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Exploring inclusive design principles applied in a Nigerian university library

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***Abstract*—** A library is a public building with facilities and services that serve a particular community's educational and social needs. A public building is, therefore, a building that must accommodate everybody at whatever age in life, regardless of anthropometric limitations. The way buildings are used changes because of the needs of aging people and people with disabilities. As such, designing for the majority implies designing for people with varying abilities and disabilities. The methodology through which this study was carried out is based on primary and secondary sources of information. The primary source is a field investigation that includes observing physical traces through a case study.
In contrast, the secondary source involves searching encyclopaedias, websites, books, and journals relevant to the study. Findings suggest that disabled people find it difficult to gain access to the library and operate freely without assistance in many public buildings in Nigeria. Therefore, this study efficiently assesses the design considerations for physically challenged people with physical disabilities in public buildings. Insight into design considerations to alleviate this accessibility challenge for people with disabilities is recommended for consideration in any library design.
Keywords: Accessibility in public libraries, Design considerations, Inclusive design, Physically challenged, University library

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I. INTRODUCTION

A LIBRARY is crucial for gathering, organising, preserving, and making knowledge and information accessible (Ari, 2017). It is not just a structure but also holds valuable social, cultural, ecological, environmental, and geographic documents that can be transmitted to future generations (Amiri, 2013). The library plays a vital role in achieving the set objectives of an educational institution, as it is the basis of all teaching and study and an essential condition for research (Ari, 2017).

According to Hotsonyame (2023), the library's fundamental tenet is to promote learning, serving as both a location for learning and a storage and use of educational resources. Libraries have evolved from storing and retrieving information to using audio and visual aids, non-book, and paperless information (Ike et al., 2007). They have created various library types, from national to private, to meet the diverse needs of the public. Each library's content is chosen to suit best the needs of a particular user or group of users (Awotola & Olowolagba, 2018; Uwandu & Okere, 2022).

The environment in which people live, including their homes and modes of transportation, significantly impacts their living conditions and quality of life (Iamtrakul et al., 2023). As the World Health Organisation (WHO) figures show, 10% of the world's population has a specific challenge or disability, making it difficult or impossible for them to participate in daily life (WHO, 2023). Social integration is a significant issue in cultures that respect individual freedoms and encourage openness and solidarity (WHO, 2023).

There is still more work to be done to create an environment that is accessible to everyone, encourages choice in lifestyle at work, school, and leisure, and prevents the marginalisation and isolation of a growing number of people. Granting those with special needs their rightful use of the entire built environment will significantly improve the general public's comfort and safety. A total shift in mindset is required for impairments to be appropriately acknowledged and incorporated into building and urban planning (Ubani et al., 2020). This study aims to provide equal access to the library for all types of students.

II. LITERATURE REVIEW

Disability history: An account of 'otherness'

How society constructs our bodies shapes our history and future, rather than the bodies themselves or their stories (Clapton & Fitzgerald, 1996a). For centuries, body differences have determined social structures by defining certain bodies as the norm and those outside the norm as 'Other'. Isolation and abuse are likely features of life outside of the human paradigm, and the narrative documented about the lives of individuals with disabilities is one of marginalisation (Clapton & Fitzgerald, 1996a). Most of the history of people with disabilities is one of silence, with the lives of people with disabilities often being ostracised even by those who are themselves marginalised (Anokwuru, 2023).

The history of disability in the West has erased models of inclusion, such as those among the Maori in Aotearoa, where it is implied that disability is recognised as normal (Allidina & Cunningham, 2023). The challenge for disability activists today is to rebuild a culture that values and celebrates individuality. According to the United Nations World Programme of Action concerning Disabled Persons, there are about 500 million persons with impairments in the world today, and at least one person in 10 is disabled by physical, mental, or sensory impairment (United Nations Enable, 2006). Up to 80% of disabled persons reside in remote rural parts of developing nations, where access to medical care and other relevant services is limited and impairments cannot be identified in time (Allidina & Cunningham, 2023).

According to the United Nations Declaration on the Rights of Disabled Persons (1975), all people with disabilities are entitled to all human rights, including the right to self-sufficiency, medical, psychological, and functional treatment; social security; special needs

consideration in social and economic planning; protection from exploitation; and being informed of their rights. According to Nu'uman et al. (2017), disabled people are often subjected to social, cultural, and economic barriers that impede their access to healthcare, education, vocational training, and employment. As we reach the third millennium, concern about the social and political implications of disability has grown dramatically (Clapton & Fitzgerald, 1996a).

Disabled people worldwide have faced long-term prejudice and discrimination, despite their diverse cultural backgrounds (Rohwerder, 2018). Edic (2021) asserted that they have been viewed as worthless beings cursed by the gods in numerous nations, leading to murder, torture, and euthanasia. In Europe, disabled infants were left to perish on barren hillsides, while adults and children with disabilities were dumped into rivers in China. In Europe, laws were crafted to ensure the eradication of disabled individuals, with the Spartans slaughtering disabled persons (Adaja, 2023).

