Online Learning For Inclusion Of Students With Neuro-Developmental Disorders: Teachers’ Use Of Strategies

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Abstract
The purpose of inclusive education is to raise the educational quality of all students. It suggests that schools’ teaching and learning processes need to be adapted to accommodate all learners regardless of their unique needs. Reducing educational inequity through inclusive practices is intended to ensure that all students achieve academic success. The unique demands placed on teachers by students with neurodevelopmental disorders (NDDs) present a significant challenge, particularly when these students are placed. This challenge is exacerbated by the need to use online and blended learning approaches in teaching at all levels of education. This study investigated the online learning support measures employed by secondary school instructors in Enugu State, Nigeria, to accommodate students with NDDs. The current state of the art regarding teachers’ perspectives on the use of online teaching for students who have NDDs was also investigated using a descriptive survey design. 89 in-service teachers from Inclusive and special schools in the study area were selected using a random sample technique. The data collection instrument was a questionnaire developed from the pertinent literature. The vast majority of teachers did not implement online learning platforms to support kids with neuro-developmental disabilities. Teachers need training on online teaching support for students with NDDs. Teachers are largely unaware of the ways they can use online platforms to assist students with NDDs. Most teachers lack of online teaching infrastructure as obstacle to implementing online learning for students with NDDS. Teachers require support to carry students with NDDs.

Key words: Inclusion, Neuro-developmental Disorders, Online Learning, Students, Teachers

Introduction
With COVID-19’s social restrictions, the use of innovative digital technologies in education has exploded. The integration of technological devices and online learning platforms has enabled educators to enhance the learning of students. It is becoming increasingly common for online education and web-based instruction to replace traditional classroom instruction and learning (Dhawan, 2020; Khalil, et al., 2020). The term is synonymous with distance education, which encompasses correspondence courses, educational television, and videoconferencing. Today, online learning makes extensive use of a wide range of Web
resources, such as multimedia and Web-based applications, collaborative technologies, and technological aids. There are many types of educational assistance offered by online education (Barua, et al., 2022). The project includes machine-learning-assisted tools for addressing learning difficulties in students with a variety of neurodevelopmental disorders (NDDs) (Yoro, Fourie, & Van Der Merwe, 2020).

The term "neuro-developmental disorders" (NDDs) refers to a spectrum of conditions that arise from abnormal brain development (Snowling, Hulme, & Nation, 2020). As a result of delayed brain function, students with NDDs may have difficulties with cognition, communication, behavior, and/or motor skills (Morris-Rosendahl, & Crocq, 2020). The American Psychiatric Association (APA) defines neuro-developmental disorders as those that result from a breakdown in the brain-behavior connection. These disorders are defined by lifelong developmental deficits (DSM-5, 2013) that begin during a child's early developmental years and persist throughout life (Le Roux & Fourie, 2017). In accordance with the DSM-5, 2013, NDDs include attention deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), communication disorder, motor disorder, specific learning disorder, and intellectual disorder.

Students with NDDs, including students who have pervasive cognitive impairments and those with specific learning disabilities, present teachers with a variety of challenges including disruptive behavior, excessive workload, inability to complete learning objectives, and poor academic performance (Fouche, Strydom, & Roestenburg, 2021). It is challenging to teach a student diagnosed with NDD because the student requires continual attention until he or she reaches a level of independence (Robinson, Shelton & Malow, 2016). NDDs present challenges owing to the need for adequate support in order to meet the diverse learning needs of students (Nketsia & Saloviita, 2013). According to studies (Eloff & Kgwete 2007; Phasha, Mahlo & Maseko 2013), teachers are lacking the necessary knowledge and skills to accommodate and support students who face learning barriers in the classroom. The study examined the experiences of teachers as well as the support strategies used to accommodate and support students with NDDs, concerning the potential difficulties teachers may encounter when teaching students with NDDs in inclusive settings.

