International Journal on Science and Technology (IJSAT)
E-ISSN: 2229-7677 ● Website: www.ijsat.org ● Email: editor@ijsat.org

Analysis of The Architecture of School Structures and Environment for Accessibility and Safety by The Physically Challenged, A Case Study of La Nkwantanang Madina Municipality Schools

Emmanuel Adjei Adjetey

Abstract
Buildings that are inaccessible become exclusive elements for individuals with impairments. In the case of senior high schools, defects in the designed physical environment hinder the right to inclusive education. In this light, the overall goal of this research is to discover, analyze, and assess the problems that jeopardize senior high schools building accessibility and the use of their spaces by individuals with disabilities. A case study at La Nkwatanang municipality, focusing on three (3) purposefully selected Senior High Schools with around 364 pupils, supported the research methodology. Eighty (80) buildings and facilities at these schools were studied over a four-month period using a combination of quantitative (semi-structured questionnaires) and qualitative (interviews) approaches. All around the world, there are numerous and difficult issues linked with the admission of students with disabilities to secondary (senior high) institutions. This issue is worsened further by difficulties encountered in the constructed environment of these institutions, with Ghana being no exception. As key results, it is seen that 80% of the problems are related to accessible space, tactile signage, toilet components and accessories, and visual signage. The key contribution is a fault mapping process centered on geographical accessibility characteristics and requirements.

Keyword: environment; accessibility; safety; physically challenged

1. Introduction

The issue of architecture of school structures and environment for accessibility and safety by the physically challenged has received heightened attention in recent times (Jackson, 2022; Graham, White & Street, 2019; HandiKOS, 2020). This is because health facilities, ministries, and other sensitive institutions used for human wellness do not adequately consider policies for people with disabilities from an environmental, economic, and social perspective (Hanes, Brown & Hansen, 2021; Ackah-Jnr & Francis, 2017). Inadequately constructed cities and incorrect implementation of international standards and laws are the main reasons for exclusion. This has an indirect detrimental impact on the socioeconomic status and opportunities of those with impairments (Useh et al., 2021). Additionally, the United Nations Convention on the Rights of Persons with Disabilities states that around 650 million people worldwide have one or more forms of disability, making them the largest minority group in the world. According to estimations, the impoverished nations accounted for almost 80% of the population with disabilities (Imrie, 2019). This suggests that about 5% of Ghana's almost 32 million inhabitants suffer from an internal impairment. Protection of Disability Rights in 2012 because disabled persons make up a greater percentage of the global population, it is imperative that accessibility standards and guidelines be established and modified in all businesses. For example, as the term "building" refers to any man-made structure meant to sustain and shelter its occupant or residents, there is no conflict when defining it in reference to all engineering and architecture-related fields, such as construction and

buildings. In the widest sense, the building was meant to support and serve life in terms of social, economic, and environmental challenges. Space, privacy, and accessibility analyses are also discussed. Since they are the most defenseless and vulnerable members of society when it comes to laws and accessibility in public places, disabled people should be given priority. Students with disabilities are among the most vulnerable groups in Ghana's educational institutions. This is particularly true as all living beings are entitled to protection, comfort, shelter, and adherence to the law (Jenks, 2007). People with physical disabilities are very concerned about unjust treatment and their inability to engage in social activities, particularly when it comes to architectural and urban planning and design. According to the regulation, any building must be accessible and comply with all legislation pertaining to individuals with disabilities. However, the public institution should provide all users with the required shelters, regardless of their financial or physical limitations. This is due to the fact that accessibility regulations provide the greatest level of comfort and liberty to the masses. When urban and rural areas are being created, people or groups may aim to finish a variety of tasks. This study therefore aims to determine whether the architectural design of buildings and facilities on the campuses of senior high schools in La Nkantanang are barrier-free and disability-friendly. The specific objectives are to conduct a comprehensive comparison of built or architectural design in second-cycle institutions in La Nkwantanangto international standards and building instruments, find out the availability of material resources such as physical accessibility, teaching-learning material, facilities, and many more for educating children with disabilities and to determine how and to what degree the disability regulations are implemented in Ghanaian schools towards their health and safety.