The church also played a role in this destructive endeavour, with Martin Luther commanding the execution of disabled infants due to his belief they were devil's embodiments (Clapton, 1996). Under the influence of Darwinian evolution theories, English eugenicists eradicated people with disabilities, and Hitler's Nazi euthanasia programme in Germany wiped out disabled individuals. Today, some people support not treating newborns with serious disabilities, as the desires of the community's non-disabled members determine whether certain impaired persons survive or die (Fitzgerald, 1996b; Ringson, 2018).

In Africa, some guardians and parents of disabled people fear social rejection and ridicule, leading them to keep them indoors and not raise them for adulthood (Clapton, 1996; Fitzgerald, 1996b). In many cultures, intentional measures were made to end the lives of these individuals, as it was thought that they were a curse from the gods. Superstition and witchcraft practices controlled how impairment was interpreted, and those who were impacted were given various negative labels and imagery (Ringson, 2018).

According to Chukwuedo (2022), disability is defined and experienced differently in different societies, with people with disabilities often viewed as harmless and holy in some African communities. This overprotection prevented them from exercising their independence and control over their lives, even if they were protected from persecution (Alamu, 1991; Kotso, 2010). In Nigeria, around 19 million physically challenged individuals live below the poverty line due to years of societal neglect (Lawal-Solarin, 2017; Umunnakwe & Onyebinama, 2007).

Library access for people with disabilities (Past and present)

Libraries have traditionally served those without disabilities, but the need for accessible libraries and services for people with disabilities is growing as more people are integrated into society and education (Dequin, 1983; Walling, 2004; Koulikourdi, 2008). Understanding the needs and challenges disabled patrons face is crucial for public libraries to provide relevant and significant services. However, few public libraries are designed specifically for people with disabilities, indicating inadequate architectural designs.

According to Spiers (1998) and Chew & Higgins (2002), disabled individuals require access to information and have demands, interests, and intellectual capacities like their non-disabled peers. Physical limitations do not necessarily reduce mental capacities, and children with physical disabilities have similar mental and intellectual quotients to those without disabilities.

Dequin (1983) and Walling (2004) warn that while the age, needs, and interests of disabled individuals may be like those of able-bodied individuals, the disability may result in more significant physical differences. It is impossible to overlook disabilities, as doing so could negatively affect how the impaired person uses the library (Branson & Miller, 1989; Prosser et al., 2002). It is essential to provide accessible and relevant services and facilities to accommodate the diverse needs of people with disabilities.

Knowledge and perspectives of libraries and library services by the disabled

Project Bookworm, a 1993 study by the National Library of Singapore, found that people with physical disabilities were unaware of the library's resources. They often thought of libraries as places to find computers and books, and they thought library events and programmes were boring. This lack of interest, rather than unfavourable opinions, was the reason for their statement that they did not want to visit libraries.

Reading was not mentioned as a hobby by people who did not utilise libraries (Ogonu & Owate, 2023). However, their interest seemed to increase when the full range of library services and facilities was described (Itsekor & Nwokeoma, 2017). Almost half of the survey participants did not routinely use the public library due to a lack of time and motivation (Esan & Akporhonor, 2021). The main causes of their lack of enthusiasm were the inability to physically access the library, its services, and its organisational structure (Adejo, 2020). It implied that this problem may be successfully resolved by enhancing physical access.

Accessibility features

Libraries may have accessibility features, but they can typically be made better (Kiruki & Mutula, 2021). One participant, who frequently visited a specific library, appeared unaware that the library had a lift for people with disabilities (Kiruki & Mutula, 2021; Munemo & Chiwanza, 2024; Baird, 1992). No obvious indicators alerted users to the lift's existence, even though it was in the staff room. To get to the elevator, one had to pass via the staff entryway; however, signs indicated that the entrance was reserved for staff use (Molepo et al., 2024; Masenya & Ngoepe, 2025).

Another participant believed a library she wished to visit did not have ramps or a lift (Winkelstein et al., 2024). Although there was a ramp at the rear door, no signs indicated the ramp's placement at the front entry (Branson & Miller, 1989; Prosser et al., 2002). The library also had a lift with several accessible features, including extra buttons for wheelchair users to reach readily and a voice recording that indicated the levels and whether the doors were opening or shutting (Koulikourdi, 2008). However, the location was obscured by glass-panelled doors, particularly if one entered from the library's front entrance.

Having accessibility features alone cannot improve access (Accessibility in Public Libraries Research Project, 2021; Branson & Miller, 1989). Additionally, every potential environmental obstacle must be thoroughly assessed, and appropriate action must be taken to overcome each (Fitzgerald, 1996b).

III. THEORETICAL FRAMEWORK

Regarding library access for those with impairments, public libraries have mostly adopted the same theoretical framework as the public (Molepo et al., 2024). When defining the requirements for basic services, the bulk of the population was considered, leaving out certain groups and necessitating the creation of specific services for them (Babatola, 2023). This is acknowledged by the long-standing practice of creating dedicated libraries for blind people, providing home library services to people who cannot visit the library, and creating distinct library divisions for this specific demographic (Brunskill, 2020).