Implementing inclusive education is dependent on teachers' instructional methods and their approach to accommodating all students in the mainstream classroom. Using inclusive teaching strategies is essential to inclusive education (Florian & Black Hawkins, 2011; Florian, Rouse, & Black Hawkins, 2011). Providing inclusive education promotes full participation and equality by assisting learners with disabilities who come from disadvantaged backgrounds, thus allowing them to participate in the educational system (Florian, Rouse, & Black Hawkins, 2011). As a result, inclusive education serves as a catalyst for change, a democratic method for recognizing and comprehending values that embrace human diversity (Swart & Pettipher, 2005). Schools with an inclusive philosophy must welcome students who are new to the mainstream school system and must strive to create an environment that is welcoming to all students regardless of their ability differences (Maguvhe, 2021). A comprehensive approach to education emphasizes all subject areas and requires teachers to identify, accommodate, and support children's varied levels of achievement (Makoelle, 2016). An inclusive education recognizes that all children are capable of learning and that they require support to succeed. The assistance consists of
adjusting and restructuring school structures, instructional methods, and strategies in order to address and accommodate learners' differing learning needs (South Africa Department of Education, 2001). Additionally, providing support involves using a variety of teaching methods, modifying the curriculum, as well as adapting the classroom environment to meet the diverse needs of students. One major way to include learners with disabilities is through the use of online learning facilities to augment teaching-learning (Yazcayir, & Gurgur, 2021; Chambers, Varoglu, & Kasinskaite-Buddeberg, 2016).

Even in remote areas and in developing countries, like Nigeria, online teaching and learning is gaining popularity. With the Internet, education and technology have been merged together, allowing experts to study and promote the benefits of online learning to both instructors and students. With the proliferation of online learning and technology-based instruction, research studies have investigated the effectiveness of these methods. The majority of studies have demonstrated great success with regard to achievement (Torun, 2020), motivation (Esra, & Sevilen, 2021), self-regulation (Pelikan, et al., 2021; Wandler, & Imbriale, 2017), and general skill development. A study conducted by Erguvan, (2014) found that instructors had positive views toward ICT tools. Based on the results of the study, instructors noted that ICT motivates students and provides variety in the classroom.

Lindner, Alnahdi, Wahl, and Schwab (2019) discovered that the new online invention provides educators with a variety of options for implementing differentiated instruction (also called customized instruction) to meet learning objectives. Teachers in inclusive and special Education tend to struggle to keep their students motivated and engaged in an activity, but computer assisted language learning opens up new avenues for assistance. Online learning energizes students (Cerna, Rutigliano, & Mezzanotte, 2020) and has a number of advantages, including lower long-term costs, increased access to multiple sources of information, interaction opportunities, and personalization of the teaching process (Yazcayir, & Gurgur, 2021).

What is most intriguing is that resources such as authentic materials such as graphics and animations, posting and responding to messages, and writing and responding to emails are no longer constrained by time and space. Instead, learners can collaborate and communicate whenever and wherever they like. With online education, a variety of learning styles can be accommodated and lasting results can be achieved. Further, previous research has demonstrated that online instruction can be just as effective as face-to-face instruction (Jansem, 2021; Gacs, Goertler, & Spasova, 2020; Moser, Wei, & Brenner, 2021). A recent study indicates that online learning incorporates assistive technologies that are important for effective inclusion (Subramaniam, Oxley, & Kodama, 2013). A child with neurodevelopmental disorders requires assistive technology for augmenting, maintaining, or improving their functional abilities due to neurodevelopmental disorders (Subramaniam, et al., 2013).

Adaptive technology may take the form of hardware, software, or web-based resources, and may consist of touch-screen technologies, large-screen monitors, optical scanners, light boxes, specialized keyboards, headsets with microphones, screen readers, speech-to-text converters, and browser extensions with access to magnification or talking dictionaries (Burgstahler 2011; Cummings 2011). Among the low-tech items used in online education are dry-erase boards, laminated photos and albums, and three-ring binders (Ennis-
Cole, & Smith, 2011). Hopkins (2006) argues that, in addition to providing access for students with disabilities, assistive technology is inherently inclusive and provides options for all students.

Students with disabilities prefer electronic books, audio books, talking books, graphic novels, MP3 files and other digital media, Playaway, large print, DVDs, closed-captioned movies, streaming videos, podcasts, and Braille (Copeland 2011). Therefore, it is evident that online learning is incorporated into assistive technology and can be differentiated to meet the needs of each individual learner. There are however very few secondary schools in Nigeria with libraries equipped with digital resources or technology-based materials, which poses a threat to inclusive education. Further, there is no empirical evidence that teachers in inclusive and special education schools use online strategies. Additionally, it is unclear how secondary school instructors feel about accommodating students with NDDs in online learning. This study examined how secondary school instructors in Enugu State, Nigeria, accommodate students with NDDs through the use of online learning support measures. I also analyzed the state of the art as it pertains to teachers’ perspectives on the use of online instruction for students with NDDs.

**Objectives of the Study**
This study sought to investigate:
1. How secondary school teachers’ accommodate students with NDDs through the use of online learning support measures.
2. The teachers' perspectives on the use of online instruction for students with NDDs.