2. Theoretical background and conceptual framework

Social Model of Disability

Originally created in the 1970s by Union of the Physically Impaired Against Segregation (UPIAS) activists, the social model of disability gained academic recognition thanks to the writings of Vic Finkelstein (1980, 1981), Colin Barnes (1991), and especially Mike Oliver (1990, 1996). According to the social model, “disability arises from interactions between individuals with disabilities and a setting that is full of social, communicative, behavioral, and physical limitations. It suggests that in order to allow those with disabilities to engage in society on an equal footing, changes must be made to the physical, mental, social, and communication environments. The social model, which views the current educational system and schools as insufficient and discriminatory, is the foundation of the inclusive education concept. Schools must make adjustments to accommodate each student's unique needs, even if their condition may have prevented them from attending regular classes”. The field of disability studies and educational viewpoints on inclusion has been significantly impacted by the social model of disability. According to the inclusive education document, all countries who ratified the convention must modify their educational systems to accommodate students with a range of requirements.

People with impairments are perceived as "unfortunate," "useless," strange, mistreated, and ill, according to Mike Oliver (1999). He went on to say that people with disabilities are seen as useless because they cannot contribute to the community's economic well-being and as unfortunate because they are unable to enjoy the financial and social advantages of contemporary society. The conclusion drawn from this investigation was that prejudice against disabled people manifested itself in the form of oppression and discrimination. The conclusion drawn from this investigation was that prejudice against disabled people manifested itself in the form of oppression and discrimination.

Therefore, the social model explains “the global cycle of poverty and disability, which holds that a person becomes socially excluded from society once they become disabled. Due to the stigma associated with their impairment, children with disabilities are frequently intentionally discriminated against or excluded from a nation's educational system because it is unable to accommodate them. He reiterated his claim that the educational system has failed students with disabilities by failing to provide them with the

tools necessary to fulfill their civic duties and rights. Similarly, the purpose of the special education system has been to keep them out of the educational process and the larger social life". Regarding the social view as well, Ainscow (2004) acknowledges that while any child may encounter challenges in school, these challenges may serve as a catalyst for the enhancement of the educational environment. On the other hand, the social model of disability suffers from the failure to acknowledge the significance of impairment. In other words, the paradigm fails to appropriately address or ignores the subjective sensations of pain associated with both disability and impairment. Oliver (1996) argues that this is based on a conceptual misunderstanding because the social model focuses on the communal conceptual experience of disablement rather than the individual experience of impairment.

The environment is presented as the primary cause of all trait-related disadvantages and as a required cause, if not a sufficient one. As a result, it identified the social environment as the primary source of barriers for people with impairments. Notwithstanding its shortcomings, the social model of disability is significant to this research because it aids in the researcher's comprehension and analysis of the social and economic factors that have long marginalized and disadvantaged children with disabilities. The approach is helpful in 19 giving academics and education trainees the knowledge and understanding they need to advocate for the government to change social, political, and economic policies to better meet the needs and goals of children with disabilities. A critical knowledge of the causes of discrimination in society is also provided by the model. Last but not least, the study chooses this model because it offers a substitute for the medical model of impairment, which places the patient at fault by focusing only on the individual.

Inclusive Education

Inclusive Education is primarily seen as "a process of ensuring high-quality, equal access, participation, and engagement, as well as a process of transformation" (Chen, Huang, Liu & Wang, 2022; Griggs & Moore, 2023). The term "inclusion" is also used more broadly by some educators and theorists to describe an educational system that guarantees access for all socially and educationally underrepresented groups. Through inclusive education, which aims to promote students' feelings of presence, access, participation, and engagement in schools, individuals' "uniqueness" [and variability within groups] are addressed (Hyde 2014, Booth, Ainscow & Kingston 2020). Even though there are many various ways to understand, define, and refer to inclusive education, its main goals revolve around reducing (un) intentional barriers and enhancing school climates that frequently restrict students' opportunities for learning and social interaction, regardless of impairment (Materechera, 2020). It is based on the idea of universal design (Kart & Kart, 2021; D'souza 2004), which was developed in the field of product design and architecture as a way to better understand how the physical environment affects inclusive education. The movement of universal design has a long history in nations with significant cultural diversity, but as it transcends national laws, policies, and practices, there are more similarities than differences. Major legislative initiatives, such as specialized standards to accommodate people with disabilities, and unrestrained market-driven responses to an aging population, mostly in the goods sector, were the two forces that drove the spread of universal design around the world (Griggs & Moore, 2023). As a result, it focused on wheelchair accessibility and other forms of accessibility for people with (physical) disabilities.