However, this biological-medical understanding of disability has been heavily challenged over the last twenty years (Phukubje & Ngoepe, 2016). Society has been criticised for allowing the environment surrounding the disabled to go unaddressed, and there has been insufficient awareness of the fact that the environment has a major importance for the degree to which a person will be defined as disabled.

According to the new framework, disability is the difference between what society expects of a person and their capacity to achieve those expectations. To reduce the gap, this framework pushes us to improve each person's capacity to meet environmental demands while altering those demands (Molepo et al., 2024).

In the context of public library services, this is a new way of thinking

that could be radically new **(**Babatola, 2023; Goldsmith, 2020). Based on this new foundation, we must reconsider everything we do and how we design our services in the future. In this sense, public libraries will not only fall behind the rest of society but also lose the opportunity to fulfil their mission of being libraries for everyone (Molepo et al., 2024; Babatola, 2023).

New Ways of thinking in libraries

The Norwegian Delta Centre has developed a model to help define libraries' services for those with disabilities. The model uses universal design and a framework to close the accessibility gap, positioning both regular and special libraries within the framework. This approach uses old and new library samples to ensure accessibility for all.

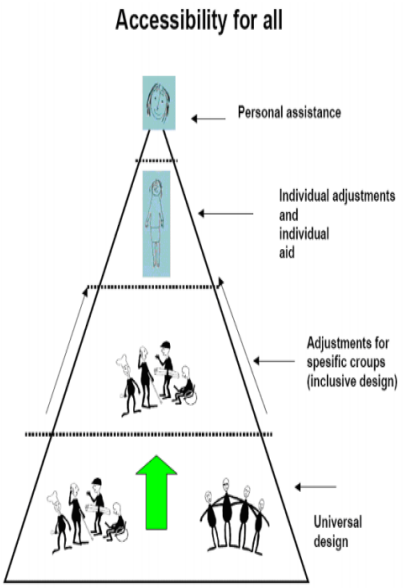

Figure 1: The accessibility triangle
Source: Norwegian delta centre

Universal Design as a Major Strategy

Universal design is a crucial aspect of the universal design approach, which aims to create settings and products that are as widely used as possible without additional customisation or inclusive design (Anyaegbu, 2010). This approach ensures that library services are accessible to all users, including those with disabilities. An accessibility guide is provided to enhance library services and remove obstacles that hinder access in the physical environment (Persson et al., 2014).

The guide allows users to explore the library's grounds and assess accessibility of shelves, signage, lighting, restrooms, door openers, elevators, and café areas, providing a foundation for creating a local accessibility action plan. This approach ensures that library services are accessible to all users, regardless of their disabilities (Nkiko et al., 2020)

Inclusive design

Adjustments for groups, or inclusive design, are included in the triangle's next section (Boden, 2023). The library must provide a universally designed library and services with specialised tools and initiatives to serve groups of people with unique needs. Once more, the next level of the triangle will require less work if these efforts are more inclusive (Persson et al., 2014).

Individual guidance

Inclusive and universal design aims to improve accessibility for the public and similar groups. However, individuals with disabilities are unique and require individual adjustments and guidance (Ramírez-Saiz et al., 2025). The physical setting and procedures for services require different levels of vision, hearing, mobility, and efficiency (Adegbola, 2012). Less skilled individuals may require assistance in modifying equipment or coaching on software used to reduce obstacles in the workplace. This ensures that individuals with disabilities are treated with respect and dignity (Erlandson, 2007).

Personal assistance

The accessibility triangle aims to cater to the needs of individuals with one-on-one assistance, such as those with complex disabilities or those in unexpected situations. Personal assistance is when a client requires a second party to act on their behalf, while guiding enables the client to perform independently (McLaughlin & Wyszewianski, 2002; Awotola et al., 2018).

Public library librarians are used to meeting specific needs, such as finding books, answering questions, and offering directions (Farooq & Manzoor, 2021). However, within the accessibility triangle, librarians must learn more about various disabilities to better understand the needs of individuals with disabilities (Adejo, 2020; Eziekwe, 2010). People with mental problems, reduced mobility, or speech loss following a stroke require a combination of traditional skills and fresh information to help them (Manwiller et al., 2023).

IV. OBJECTIVE OF THE STUDY

This study explores inclusive design principles that can be applied in a Nigerian university library.

V. METHODS

Research approach

This study utilised a qualitative research approach. The qualitative approach involves mainly exploratory research to gather and analyse non-numerical data and understand individuals' social reality (Borg, 2024). The approach here is about recording, analysing, and attempting to uncover the deeper meaning and significance of human behaviour and experience. The qualitative research approach was relevant to the study because the researchers sought to gather the experiences shared by participants in a dialogic process in their natural environment.

