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Disabled Students' Inclusiveness on E-learning Platforms

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Abstract– This study aims at highlighting the existing issues of inclusiveness in educational sector and the inclusiveness of disabled students on e-learning platforms in Nigeria. As e-learning witness significant acceptance during Covid-19 period and beyond, there still exist a divide between the able and disabled students in the use of e-learning platforms. Platforms such as Blackboard, Moodle, Google classroom, Zoom, Microsoft teams and WhatsApp are highlighted. While disabilities such as autistic spectrum, visual impairment, hearing impairment, mental health and mobility difficulties are discussed, assistive technologies such as screen magnifier, screen reader, screen keyboard and speech recognition are shown to be significant for inclusiveness when it comes to disability.

Keywords: *E-Learning, Inclusive education, Disabled students, Online platforms*

I. INTRODUCTION

Students can study entirely online or a combination of online and face-to-face learning through e-learning. Learning management systems (LMS) such as blackboards and Moodle are used [1]. Some less specialized social media networks such as WhatsApp, Telegram, Zoom, and Facebook can also be used. There exist variances in how schools and other educators approached online instruction. Many students have been able to enjoy a peer-learning environment outside of the classroom due to platforms such as Google Classrooms, Zoom, and Whatsapp [2]. Today, we live in an era of Information Technology, an era in which education is enriched by innovative development in the educational system. Education is the most effective way to give everyone a fair chance to go to school, learn and develop needed skills to thrive in the society. Inclusive education means involving all students in the same classrooms, the same schools, learning opportunities for groups who are traditionally excluded – not only students with disabilities, but speakers of minority languages too [3].

Inclusive systems value the unique contributions students of all backgrounds bring to the classroom and allow diverse groups to grow side by side, to the benefit of all experience [1]. It is highly commendable when students with disabilities have equal access to quality education where they can learn to be optimally functional in the education system. According to [4], Over 29 million people could be said to have disability issue in Nigeria. In several higher institutional settings in Nigeria, students with disabilities are educated alongside other regular students. Thus, e-learning is said to be an essential factor in carrying out learning activities with ease within various departments of different Institutions.

E-learning is a web-based learning ecosystem that brings together stakeholders, with the aid of technology and

processes. The popularization and expansion of access to the World Wide Web and greater access to devices to access the Internet, such as smartphones, laptops, tablets, and computers, learning using e-learning practices has expanded rapidly all over the world [5]. According to [6] the total population of the world is put at seven billion. An estimated 15 percent of the population lives with disability. Disabled students studying in higher institutions could encounter difficulties accessing learning resources when e-learning systems is involved.

According to [7], the world is now striving for free, equitable, and high-quality education for all people, starting with basic school, post basic school, and finally higher institution. Many countries, including Nigeria, have accepted these aims. This therefore entails, provision of good environment that accommodates impaired students, especially those in higher education. However, the guidelines are implemented differently in different countries and by different institutions [8]. In educational system, students with disability or special care needs are to be provided with same opportunities as those without disability in the e-learning environment. According to [4], about twenty-nine million of the one hundred and ninety-five million population in Nigeria were living with disability. According to [4] people with disabilities lack access to basic services and this represents a major impediment to their socioeconomic and educational inclusion. This calls for the educational system, most especially in Nigeria, to take an initiative approach towards the enabling of inclusivity and equality for all students. Disabled students have varying needs when accessing e-learning platforms. As disability is an individual experience and two people with the same disability can have different experiences. Therefore, it is necessary to consider and incorporate the common needs of disabled students when selecting an e-learning platform for teaching in the university system. All efforts to build inclusive e-learning platforms are further strengthened with the participation of disabled students through their personalized perspectives as will be expressed in this study. Given this, e-learning accessibility for all students should be a priority for universities in Nigeria. Students with disabilities are excluded in terms of consideration when selecting an e-learning platform as a learning environment to teach students in the Nigerian university system. Previous research has focused on inclusion for the disabled students in the traditional learning environment and the impacts of government towards enhancing inclusive education for the disabled students. Fewer studies have examined the inclusiveness of the disabled students in the e-learning

environment and the e-learning platforms that promotes inclusiveness in the e-learning environment. E-learning platforms used by lecturers at the University of Ilorin are not fully utilized to accommodate disabled students. Students

with disabilities are to be included in the learning environment where they can have accessibility to their lecture materials and classes on e-learning platforms without any iota of exclusion. This paper tries to shade more light concerning students with disabilities on the accessibility and use of e-learning platforms which forms their e-learning inclusiveness.