**Method**
The study utilized a descriptive survey research design, with quantitative approach. With this method, the researcher was able to collect data systematically on the characteristics of the teachers and their use of online learning modality for teaching students with NDDs. Ethical approval was collected from the Faculty of Education Research Ethic Committee, University of Nigeria before conducting this study. Data were collected from 89 teachers, randomly drawn from three government-owned secondary inclusive schools and two special primary and secondary schools in Enugu state, Nigeria. Majority of the teachers [78 (87.5%)] were females while Smaller proportion [11 (12.5%)] were males. Teachers teaching in inclusive schools were more [ 67(75.2%)] than those on special schools 22[(24.8%)].

**Data collection and Analysis**
A yes of no questionnaire was used to generate data pertaining to teachers’ practices and preference to online inclusive practices. The questionnaire was face validated by thress experts and their suggestions were built into the instrument. Adoption of online teaching, Previous training in online, the perceived level of difficulty of online teaching, teachers’ attitudes toward the adoption of online teaching, School limitations in regard to online teaching. Data were collected from the 17th of January to the 28th of February, 2022. Data were analyzed using percentages, mean and standard deviation. Data were coded and analyzed in SPSS software version 24.
Results and Discussion

Figure 1: Teachers' Implementation of Online Teaching

Figure 1 illustrates the results of a survey of educational institutions on the status of online teaching. The survey discovered that 22% of the teachers have been implementing online teaching. The majority of the teachers who participated in the study (78%) have not implemented online teaching for inclusion of learners with NDDs. This means that online teaching and learning is rarely implemented for inclusion of students with NDDs (See Figure 1). When asked to specify the online teaching that they adopt, teachers stated sharing worksheets on WhatsApp and monitoring homework feedback through phone calls and video calls, and sending audio and video clips.

Figure 2: Teachers' Training on Online Teaching

Data expressing the training of teachers on online teaching are presented in figure 1. The figure shows that 51 (57%) of the teachers have received training in one occasion or the other.
on the use of online teaching. When teachers were asked to specify training, they stated trainings on online teaching and evaluation, or building online platforms into teaching-learning activities, and blended learning.

![Fig. 3: Constraints to the implementation of online learning for Students with NDDs](image)

Data in Table 3 indicate some constraints to the implementation of online learning for students with NDDs. The highest constraints identified by the teachers were poor support from the parents, and poor access to online researches, which were agreed by 91 and 90 percent of the teachers respectively. Poor infrastructure for online teaching was another constraint rated by 77(87%) of the participants. Other constraints are poor network and/or no digital aid as pointed by 71(78%) of the teachers; lack of Training on the use of online teaching, which was identified by 67 (75%) of the teachers; poor skills/expertise, which was identified by 60 (67%) of the teachers; Lack of financial support was also agreed to by 53 (59%) of the teachers who participated in the study.
In the figure 4, all the teachers (100%) submitted that they need online teaching resources, 91% need more training on the use of online teaching; 90% need funding for resources and personal computers; 93% needed parents support and 93% needed stable electricity, 82% of the teachers need free internet access through stable network. These indicate that teachers need upskilling and external supports in order to implement online learning for students with NDDs.

Discussion
The present investigated the online learning support measures employed by secondary school instructors in Enugu State, Nigeria, to accommodate students with NDDs. Specifically, the study sought to find out teachers' implementation of online teaching for supporting Students with NDDs, teachers' training on online teaching for supporting Students with NDDs, constraints to the implementation of online learning for students with NDDS; and support needed by teachers to implement online learning for supporting Students with NDDs. In particular, the results revealed that, when it comes to implementation, the vast majority of teachers who responded to the survey did not use online learning platforms to support kids with neurodevelopmental disabilities. In the survey, only 22% of teachers reported using online teaching techniques to support their students. Only 8% of the teachers surveyed
indicated that they did not use online learning resources. According to the study, 22 percent of the teachers employed whatsapp calls and audio and video clips as online teaching tools. It is possible that this is due in part to the fact that Whatsapp is the most widely used online platform that is accessible by both instructors and parents, and requires less technical skill.

The findings of this study are consistent with those of others who have stressed the importance of diversifying distance education resources and content in light of students' characteristics (Mustafa, 2020; Zhou et al., 2020). The conclusion also corroborates findings from the study that most school teachers in the study area did not provide support education services, which are critical for the educational success of children with disabilities. Inclusion and special education services are intended to benefit students with disabilities, including those with NDDs, during and after school hours through a tailored education based on the equity and inclusion principle (Mo NE, 2012). Having the assistance of their families and teachers, these young people must continue their education online at home (Yazcayir, & Gurgur, 2021). Online instruction could be enhanced by teacher guidance and follow-up (Yoro et al., 2020). Consequently, the low number of teachers who use online teaching to support students with NDDs suggests that the majority of teachers do not assist students with NDDs in their home learning.