Research design

This study uses a case study research design, which involves researching a phenomenon by studying a single case example in depth. The permission was sought to conduct the research at the University Library Complex of Albert Ilemobade Library, Federal University of Technology, Akure, Nigeria. The researcher chose a case study research design to enable them to spend more time with the participants who were not widely scattered. More time spent with the participants enabled the researchers to build a good rapport and collect quality data.

Data collection methods

Oral semi-structured interviews

Oral semi-structured interviews enabled the researchers and the participants to engage in dialogue, allowing each party to follow up on the dialogue. Follow-ups on the dialogue enable the researchers and participants to understand each other and bring relevant and quality data to the discussion.

Observations

Observation was also used to collect data. The observation was utilised to gather information as it occurred in a setting and to study behaviours in a natural setting by observing physical traces through a case study of the existing library complex.

The secondary methods involved searching encyclopaedias, websites, books, and journals relevant to the study. The study aimed to understand the merits and demerits of the places under study.

Research site

The study was conducted at the University Library Complex of Albert Ilemobade Library, Federal University of Technology, Akure, Nigeria. Informed consent was sought from the university management to use the library complex for research. The library complex can accommodate over 2,000 readers, is located at the main academic core area of the university, and can be easily accessed from any part of the university. The research site was chosen based on convenience and accessibility.

Data analysis

Data was analysed using thematic analysis. The collected data were classified and presented in themes. Data were then analysed in line with these themes. The analysis begins with data that needs to be contextual and aims to organize meanings found in the data into patterns and, finally, themes (Lindberg et al., 2024). The qualitative data were gathered from oral semi-structured interviews and observation in preparation for thematic analysis. Data was arranged, transcribed, and then coded. By identifying uniqueness, individual interpretations, and experiences, this type of analysis helped the researchers make sense of the gathered and shared data (Byrne, 2022). The thematic analysis allowed the researcher to interpret the data and ascertain its significance.

Ethical considerations

The permission was sought to conduct the research at the University Library Complex of Albert Ilemobade Library, Federal University of Technology, Akure, Nigeria. The participants were informed of the study's objectives and their intention to involve them in the study. The participants willingly consented to participate in the study and were informed they could freely withdraw from participating at any stage. Anonymity was also brought to the attention of the participants. They were assured that their identities would remain anonymous and no suggestive statements about them would be used throughout the study. Furthermore, the participants were also informed that the data to be collected would be kept strictly confidential for the study.

VI. RESULTS

This research conducted a case study on the University Library Complex as an example and guide for realistic design. The study analysed the design's merits and demerits, aiming to instill some of these merits and improve on the demerits, focusing on a unique form that provides easy accessibility for both able and disabled individuals.

Albert Ilemobade Library, Federal University of Technology, Akure, Ondo State.

Brief history

The University Library, established in 1981, is in an ultramodern building with three floors and over 67,847 volumes of books and 1,500 journal titles. Open from 8 am to 9 pm Monday to Friday and from 9 am to 4 pm on Saturdays and Sundays. The library's second phase, completed in 2006, can accommodate over 2,000 readers and offers electronic services, e-learning support, a fully equipped postgraduate research unit, and teleconferencing services.

Location

The main library complex is located at the main academic core area of the university, and it can be easily accessed from any part of the university.

Description of the building

Architect: The building was designed by Arc. Victor Buoro (Versatile consultant, Surulere, Lagos).

The ground floor houses various units, including ICT, serial section, bindery, student cloak room, conveniences, library portal desk, reading rooms, reference room, offices, postgraduate research library, archives, and records. The first floor houses general reading rooms, acquisition units, catalogue and classification units, education/tech units, and offices. The second floor houses general reading rooms, a bibliography, conveniences, an e-library, a postgraduate reading room, a seminar room, a conference room, and the university library's office.

Plate 1: View showing Federal University of Technology, Akure Entrance Gate. (Source: Researcher's Field Work, 2025).

Plate 2: Approach view of Albert Ilemobade Library, Federal University of Technology, Akure, Ondo State.
Source: Researcher's Field Work, 2015.

Plate 3: An interior view showing the stair hall of the Albert Ilemobade Library, Federal University of Technology, Akure, Ondo State.
Source: Researcher's Field Work, 2025.

Plate 4: An interior view showing change in floor level of Albert Ilemobade Library, Federal University of Technology, Akure, Ondo State.
Source: Researcher's Field Work, 2025.

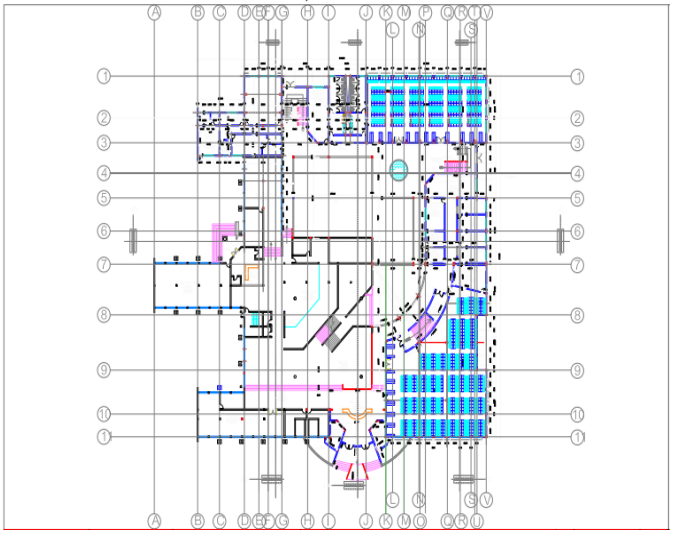

Figure 2: Showing ground floor plan of Albert Ilemobade Library, Federal University of Technology, Akure, Ondo State.
Source: Researcher's Field Work, 2025.