II. E-LEARNING

E-learning is abbreviation for "electronic learning." As the term implies, electronic learning entails using electronic devices or technology to obtain instructional content outside typical classroom context, most a times, delivery is via internet. Present day situation, it refers to an entirely online course, program, or degree. The teacher or tutor, the learner, and the technology used to promote learning are all focused on e-learning [9].

According to [10], E-learning can be categorized into four main definitions, firstly, E-learning as the use of technology to deliver learning and training programs. Secondly, E-learning as the delivery of a learning, training, or educational program by electronic means. Thirdly, E-learning as learning facilitated using digital tools and content that involves some form of interactivity, lastly, E-learning as information and communication technologies used to support students to improve their learning. E-learning is an innovative web-based system that uses digital technologies and other forms of educational materials whose primary goal is to provide students with personalized, learner-centered, open, enjoyable, and interactive learning environment supporting and enhancing the learning process [11].

As [12] explained, e-learning uses network technologies to create, deliver, and facilitate learning anytime and anywhere. E-learning is the use of Information Technology to convey information and knowledge for the purpose of educating and training; it has emerged as a modern education paradigm. E-learning includes the use of the internet to gain access to information and expertise regardless of time or location [13]. Indeed, E-learning in Nigerian higher institutions has recently continued to rise at an unprecedented rate, despite numerous hurdles though experiencing poor ICT infrastructure. Advances in communication and computer technologies have resulted in the augmentation and near-phase-out of traditional educational delivery systems. In many countries around the world, these new technologies provide for greater learning flexibility and educational reach [12]. Due to very high primary cost of infrastructural development and to increase public access to internet and other ICTs, the developing countries are still far behind from getting full benefits of E-learning. The cost of a personal computer (PC) and Laptop are still very high in Nigeria considering the income level of an average worker in the country, most of the student have no computer education background, hence they are afraid of operating one, some go to the extent of hiring expert at a cost to fill their admission, registration and other documents meant for them to fill online. However, the very few who have access to the computer do not know how to maximize its usage. Nigerian higher institutions, on the other hand, are lagging in terms of technology adoption, with an exceedingly low rate of E-learning because of low rate of usage.

III. ONLINE LEARNING PLATFORMS

An online learning platform is an information system that provides a safe learning environment for learners to participate in an online or virtual class.

This is an LMS solution that offers an adaptable learning environment that is suitable for both academic and business development purposes. As a learning platform, it provides a range of social and blended learning features that can make any type of training engaging. It fits well for the requirements of educational institutes, public administrations, educators, trainers, and instructional designers [14]. Blackboard for example, aims at providing platform accessible to learners and tutor or facilitators for easy access to their online materials and courses.

Moodle is acronym for modular object-oriented dynamic learning environment. It is an open-source learning management platform, free for users. It includes the drag and drop features and useful resources that can help users. The platform uses more than 95 languages and powers learning environments worldwide [14]. Moodle's accessibility is expected on most assistive technology, at least at the HTML (Hyper Text Markup Language) code level.

Google Classroom is a free blended learning platform developed by Google for schools and aim to give simplicity to online learning. It is a learning management system which have been popular over the past decade, it is simple and very easy to use and seamless setup. It helps users to communicate effectively and efficiently, it is cost effective [15].

Zoom became the choice for meetings and webinars because of its ease, memory space and functionality. It is a video conferencing tool for online classes. It requires the use of passcode to partake in real time lectures. Hereby, providing a secure learning environment for safe interactions between students and teachers.

Classrooms are true team environment where students and instructors can exchange thoughts and ideas. Microsoft teams allows students work together to exchange videos, assignments and engage in chat conversations [16].

While a learning management system can be seen as common software application for tracking online learning activities, it is important to integrate social media platforms, including chat platforms such as WhatsApp. The instructor can use WhatsApp for one - on - one text exchanges to address individual students' expectations and needs. Students can contact instructor directly. Regardless of time, physical distance or working hour.

Zoom, Microsoft teams, Moodle, Google classroom, WhatsApp and similar platforms are often used by universities, but their accessibility features vary widely and not all of them have features to assist students with disabilities. Platforms, such as Microsoft Teams and Google meets, use automatic captions, but the accuracy is not hundred percent [17].