As a dominant term in business and society, universal design has been used synonymously with ideas like "design-for-all" and "barrier-free design," but during the 1990s, it has become widely utilized in educational institutions (Griggs & Moore, 2023). It is implied by the term "universal design" that all people, to the greatest extent possible, should be able to use products, environments, programs, and services without the need for adaption or specialized design (United Nations [UN] 2006, Story 2011).

Making spaces usable and accessible is its aim. Since accessibility is a relative concept, accessibility concerns ought to be addressed in terms of the relationship between a person and their surroundings. Therefore, the definition of accessibility is the balancing of a person's functional capacity with the design and requirements of their physical environment (Vaghrodia & Patel, 2022). Accessibility is seen as a catch-all word for all elements that affect human performance, despite its concentration on mobility issues (Griggs & Moore, 2023). In an environment that is accessible, anyone with any disability can "function autonomously." Usability is the capacity of a person to move about, be present in, and use the environment "equally" with others (Griggs & Moore, 2023). or to fulfill functional requirements. On the other hand, usability is reliant on accessibility. Usability is the measure of how well an environment's design promotes performance, functionality, and well-being (Griggs & Moore, 2023).

Despite having its roots in a broader knowledge of disability, universal design emphasizes the importance of equity. It is therefore regarded as a human-centered and rights-based approach to developing innovative and more inclusive solutions and designs, in addition to the customary providing of specialist designs (Materechera, 2020; Kart & Kart, 2021). “All students can then access, utilize, and enjoy the physical settings of schools, including buildings, amenities, and architectural designs, thanks to universal design. Instead of being an afterthought to support subsequent accessibility measures or adjustments, this emphasizes the necessity of incorporating persons with disabilities into broader ideas and the provision of surroundings and education” (Materechera, 2020; Kart & Kart, 2021). In light of this, universal design's theoretical position is in favor of the idea that creating inclusive physical environments will benefit all students and advance their safety and health. Universal design is based on seven fundamental ideas that maximize the use of particular designs (Materechera, 2020; Kart & Kart, 2021). These guiding ideas aid in bringing the IE vision to life:

(1) Equitable use: People of different capacities can use and sell the design, which appeals to them and provides a similar and non-stigmatizing way to engage. Therefore, seating should resemble natural mobility or involvement in class activities.
(2) Flexibility in usability: The design accommodates a broad spectrum of personal preferences and abilities, offering various approaches or adaptability to make designs generally beneficial.
(3) Simplicity and intuitiveness: The design is easy to use regardless of the user's background, level of experience, level of competence, language proficiency, or current level of focus. Therefore, it should give scaffolding, provide appropriate prompting and feedback, and eliminate excessive complexity.
(4) Perceptible information: Regardless of environmental conditions or sensory abilities, the design provides necessary information to the user. Multiple modes of output (pictorial, verbal, tactile) are thus provided for communicating vital information in designs.
(5) Error tolerance: The design reduces risks and the negative repercussions of (un)intentional activities. It should make it harder for users to make mistakes, but if they do, the person should not be injured. As a result, risks are removed from schools to protect the safety of all students.
(6) Low physical effort: The design minimizes strain and overexertion while enabling effective and comfortable use.
(7) Regardless of body size, posture, or mobility, appropriate size and space are provided for approach, reach, manipulation, and usage. Heavy doors that must be used regularly in schools should be removed. In other words, there should be adequate area in classrooms for kids with physical limitations to use personal assistance or assistive technology. All things considered, universal design aims to improve inclusive education institutions' usability, accessibility, safety, ease of use, and accommodation for all.

Physical Disabilities and Education

People with disabilities have historically been placed in special schools, which have resulted in their lifelong exclusion from the regular education system. In addition to this classification, there are not enough of them registered for primary school. Accordingly, these kids will probably drop out of school sooner and not finish high school or beyond, even if they continue their education (Graham et al., 2019). A contentious problem in Kosovo is the absence of precise central statistics on the number of PWDs, as well as the precise number of children enrolled in or not.

It begins primarily with social norms that stigmatize people with disabilities and persists with physical barriers including inadequate facilities (inaccessible restrooms and classrooms) and inadequate help from specialists (UNICEF, 2019). In the past, the issue of accessibility in educational institutions has received little attention in certain small-scale projects, with the architect bearing a significant portion of the obligation. Despite laws and administrative directives governing planning without barriers, the architect, who designed the majority of the built environment, failed to anticipate the PWD's accessibility (Demjaha et al., 2022).