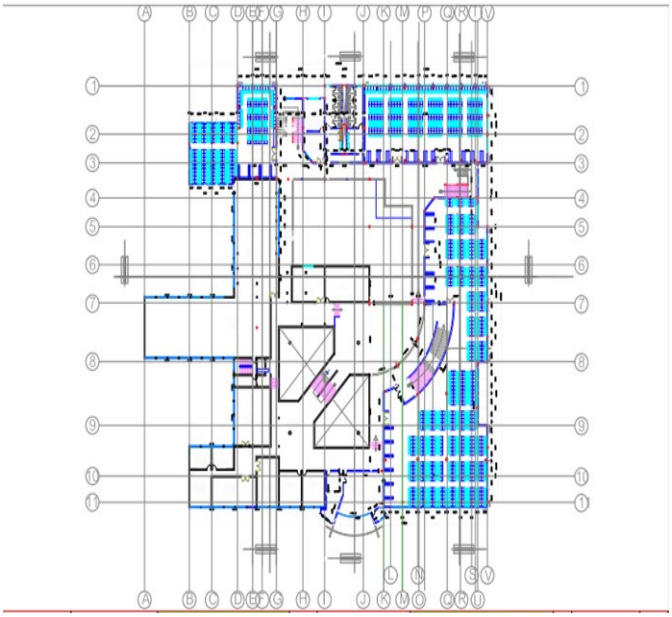

Figure 3: Showing first floor plan of Albert Ilemobade Library, Federal University of Technology, Akure, Ondo State.
Source: Researcher's Field Work, 2025.

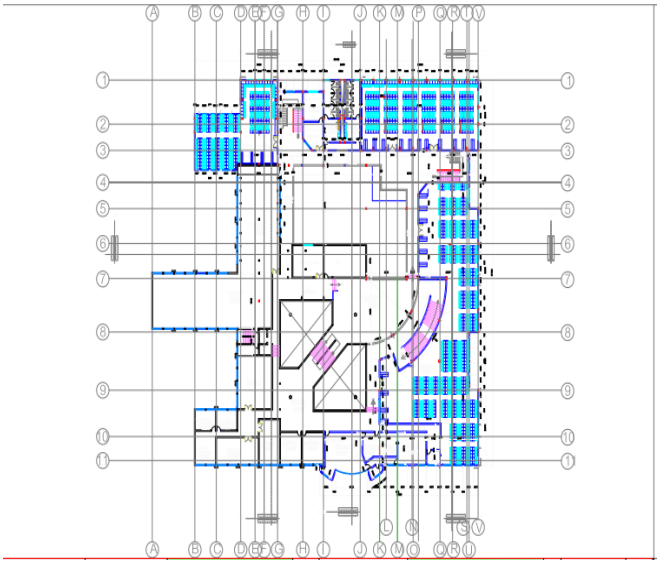

Figure 4: Showing second floor plan of Albert Ilemobade Library, Federal University of Technology, Akure, Ondo State.
Source: Researcher's Field Work, 2025

Appraisal

Merits

The library provides a ramp for physically challenged individuals, uses unique skylights in circulation desks, and uses PVC tiles in reading areas to reduce noise. Staff supervision is provided through alternative stairs, and formal seating arrangements are maintained in reading rooms.

Demerits

The building lacks vertical movement provisions for physically challenged individuals and books, and there is no accessible egress plan for emergencies. Shelves are not reachable for wheelchair users, and toilets are not wide enough for them to move around. Additionally, handles and buttons are not placed correctly for wheelchair users. There are also no shading devices to reduce sun's impact in reading rooms.

Deduction from the case study

The library should be designed to accommodate wheelchair users, with toilets, doorways, corridors, and internal circulation routes being wide enough and barrier-free for easy movement. Books should be placed within the reach of wheelchair users, and a lift and escalator should be provided for the vertical movement of books. Designing reading chairs, desks, and shelves should consider the needs of physically challenged individuals. Parking lots should be designed to allow people with mobility impairments to access the library without much walking.

Adequate consideration should be given to the design of stairs, risers, treads, and landings to accommodate people with physical disabilities. Handrails should be provided for ramps and stairs. The library should be in the campus's core academic area, along with easy access routes. The building should be a regular shape, mostly a combination of rectangles, and use a skylight system in the reading rooms. The library should be based on a modular system that can be easily expanded or modified to accommodate changes in collection format and user needs.

