauregard St., Alexandria, VA 22311-1714 (Product no. 101042: $22.95 ASCD members; $26.95 nonmembers).

Rowlands, T. (2015). The utilization of assistive technology to enhance educational support for all learners in a mainstream school. *Unpublished PhD Dissertation, University of South Africa*.

Rudestam, K. E., & Newton, R. R. (2007). The method chapter: Describing your researchplan. *Surviving your dissertation: A comprehensive guide to content and process*, 87-117.

Selçuk, A. A. (2019). A guide for systematic reviews: PRISMA. *Turkish archives of otorhinolaryngology*, *57*(1), 57.

Svensson, I., Nordström, T., Lindeblad, E., Gustafson, S., Björn, M., Sand, C., & Nilsson, S. (2021). Effects of assistive technology for students with reading and writing disabilities. *Disability and Rehabilitation: Assistive Technology*, *16*(2), 196-208.

Swartz, M. K. (2011). the PRISMA Statement: A Guideline for Systematic Reviews and Meta-Analyses. Journal of Pediatric Health Care, 25(1), 1-2.

Tebbutt, E., Brodmann, R., Borg, J., MacLachlan, M., Khasnabis, C., & Horvath, R. (2016).Assistive products and the sustainable development goals (SDGs). *Globalization and health*, *12*(1), 1-6.

Tony, M. P. (2019). The effectiveness of assistive technology to support children with specificlearning disabilities: Teacher perspectives. Master's Thesis, Jonkoping University

Trostle Brand, S., Favazza, A. E., & Dalton, E. M. (2012). Universal design for learning: A blueprint for success for all learners. *Kappa Delta Pi Record*, *48*(3), 134-139.

Unicef. (2021). Nearly 240 million children with disabilities around the world. *UNICEF's most comprehensive statistical analysis finds*.

Vetenskapsrådet. (2017). Good Research Practice [Text]. Retrieved from https://publikationer.vr.se/en/product/goodresearch-practice/

Visagie, S., Eide, A. H., Mannan, H., Schneider, M., Swartz, L., Mji, G. & MacLachlan, M.(2017). A description of assistive technology sources, services and outcomes of use in a number of African settings. *Disability and Rehabilitation: Assistive Technology*, *12*(7), 705-712.

Vygotsky, L. (1978). Interaction between learning and development. *Readings on the development of children*, *23*(3), 34-41.

Wahome, N. (2021). The Role of Assistive Technology in the Education of Children with Special Needs: Teacher's Perspectives. Master's thesis, Linkoping University

Walliman, N. (2015). Social Research Methods (Second). Oxford Brookes University, UK: SAGE Publications Ltd.

Weiland, S., Hickmann, T., Lederer, M., Marquardt, J., & Schwindenhammer, S. (2021). The 2030 agenda for sustainable development: transformative change through the sustainable development goals?. *Politics and Governance*, *9*(1), 90-95.

World Health Organization official web site (2012). Disabilities and Rehabilitation. Retrieved fromhttp://http://www.who.int/disabilities/en6th

Wren, T. E. (2012). *Conceptions of culture: What multicultural educators need to know*. Rowman & Littlefield.

Yusuf, M. O., Fakomogbon, M. A., & Issa, A. I. (2012). Availability of assistive technologies in Nigerian educational institutions. *International Journal of Social Sciences & Education*, *2*(1).

Zayyad, M. (2019). Incorporating Assistive Technology for students with disabilities. *M., Shelley & SA, Kiray (eds.). Education Research Highlights in Mathematics, Science and Technology. ISRES Publishing*, 271-285.

Appendices A

Interview Procedure

Introduction Key Components:	
Thank you Name	I want to thank you for taking your time to meet with me today. My name is Ayantoye Seye Kenith
Purpose	I will like to talk to you about the role of assistive technology in enhancing participation of children with disabilities in basic education. Specifically, I want to ask you about your perception.
Duration How interview was conducted Confidentiality	The interview will last for forty minutes. I will be recording the session because I don't want to miss any of your comments. Although I will be taking some notes during the session but can't possibly write fast enough to get it all down. Because I am recording, please be sure to speak up so that 1 won't miss any of your comments. All responses will be kept confidential. This means that your Interview responses will only be used for research purpose and I will ensure that any information I include in my report does not identify you as the respondent. Remember, you don't have to talk about anything you don't want to and you may end the interview at any time if you think you can't continue. Do you have any questions about what I have just explained? Are you willing to participate in this interview?
Opportunity for questions	

Questions	1. How do you think Assistive technology can be used to promote inclusiveness in the classroom? 2. With your experience, can you give a typical example of how you have used AT in the classroom regarding inclusiveness? 3. Explain the feeling a learner have in the classroom while using assistive technology to teach? 4. What learning difficulties do you think assistive technology can be used to solve among children with disabilities? 5. Can you give instances and the type of AT that can be used to solve the difficulties? 6. What do you understand by independent learning? 7. Do you think AT can be used to facilitate independent learning, If yes, how? 8. In what way will AT improve the learning of a learner, and what skills can a child develop using AT? 9. Is there any peculiar challenges or constraint of using AT you would like to discuss.
Closing Key Components: Additional comments Next steps Thank you	 Is there anything more you would like to add? I'll be analyzing the information you gave me. I'll be happy to send you a copy, if you are interested. Thank you for your time.

Appendix B Consent Letter

Dear Participant,

My name is Ayantoye Seye Kenith, and I am master's student at the University of Gothenburg, Sweden. Kindly take your time to read this authorization document before deciding to take part in this research.

Title: Role Of Assistive Technology In Enhancing Participation Of Children With Disabilities In Basic Education In Nigeria

Introduction: You are being contacted to participate in research titled "Role of Assistive Technology in Enhancing Participation of Children with Disabilities in Basic Education in Nigeria". The study will explore special education teachers' perspectives on how assistive technology can be used to facilitate inclusive learning, promote independent learning and solve learning disabilities. This research will be carried out by interviewing special education teachers with cognate five years' experience. This letter elucidates why the researcher is conducting the study and how the research will be done.

Procedures: Semi-structured interviews with research participants will be used to gather the data. This is to gain insight into teachers' perspectives on the role of assistive technology. The duration of the interviews will be for forty minutes, and it will be done with zoom.

Compensation: Although we are unable to pay you for your time, your contributions will be highly welcomed in helping to close the knowledge gap in this field.

Confidentiality: Your personal information will remain private. Your names will be changed to pseudonyms in the study. Additionally, audio recordings of interviews will be kept in a secure location protected from disclosure, and they will be removed once the research is over and the data have been processed.

Voluntary Participation: It is entirely up to you whether or not to take part in this study. Absence from participation carries no consequences. You may also choose not to respond to any of the questions if you have no answer for them. Also You have the freedom to leave the study whenever you choose without facing any repercussions.

Incase of further clarification, you may contact me **:** Ayantoye seye , (seyeken@gmail.com)

I have read through the above-mentioned protocol. I have been given a copy of this description and the questions for the interview that are attached, and I willingly accept to take part in the research.

Thank you.

Participant: _____ Date:_____

Researcher: _____ Date: _____