Disability Issues in Ghana

Naami (2014) emphasized “architectural, transportation, information, and medical challenges in this regard”. People with disabilities are also excluded from leadership roles, decision-making, and social activities (Takyi, 2013). For instance, some local chiefs protested the appointment of Dr. Henry Seidu Danaa, a lawyer with a disability, when he was proposed for a government post as a minister for the Ministry of Chieftaincy and Religious Affairs (Sackey, 2015). 16 Barriers to healthcare are another issue. For instance, because there are no HIV resources available in accessible formats like Braille for the blind or local language-captioned movies for the Deaf, people with communication difficulties will not learn about HIV (Evans, Adjei-Amoako, &Atim, 2016). Disability organizations have struggled with a shortage of qualified specialists. This issue has been reported in the literature, including a study by Crowley et al. (2013) that found that there were only ten certified speech-language pathologists in Ghana in 2013. Additionally, schools lack specialized teachers who can work with students with disabilities. "Lack of awareness among policymakers and professionals, as well as a lack of professional knowledge about intellectual disability, resulted in increased risk of delayed diagnoses, secondary co-morbidities, persistent abuse, depleted social capital, and isolation," according to a "Inclusion Ghana" 2013 report. Including In response to this difficulty, Ghana says it has trained over 300 health professionals on how to deliver services that are accessible and understandable to those with intellectual impairments, as well as training for self-advocates with intellectual disabilities. According to Amenyedzi (2016), there are a lot of negative cultural views on disability in Ghana, even in Christian churches. These beliefs frequently imply that disabled individuals are cursed and in need of faith healers or exorcisms to be healed. These individuals are further ostracized and excluded if they are not cured. The effects of colonialism have molded, influenced, and perpetuated public health in Ghana. Although poverty influences public health infrastructure provision and healthcare access in general (Badu, Agyei-Baffour, & Opoku, 2016), it also results in 17 impairments. For example, carrying water is a major cause of muscular skeletal impairments in Ghana (Geere et al., 2018).

Accessing skilled care can be difficult at times, and this problem is even worse for those with disabilities (Barlow & Reynolds, 2018; Crowley et al., 2013; Ganle et al., 2016). Numerous harmful cultural attitudes exist. People with disabilities are often exposed to cultural traditions that are meant to help them overcome their limitations. In the event that they are not cured, they are stigmatized, shunned, ridiculed, and excluded (Anwar, 2017). Disability is associated with "witchcraft, sorcery, juju, and magic," according to cultural beliefs (Agbenyega, 2003). (page 4). Widespread disdain and limiting

cultural attitudes and prejudices against disabled people were noted by Geurts and Komabu-Pomeyie (2016). Individuals with sensory disabilities, like blindness or deafness, and those with physical disabilities, such wheelchair users or amputees, are commonly regarded as having additional disabilities (e.g. mental illness or intellectual disability). Family members refuse to assist. Families are hesitant to accommodate their impaired relatives' needs. Other family members do not help, with the exception of parents, who may meet the requirements of their impaired children. The disabled individual has no choice but to fend for themselves if their parents are impoverished. The majority of individuals with disabilities depend on the larger society for their daily sustenance due to a lack of assistance from their families (Opoku et al., 2017).

3. Methods

Design, Population and Sample

The study adopted quantitative research design. Creswell (2003) asserts that quantitative research is a means of analyzing objective concepts through the evaluation of the relationships between variables, which can thereafter be assessed through the use of certain instruments. Creswell (2008) asserts that researchers can test a theory or concept with the use of quantitative design. Investigating the connection between teaching and learning environments and academic results in the municipality of La Nkwantanang is the main objective of the study. Both public and private senior high schools in the research area were the subjects of the investigation. A purposive sample of 3654 students was taken for the study. Three schools in the La Nkwantanang Municipality—two public and one private—were used to choose the students.