VII. DISCUSSION

The need to access libraries is not one that we need to contend (Itsekor & Nwokeoma, 2017; Langmead, 1970). Libraries provide us with a vast resource of knowledge, whereby a person can access books, periodicals, newspapers, journals, etc. Today, with the advent of digital libraries, collections are stored in digital formats and accessible by computers. Persons with disabilities should also have access to physical and digital libraries (Adejo, 2020). It is therefore essential to ensure physical access to the library facilities. By physical access, one would mean that any person, irrespective of the limitations of their physical abilities, can access and use all library sections independently, safely, and comfortably (Echezona et al., 2011).

According to United Nations Enable (2004), Accessibility in Public Libraries Research Project (2021), Eziekwe (2010), and based on the results of the study demonstrated through the case study, the design criteria to be considered in the inclusive design principle applied in a Nigerian University Library are as stated below:

Ramps

Ramps should be provided wherever stairs obstruct the free passage of pedestrians, mainly wheelchair users and people with mobility problems. An exterior location is preferred for ramps. Indoor ramps are not recommended because they take up much space. Ideally, the entrance to a ramp should be immediately adjacent to the stairs (United Nations Enable, 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Ramp configuration:

Ramps can have one of the following configurations:

Straight run

90^0 turns

Switch back or 180^0 turn

Width

Width varies according to use, configuration, and slope. The minimum width should be 0.90m (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Slope

The maximum recommended slope of ramps is 1:20. Steeper slopes may be allowed in special cases, depending on the length to be covered (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Landings

Ramps should have landings for resting, manoeuvring, and avoiding excessive speed. Landings should be provided every 10.00 m, at every change of direction, and the top and bottom of every ramp. The landing should have a minimum length of 1.20 m and a minimum width equal to the ramp (United Nations Enable, 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Handrail

A protective handrail at least 0.40 m high must be placed along the full length of ramps.

An intermediate handrail could be installed for ramps over 3.00 m wide. The distance between handrails when both sides are used for gripping should be between 0.90 m and 1.40 m (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Surface

The ramp surface should be hard and non-slip. Carpets should be avoided (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Tactile marking:

A coloured textural indication at the top and bottom of the ramp should be placed to alert sightless people as to the location of the ramp. The marking strip width should not exceed 0.60 m (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Mechanical ramps:

Mechanical ramps can be used in large public buildings, but are not recommended for use by persons with physical impairments. If the ramp is to be used by a person who uses a wheelchair, the slope should not exceed 1:12. The maximum width should be 1.00 m to avoid slipping (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Elevators

The main principle here is to provide well-dimensioned elevators that disabled people can use conveniently. To achieve this, the following considerations must be given:

The accessible elevator should serve all floors normally reached by the public. Wide elevator cabs are preferable to long ones. The minimum internal elevator dimensions, allowing for one wheelchair passenger alone, are 1.00 m x 1.30 m. The door opening should not be less than 0.80 m. The inside of the elevator should have a handrail on three sides mounted 0.80 to 0.85m from the floor. The control panel should be mounted 0.90 m to 1.20 m from the floor for easy reach. Control buttons should be illuminated and in an accessible location. Their diameter should be no smaller than 20 mm. The numerals on the floor selector buttons should be embossed to be easily identifiable by touch.

The elevator should signal arrival at each floor using a bell and a light to alert sightless and hearing-impaired passengers simultaneously. The elevator's floor and the area in front of the elevator on each floor should have a non-skid, resilient surface or a low-pile fixed carpet. The colour of the elevator door should contrast with the surrounding surface to be easily distinguishable by persons with visual impairments (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Platform lifts

The platform lifts allow people with mobility problems free vertical access between different levels. They are special passenger-elevating devices for people with disabilities and can have either a vertical or an inclined movement (United Nations Enable, 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Vertical movement platform lifts:

For maximum level changes of 2.50 m, vertical movement platform lifts may be installed adjacent to the stairs. For level changes of more than 1.20 m, the lift should be placed in a closed structure with doors at the different accessible levels. Vertical platform lifts can have a variety of openings for entry and exit (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Inclined movement platform lifts:

Inclined movement platform lifts have three elements: a railing, an electric generator, and a moving platform or seat. The lift operating system can be either lateral or suspended. Inclined movement platform lifts can be installed along the stair wall if they do not obstruct the required exit width. The seat or platform can be folded when not in use. The minimum width of the stairs should be 0.90 m to allow lift

installation. Platform lifts can be installed on all types of stairs, including switch-back stairs i.e., with a rotation angle of 180^0, and spiral staircases (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Stairs

It is necessary to provide safe and well-dimensioned staircases for the comfort of all people, especially those with mobility problems. To achieve this, the following considerations must be given:

Differences in level should be illuminated or minimised as much as possible for the comfort of disabled people. A complementary ramped route, elevator or lift should be provided where there are steps in an otherwise accessible path. All steps should be uniform. Circular stairs and stepped landings should be avoided. Open risers are not recommended. The minimum width of a stairway should be 0.90 m for one-way traffic and 1.50 m for two-way traffic. For indoor stairs, the riser should be between 0.12 m and 0.18 m, and the tread between 0.28 m and 0.35 m. For outdoor stairs, the maximum riser should be 0.15 m, and the minimum tread should be 0.30m. An intermediate landing should be provided when the stairs cover a difference in level of more than 2.50 m. The length of the landing should be at least 1.20 m extending along the full width of the stairs. Sharp edges and overhanging nosing should not be used for treads. Nosing should be flush or rounded and not project over 40 mm. Handrails must be installed on both sides of the stairs and around the landing for gripping. For stairs more than 3.00 m wide, one or more intermediate handrails could be provided. The distance between the handrails when both sides are used for gripping should be between 0.90 m and 1.40 m. Handrails must extend between 0.30 m and 0.45 m at the top and bottom of the stairs (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Mechanical stairs (escalators):

Mechanical stairs can be provided with an adaptable tread at least 1.20 m long, if they are to be used by persons confined to wheelchairs. The edges of escalators should be painted in contrast to benefit poor-sighted users (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Railings and Handrails

Adequate railing must be installed wherever needed for the comfort and safety of all people, especially those with mobility problems. Safety guards or railings should be installed around hazardous areas, stairs, ramps, accessible roofs, mezzanines, galleries, balconies, and raised platforms more than 0.40 m high. On stairways, windows positioned less than 1.00 m from the landing should have railings. Handrails should be installed to assist disabled persons in bathrooms and toilets. Spacing between the vertical and horizontal bars of railings should be narrow for the safety of children. Handrails should not obstruct the path of travel. To facilitate use by ambulant disabled and elderly people, handrails should be mounted between 0.85 m and 0.95 m above the finished floor level. For the benefit of wheelchair users, a second handrail can be mounted between 0.70 and 0.75 m from the floor. A third handrail can be mounted at 0.60 m to facilitate use by children and short people. To guide sightless people using a long cane, a rail should be mounted between 0.10 m and 0.15 m (fig. 26), or a low curb should be installed between 50 mm and 75 mm. Low curbs also act as wheel stops (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Entrances

It is necessary to provide accessible and easy-to-find building entrances. The following considerations must be given to achieve this:

For new accessible constructions, all main public entrances should be accessible to an ambulant disabled person. At least one entrance per facility should be accessible to a wheelchair user. In new buildings, the accessible entrance(s) should be the main entrance(s) intended for use by the public. Accessible pathways should connect each accessible entrance to accessible indoor or outdoor parking areas, local public transit stops, and drop-off areas. In multi-storey buildings, the accessible entrance should permit access to a conveniently located accessible elevator or lift. Accessible entrances should be clearly identified using the international symbol of accessibility, including alternate locations of accessible entrances. The surface of the landing should have a slope of 2% for drainage. The finish material should be non-slippery. Jute door mats should be avoided. When used, however, the upper surface of the mat should be level with the floor finish. Sheltered landings are preferable (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Vestibules

To provide sufficient space to manoeuvre a wheelchair between two sets of doors. Vestibule entrance doors can be either the sliding type or the swinging type. For swinging doors, the door mechanism should allow the maximum opening swing (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Doors

Doors should be wide enough to facilitate the passage of a wheelchair user through them.

Accessible doors should be so designed as to permit operation by one person in a single motion with little effort. Power-operated doors are the best for people with disabilities.

The activator system should be automatic or placed within easy reach. An accessible door should have the following features: a sign, a door handle, an extra pull handle, glasing, and a kick plate (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Door types

Automatic doors: These can be sliding or swinging. In general, sliding doors are preferable to swinging doors. Automatic doors are useful when traffic is heavy. Automatic doors should have an adequate opening interval. Guardrails can be installed near double-swinging doors to indicate a door-opening area and to prevent people from being hit by the door (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Revolving doors: - Revolving doors are not suitable for the use of disabled people or people with prams. Wherever revolving doors exist, an adjacent accessible swinging or sliding door should be provided. Auxiliary gates should be provided next to the turnstiles (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Pivoted doors: - Pivoted doors should swing away from the direction of travel wherever possible (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Sliding and folding doors: Manual sliding and folding doors are recommended for narrow spaces not heavily used by the public (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Door opening:

For exterior doors, the minimum opening is 0.90 m when the door is open. For interior doors, the minimum opening is 0.80 m when the door is open. The minimum door opening can be 0.75 m if the access is straight or the door can stay open. The minimum door width of restrooms should be 0.75 m. For doors installed in an opening more than 0.60 m in depth, the clear door opening should be at least 0.90 m. For double-leaf doors, at least one leaf should have a minimum clear width of 0.80 m (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Exit doors landing:

The exit landing should not exceed the finished floor level by more than 20 mm (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Glasing and glased doors:

Outward swinging doors and doors in public corridors should have low windows to enable users to see oncoming traffic. The bottom edge of the window should not be higher than 1.00 m from the finished floor level (United Nations Enable 2004; Accessibility in Public Libraries

Research Project, 2021; Eziekwe, 2010).