In the online platforms, the challenges of the hearing impaired can be greater. They might not be able to hear what the lecturer is saying - audio is distorted through technology. Other challenges include absence of closed captions or subtitles, not being able to quickly check with a peer what was said, and not having manual or electronic notes immediately available to them [18].

IV. DISABILITY

Disability refers to some physical or mental impairment to an individual which prevents them from carrying out their normal activities. Physical impairments may affect the senses such as sight, hearing and movement. Disability affects the way students' study and, in some cases, require special technology known as assistive or adaptive technologies to access information on the web [19]. Depending on the disability, individuals will need personalized information in specific formats. Just like the digital divide where there is a wide gap between those who have and can use information and communication technology (ICT) and those with very limited or no access, there exist also, a disability divide. Disability divide is that divide caused by ICT inaccessibility to people with disabilities compared to able-bodied people [20]. Although there are special technologies (assistive technologies) that enable disabled people to access learning content online, some of these systems are still inaccessible to some disabled individuals. This cuts them away from others, resulting in a divide which places disabled people at a disadvantageous position. In many developing countries such as Nigeria, people with some common forms of disability such as visual impairments, still lack appropriate assistive technologies e.g., screen readers, magnifiers to access online content.

The number of people with impairments could witness an increment, with a growing number of impaired students enrolling in higher education each year. There are so many different types of disability though, this paper will highlight the common disabilities that could be seen within our campuses in Nigeria.

A. Autistic Spectrum Disorder

The term "autistic spectrum disorder" refers to a group of conditions that includes autism and Asperger Syndrome. This chronic developmental condition affects the manner an individual interacts and communicates with others, as well as a variety of repeated behaviors and interests. Individuals having such diseases experience difficulties understanding written and spoken language. Social interaction difficulties manifest in making friends and interacting with other people.

B. Visual Impairment

A person's ability to perceive information is affected by visual impairment. To read lecture notes, students with visual impairments, especially severe impairments, frequently require some type of assistive technology. When websites or e-learning systems are not developed with accessibility in mind, this group of people are frequently disadvantaged.

C. Mental Health Difficulties

Mild depression to acute schizophrenia is example of mental illnesses. Psychosis, anxiety (including panic attacks), attention deficit disorder, obsessive compulsive disorder, self-harm, and eating disorders are some of the more frequent mental health problems (such as anorexia nervosa, bulimia nervosa and binge eating disorder). Agoraphobics avoid crowds and consequently public venues, so personalizing of services online would be beneficial to them. Accessibility and usability principles must be followed when creating websites for individuals with disabilities to include them.

D. Mobility Difficulties

Mobility and dexterity difficulties which could also be referred to as physical impairments may be acquired or congenital in origin and affect individuals in a variety of ways. Such difficulties could be characterized by problems with sitting for long periods or slow movements which in some cases could be painful, resulting from injury or amputations, arthritis, or spinal cord injury for example. Some students with mobility difficulties will need to use wheelchairs or electric scooters. Mobility difficulties are not only limited to the lower limbs, but also affect the upper limbs and this could make using the mouse and keyboard difficult for such people. Alternative input devices such as joysticks could be used. To make "reasonable adjustments", higher education institutions will need to provide tables that are accessible using wheelchairs as well as ramps, where this is needed.

E. Hearing Impairment

Hearing loss in one or both ears, which can be complete and partial, is referred to as hearing impairment. According to [21], there were approximately 278 million people worldwide with such disabilities in 2005. People with hearing impairments will have unique needs when using information and communication technologies, such as captioning for video and audio. As a result, system designers must consider the demands of such individuals when creating their designs. Through apps that improve hearing, the semantic web has the potential to provide answers to difficulties faced by people with auditory impairments. Online services for impaired students in higher education must meet certain criteria. A personalized system which recommends services to such students will need to provide mainly visual information as audio resources might be irrelevant in this case.

V. DISABILITY IN NIGERIA

According to [22], Nigeria has a population of around 19 million physically challenged persons. Because of years of societal neglect, especially their lack of access to paid job, between seventy-five and ninety per cent of them live in poverty. In the state of Oyo, the first Nigerian Federal College for Special Education was established. Since its foundation, the college has graduated many students with degrees in special education. During this time, teachers' educational curricula and higher education institutions' curricula began to include elements of special education courses [23]. With the establishment of the Department of Special Education at the University of Ibadan, the government further accelerated the appropriate functioning of special education. The University of Jos created a comparable department in 1980. Presently, there are around 105 special education schools across the country.