In this study, the sampling size determination method developed by Krejcie and Morgan (1970) was applied. The sample size is calculated with the help of the Krejcie and Morgan Table. Therefore, it is not necessary for the researcher to study every sample. Krejcie and Morgan (1970) created an easy-to-use table for determining sample size for a given population. The number of samples in this study was determined in part by applying the Krejcie and Morgan sampling technique. Four (3) schools—West Africa Senior High School, Presbyterian Boys Senior High School, and Faith Community Baptist Senior High School—in the Madina La Nkwantanang municipality in Ghana's Greater Accra region were purposefully chosen by the researcher. The sample size was determined by taking into account the population for each institution. The school administration population provided the population statistics for each school and figures are shown on table 1 below

Table 1 population Under Study

Name of School	**Student Population**
West Africa Senior High School	2,500
Presby Boys Senior High School	3,700
Faith Community Baptist Senior High School	800
TOTAL	**7000**

Data Sources

During the study, the research both quantitative and qualitative research approaches were employed. Also, both primary and secondary data sources were consulted to generate data for the study. Because of the time period chosen, much of the data used in the study was secondary in nature. The following are examples of secondary data: Documentary materials might be written or non-written (media-based), Area-based (e.g. journal, nation) or time-series-based multiple sources, censuses, continuous and regular surveys, and ad-hoc surveys are all examples of surveys. The majority of secondary data was usually derived from literature reviews. Secondary data that was used in the study included information on

building requirements for the physically challenged, a review of laws that govern inclusive education in Ghana and internationally, methods of diagnosing and applying best practices, and other vital information (required for furthering and supporting the analysis of primary data). Such information is now primarily accessible via the Internet. Libraries, on the other hand, were a valuable source of books on leading theories and expert thought on the issue. To acquire primary data from the field, a questionnaire was used.

4. Data Collection Instruments and Procedures

Public and private senior high schools in the municipality of La Nkwantanang made up the study's population. Using non-random purposive probability sampling, three (3) of the six (6) Senior High schools were chosen. This process was prompted by a number of factors, including the GES classification, the year of establishment, academic performance, student population, location, popularity, and, in certain situations, the quantity of well-known products produced in the nation (Table 2). Each school's randomly chosen buildings and facilities were inspected once as part of a survey to see how well they adhered to the building standards in use. Table 3 displays the gender distribution of the chosen schools. Measurements were taken to the closest 5 mm for a total of 705 elements in 264 buildings and amenities in the schools (Table 4). The administrators of every school were given questionnaires to complete, which focused on the number of employees and students with disabilities at each school, the approximate age of the buildings, and the institution's admissions procedure. To supplement the results, school administrators were questioned about certain sections of the surveys.

5. Data Analysis

The quantitative data sets are analyzed using descriptive and thematic approaches, respectively. For descriptive statistics (quantitative data analysis), charts and tables were mostly employed, while themes based on research objectives were produced from qualitative interviews to provide specifics on the influence of teaching and learning circumstances on pupil performance.

6. Results and Discussion

Socio-demographic characteristics of respondents for the qualitative interviews

Twenty-six educators were interviewed. Thirteen (50%) of the responses were women, and the remaining thirteen (50%) were men. There were two men and two women among the Municipal Education Office representatives. Information about the respondents' professional qualifications, length of teaching experience, and demographics (age and marital status) were gathered, but it had no bearing. While 14 of the respondents also held a first degree from a university and three held a master's degree, all of the respondents held professional teaching "certificates A."

Table 2 shows the academic qualification of the teachers

Qualifications	Number	Percentage (%
Cert A	10	33
First Degree	14	47
Masters	6	20
Total	**30**	**100**

Gender of Respondents

Figure 1 below presents gender composition of respondents. The sample of 30 respondents drawn was balanced on gender with 15 (50%) being females and 15 (50%) of them being males.