Regarding teacher training on online teaching support for students with NDDs, 43% of teachers are largely unaware of the numerous ways they can use online platforms to assist students with NDDs. 57% of teachers have received training on online teaching. Participants who were asked about their prior training said that they had only received rudimentary training on the use. The findings of this study corroborate those of (Woodcock, Sisco, & Eady, 2015), who found that teachers trained in the use of online learning are more likely to use e-learning approaches that demonstrate subject matter competency and information communication technology skills. Researchers discovered that teachers' ability to study and apply e-learning for students is also influenced by four hierarchical conditions: (a) ease of use, (b) psychological safety, (c) e-learning self efficacy, and (d) competency (Woodcock, Sisco, & Eady, 2015). Online teachers acquire most of their training while teaching online, according to Zweig and Stafford (2016).

Most teachers identified a lack of online teaching infrastructure as a significant obstacle to implementing online learning for students with NDDS, which was cited as a barrier by 77 out of 87 participants. Additional obstacles include a lack of network and/or digital assistance, as identified by 71 (78 percent) of instructors; a lack of training on online teaching, as reported by 67 (75 percent) of teachers; and a lack of skills/expertise, as reported by 60 (67 percent) of instructors. The study conducted by Hayes et al. (2017) found that a significant portion of principals and teachers surveyed (approximately 66.3%) experienced "difficulty in ensuring the quality of web-based learning" as the most frequently selected difficulty associated with the adoption of online teaching. Another challenge is an "underdeveloped information infrastructure" (48.9 percent), "tight schedules and excessive workloads" (43.5 percent), as well as "a lack of advice and training" (43.5 percent) (38 percent). In another survey, Zweig and Stafford (2016) noted that the most frequently identified problems related to fostering student engagement and perseverance. This study
indicates that online teachers may require additional training in a number of areas in order to provide the best possible assistance to their students online.

As to the support that teachers require to carry students with NDDs, all teachers (100%) indicated they require online teaching resources, 91 percent require additional training on the use of online tools, 90 percent need funding for resources and personal computers, 93 percent need parental support, and 82 percent require free internet access via a stable network. In order to successfully implement online learning for students with NDDs, teachers require professional development and external support. According to a separate study, teachers had the greatest need for support in general information technology literacy, online teaching abilities, online teaching resources, and home-school collaboration. Over 89 percent of teachers questioned said that all things in these four categories were necessary. In more detail, "access to successful cases of online teaching" (96.5 percent) and "access to online curriculum resources" (96.1 percent) - both of which are classified as online teaching resources - were deemed necessary by approximately 69.9 percent of teachers, showing that the need for psychological support is significantly lower than the other categories. As reported by Yoro et al. (2020), teachers use a variety of support strategies to assist learners, including cooperative learning, peer learning, ability grouping, and comprehensive visual aids. In other words, teachers require assistance when it comes to assisting students with NDDs through online teaching-learning modalities, even after they have completed face-to-face instruction.

Conclusion
This study concludes that there is poor implementation of online learning platforms to support learners with neurodevelopmental disabilities. Teachers need training on online teaching support for students with NDDs. Teachers lack skills and are unaware of the numerous ways they can use online platforms to assist students with NDDs. There is lack of online teaching infrastructure for online learning, and such constitute obstacle to implementing online learning for students with NDDS. Teachers require to support to carry students with NDDs along in online learning. Other requirements for learning are online teaching resources, additional training on the use of online tools, funding for resources and personal computers, parental support, and free internet access via a stable network.

Implications for Inclusive Education Practice
The outcomes of this study have implications for teachers, parents, the policy makers and the Government. In the current paradigm of teaching, inclusive education is gradually forming a general philosophy of education delivery. For the teacher who wishes to include students with NDDs, the use of online platforms can assist in individualized programs and feedback from home. It enables the teachers to collaborate with the parents to monitor the students’ progress, and assist their weaknesses. The outcome of this study will imply building in online learning into inclusive and special education. So, curriculum developers, through the outcome of the present study can develop diverse frameworks for implementing online learning in inclusive and special schools. Legislation should be put in place to oblige in-service teachers to use online learning tools to support students with neuro-developmental disorders. More theoretical underpinnings are required to enhance online teaching for students with NDDs.
References