Completely glazed doors should be avoided in buildings frequented by people with visual impairments. Glased doors should be marked with a coloured band or mark placed for the benefit of all users at a height between 1.40 m and 1.60 m (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Corridors

Corridors should be well-dimensioned to facilitate the passage and manoeuvring of a wheelchair. To achieve this, the following considerations must be given:

The unobstructed width of a low-traffic corridor should not be less than 0.90 m. This also allows manoeuvrability in 90^0 turns. The unobstructed width of a public corridor should not be less than 1.50 m. The recommended width is 1.80 m. The corridor width should allow manoeuvrability through the doors located along its length (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Rest Rooms

Accessible space inside restrooms should be sufficient, with all fixtures and fittings being within easy reach. To achieve this, the following considerations must be given:

Turning circles of 1.50 m diameter are recommended inside the restroom to allow for full-turn manoeuvring of a wheelchair. The ease of transferring from a wheelchair to a toilet seat or bidet depends on the approach. In general, there are four different approaches:

The parallel approach is the easiest. The diagonal approach is difficult. The perpendicular approach is also difficult. The frontal approach is the most difficult and needs particular care (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Public restrooms:

In any public restroom, at least one compartment for each sex should be accessible to an ambulant disabled person. At least one unisex compartment in any public restroom should be accessible to a wheelchair user. Accessible restrooms should be marked with the international symbol of accessibility. No indication is needed if all restrooms are accessible. Pivoted doors should open outward unless sufficient space is provided within the toilet stall. A separate unisex unit is always desirable in public buildings, even when all restrooms are accessible, to allow a disabled person to be assisted by an attendant of the opposite sex. Special restrooms should be marked with the international symbol of accessibility, not just the only accessible restrooms. A water-closet and a lavatory should be provided within special restrooms. The size and layout of special restrooms should comply with the minimum requirements (United Nations Enable, 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

Water closets:

The size and layout of water-closets and toilet stalls should comply with the minimum requirements. The toilet seat height should be between 0.45 m and 0.50 m from the finished floor level. The distance between the center line of the toilet seat and the adjacent wall, if provided with a grip bar, should be between 0.45 m and 0.50 m. Grab bars should be mounted on the wall behind the water closet, if tankless, on the side wall closest to the water closet, or on the floor at the edges of the seat. Grab bars should be mounted between 0.85 m and 0.95 m from the floor. Flushing arrangements and toilet paper should be placed within reach at a height between 0.50 m and 1.20 m. Accessible hand-operated flushing controls are recommended on the open side of the water closet. Wall-mounted water closets are recommended (United Nations Enable 2004; Accessibility in Public Libraries Research Project, 2021; Eziekwe, 2010).

VIII. CONCLUSION

To fully integrate disabled people into society, architectural and urban barriers must be removed when designing public and private spaces (Beckman, 1976). Many structures are inaccessible to the elderly, young, and people with impairments due to their subpar performance and design. To ensure accessibility, it is essential to consider fundamental accessibility requirements such as functionality, autonomy, and safety.

All risks in and around buildings should be recognised and removed to guarantee safety. This includes identifying and eliminating unnecessary barriers and obstacles, such as furniture, partitions, sculptures, screens, potted plants, thresholds, and steps. Floor surfaces should be non-skid, and open pits or soft patches should be cordoned off. Signposts and markers should be used to indicate accessible facilities.

Wheelchair users should be able to move around restrooms, doorways, and hallways with ease. An alternate entry, such as a ramp, should be installed at the main entrance, egress, and at each floor level change. Internal circulation channels should be sufficiently open and barrier-free to enable people with mobility impairments to move about easily.

Bookcases should be accessible to wheelchair users, and lifts and escalators should be provided for both able-bodied and disabled individuals. The design and height of reading desks, seats, and bookshelves should be considered for those who are physically unable. Parking lots should be planned so those with limited mobility can access the library with little to no walking.

Designing landings, threads, risers, and stairs should also consider the needs of individuals with physical limitations. Stairs and ramps should have handrails, and the library should be situated in the central academic district of the campus for convenient access.

Inclusive design principles necessitate a paradigm shift towards social architecture in education and practice to ensure equal access to the built environment for all. The Nigerian government must lead in implementing legislation requiring accessibility and prioritising public structures, as it is the result of disabled people's civil rights campaigns in the United States of America and Western nations. Implementing "barrier-free" design may take time due to alterations to conventional design elements and preconceived notions. A policy for accessible building design is necessary, considering the needs of individuals with physical, sensory, or intellectual disabilities.

People with disabilities should be consulted for information on their needs. The quality and convenience of housing and building services must be improved by considering the diverse spectrum of disabilities. Making new buildings accessible should be the first goal, promoting equity, and making everyone's lives more convenient. This is the only equitable solution.

IX. CONFLICTS OF INTEREST

There are no conflicts of interest in this study.

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