The Topo Industrial School for the Maladjusted, in Badagry, was the first school for the crippled in Nigeria, founded by the Roman Catholic Mission in 1875. A Reverend Father founded the Sacred Heart Hospital Lantoro in Abeokuta in 1890. Foster, a black deaf American, founded the Ibadan Mission School for the Deaf in 1960. He introduced sign language training skills for the deaf in Nigeria. Foster opened a new school for the deaf at Asata, Enugu, which was later merged with the existing special education institution for the deaf in Ogbeta by 1964. The childcare and treatment Home, School a Women's Voluntary Organization formed in 1961 [22]. The then Federal Government (Gowon, as the Head of State) declared in 1975

that Nigeria will give special education to its inhabitants. In that same year, the University of Ibadan's Special Education Unit was elevated to the status of a full department, paving the way for the establishment of other government-run special schools. The Federal Government founded the handicapped special school (Saki), blind schools (Ogbomosho and Benin), deaf schools, and other institutions in 1977 [24]. The physically challenged St. Joseph's Rehabilitation Centre was founded in 1978 in several states and municipalities. Here is Ilorin, the Kwara State School for Special Needs, Ilorin was established in the year 1974, and the Federal Government built a Centre for supportive services for the Deaf in 1990 at the Faculty of Education, University of Ilorin, to promote education for disabled people.

VI. SCHOOLS FOR THE DISABILITY

A. *Pre-Tertiary Schools*

In Nigeria there are quite several special needs school operating in various geo- location in Nigeria. The first advocacy group to fight for quality special education was made up of parents whose children were marginalized in the United States in the year 1933. According to [25], Special Education in Nigeria has a fairly short history, only becoming a public concern in 1975. Before the Government stepped in 1975, those with special needs were looked after by different religious or voluntary groups, such as the School for the Blind of Gindiri and the Wesley School for the Deaf in Lagos.

They are mainly setup to support learning for children with special needs and disabilities. To promote inclusion and give quality education to disabled students. The following schools include Royal school of therapy education, Abuja, Centre for children with special need, Abuja, Modupe Cole memorial child, Lagos, Alderstown School for the deaf, delta state, Patrick speech and language Centre, CADET Academy Abuja, Open Door Special Education Center, Anthos House Lagos, Otana Hearing Center, Center For Autism An Developmental Disability, Disability Empowerment Solution, Benny Child Care Services Outreach, Benola, Blazing Heart Autism Center, Disability Rights Advocacy Center, Zamar Institute, Child Development Therapy Services, Elsali Care Foundation, Hope House School, Maar Dec, Step One Special Care, Ri-Care Therapy, Adeyanju Taiwo Center For Children With Disabilities, Dayspring Infant And Junior School, Marigold Special Needs, Center Of Kids With Special Needs Nigeria, Comrade Dave Ofoeyeno School For Special Children, Pacific Hall Special School, The Sage School, Abdulsalam Vocational And Sign Language Training Center [26]).

B. *Nigeria Tertiary Institutions with Department or Unit for Special Needs*

These are tertiary institutions with department or unit for disabled. However, these departments or units are open to others who are willing to enroll for studies or learning. These includes: i. Fed College of Educ. (Special), Oyo ii. Federal College of Education, Pankshin (Affiliated to University of Jos, Plateau, iii. Kwara State University, Malete, Ilorin, iv. University of Calabar, Calabar, and v. University of Ibadan, Ibadan, vi. University of Uyo, vii. Bayero University, Kano [27].

VII. ASSISTIVE TECHNOLOGIES FOR DISABLED STUDENTS

Assistive technologies have provided one of the main means of including disabled students in education. When used with computers or the web, disabled students could have more access to information online. This section looks at some of the assistive technologies that have been utilized to improve impaired students' access to information. Any technology, hardware, or software used to increase, improve, or maintain the capacities of people with impairments is referred to as assistive technology [28]. Assistive technology allows persons with disabilities to complete tasks that would otherwise be difficult or impossible to complete without assistance, and it aids their academic, professional, and social integration. For students with impairments, a computer is merely one part of assistive technology. This paper highlight few of the assistive technology that could aid impairment in Nigeria.

A. *Screen Magnifiers*

Screen magnifiers are used by people with low vision to increase the size of the content displayed on the screen and to focus on certain areas of the screen. These could be used by students with vision impairments to assist them in reading online or printed learning materials. [28] looked at the designs of some screen magnifiers and identified two methods for putting them on Windows systems: driver- and system-based magnification. [29] used visual search theory concepts to design and build a screen magnifier, advising that a yellow background be used.

B. *Screen Readers*

Screen readers are used by blind persons to read text-based media. This is some form of text-to-speech software. Students with impaired vision or who are blind can utilize screen readers to know online content. Screen readers scan the description given in the properties when they come across a picture on a website. A visually impaired individual using a screen reader may be unable to interpret the description if no description is provided or if the description is incorrect.

C. *Screen Keyboards*

Physically challenged learners could use the screen keyboards instead of standard keyboard as it helps to use a pointing device or a switch to select keys on a screen keyboard. Innovation in keyboard development over the time have been made which results to the Touch Display Keyboard [30], this is an interactive touch display. It may be easier to use for people who have difficulty moving their upper limbs. To evaluate the performance and subjective ratings of a typical finger touch text entry method and a regional mistake correction approach.

D. *Speech Recognition Software*

Speech recognition software allows people with restricted mobility to use their voices instead of a mouse or keyboard to interact with computers. [31] used speech recognition to teach foreign language pronunciation and prosody in a classroom context, which has been shown to improve word recognition and reading comprehension. According to [32], a synthesized voice had 12% errors compared to 36% for a native Greek speaker, implying that speech recognition software has advanced to a high level of accuracy.

VIII. INCLUSIVE EDUCATION

Inclusive education entails recognition of the need to work towards education for all, schools or institutions that include everybody, celebrate differences, support learning, and respond to individual needs [33]. Inclusion is based on the idea that all students have equal rights to education regardless of their difference and disabilities in the general educational system. For students with disabilities to be included in the e-learning platforms. The Nigerian institutions should ensure that before a learning platform is accepted for teaching students, it must accommodate all the students regardless of their impairments, ability, and situation. Making use of inclusive learning management system that contains the accessibility features following the web content accessibility guidelines (WCAG 2.1) issued by the world wide web consortium (W3C).

IX. CONCLUSION AND RECOMMENDATIONS

Studies show that students with disabilities are faced with some challenges in accessing online learning environment at the university. Isolation could result from disconnect, since there was no provision made available for the disabled students to participate in virtual learning environment and to receive feedback instantly on E-learning platforms. To have a great inclusive learning environment, the e-Learning platforms must be accessible to possible, all students with different impairments. Poor e-learning adoption could be linked to lagging in engineering and telecommunications, however, there is huge development telecommunications in the present-day Nigeria.

- In order to achieve an all inclusive education, there following recommendations are made:
- The institution needs to consider the needs of students with disabilities before migrating to a virtual environment by making available e-learning platforms that supports the use of assistive technology for the disabled.
- Instructor or lecturer awareness program should be held by the School Management to enlighten the lecturers on the inclusiveness of students with disability in their classes.
- Developers are hereby implored not to oversight the needs of student with disabilities when developing learning platforms for students.
- There should be development of more easily accessible inclusive e-learning platforms such as blackboard which supports screen readers when in use. These platforms should be easily accessed by the students.
- Nigeria Policy Makers in collaboration with Ministry of Education should ensure that the disabled students in various institutions, most especially the government owned institutions, are not neglected in integrated setting. Ensuring that all necessary devices are put in place by the School Management for easy accessibility to the disabled students irrespective of their different impairment needs. This will promote inclusiveness and active participation of the disabled students in the virtual classes.
- The lecturers and Students should be encouraged to use the E-learning platform that supports inclusiveness, recommended by the School Management.
- The government should implore more universities to implement an inclusive learning system in their curriculum.
- Developers should be able to design an inclusive learning platform for the visually impaired students by including screen readers that reads out information to the student and describes images displayed on the screen, when developing an e-learning platform for an institution.
- The institution can create its own personalized E-learning platforms that supports flexibility for the disabled student to personalize it to suit their disability needs.
- The e-learning platforms should have communicative, and help features for easy interaction between the lecturer and the disabled student.

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