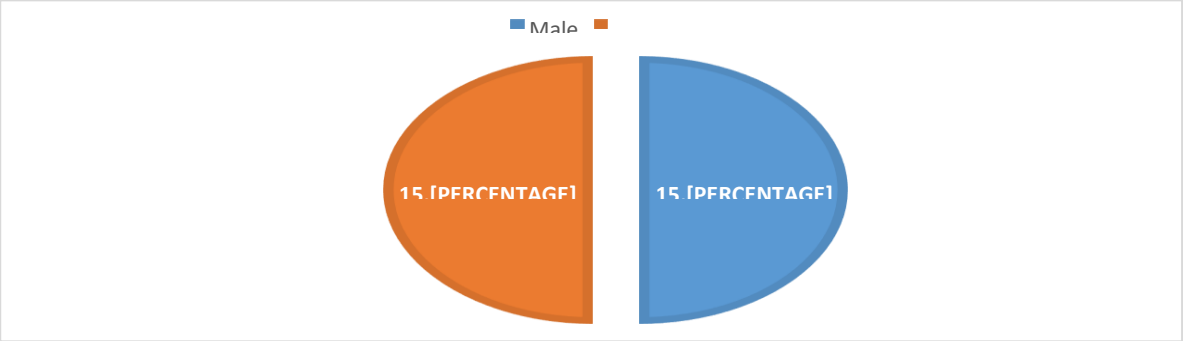

Figure 1 Gender of respondents

A total of 364 questionnaires were administered to student respondents. The number of respondents who were male was 269 (74%) and 95 representing fifty percent (26%) were female. In terms of class distribution as below, it was found that a larger proportion of the respondents were SHS 1 students representing 38.19% of the respondents whiles the least number of respondents came from the SHS 3 level with 29.94%, and finally SHS 2 presented with 31.87%.

Table 3 shows the class distribution of the respondents for the semi-structured questionnaires.

Class Level	Number	Percentage (%)
SHS 1	**139**	**38.19**
SHS 2	**116**	**31.87**
SHS 3	**109**	**29.94**
Total	**364**	**100**

Table 1 Shows the class distribution of respondents in La Nkwantanang.

Physical Buildings or Facilities

This part describes the physical features that were surveyed. A total 0f 80 facilities were surveyed to determine whether the facilities and buildings were compliant to the national and international standards. The table (4.3) below illustrate the type and number of buildings and facilities surveyed by the researcher.

Table 4: Type and number of buildings or facilities surveyed

Type of building	n	Percentage(%)
School car parks	6	7.5
Classroom Block	12	15.0
Dormitory Blocks	24	30.0
Administration Blocks	5	6.25
Church Buildings or Mosques	6	7.5
Dining Halls	5	6.25
Assembly Halls	3	3.75
Laboratory Blocks	11	13.75
Libraries	3	3.75
Playing Fields	3	3.75
Public Fields	2	2.5
Total	**80**	**100**

The Degree to which disability regulations/ requirements are implemented

The objective here is to determine whether the requirements set out by the national and international organizations for inclusive education in the countries are adhered to and to what extent does it affect the teaching and learning of the disabled the La Nkwantanang municipality of the Greater Accra region of Ghana. The table below demonstrates the level of compliance or implementation with some of the regulatory or standards requirements set out to regulate the practices of inclusive schools in the La Nkwantanang municipality.

Table 2: The Degree to which disability regulations/ requirements are implemented

Implementation Parameter	Yes (%)	No (%)
The need for a special arrangement when attending classes	40.4.	28.60
Do you have suitable and sufficient fire warning and evacuation systems in the school?	88	12.
Do you have suitable and sufficient first aid equipment and assistance available?	67	33
Do you have competent persons trained to ensure the safe evacuation of all persons from buildings in the event of serious and imminent danger?	75.6	24.4
Do you have an access ramp to your classrooms?	10	90
Is there a provision for an appropriate assembly point in case of emergency	12	88
Does management organize health and safety education for you from time to time?	35.3	67.7
Is there a well layout on campuses? e.g.sports field, assembly hall, well covered drains, covets etc.?	34	66

With regards for need for special arrangement when attending classes, the response was overwhelming supporting policies that will ease the burden of most especially visually impaired and physically challenged who often accompaniment to and from school. Suitable and sufficient evidence (89.6%) suggests that no emergency warning systems was in place something to be done urgently. Adherence to the fire safety regulation for installation of fire extinguisher had been poor (12%). This has reached levels of been critical not only for the disabled but also for the general student population. The need for competent trained and qualified personnel for emergency purposes was unanimous (75.6%) among the respondents. Respondents reported that only 10% of the facilities had rams and in fact 90% of the access structures were staircases which were not conducive for students using wheelchairs. Majority of the students (75.9%) reiterated for the need for appropriate access points and signage to reduce casualties and ensure proper head count during emergencies. Finally, respondent's general consensus was that management of various schools should organized periodic health training for students.

7. Discussion

Eighty buildings and infrastructure in three senior high schools in Ghana's La Nkwantanang municipality were surveyed, yielding a total of 705 items. Every aspect was examined in compliance with the international standard's standards, which were broken down into nine main categories. The data revealed that most institutions had moderate to severe restrictions in seven of the nine characteristics, with the exception of signs and audible communication, where compliance ranged from no restraints to light restrictions.

Car parks and garages

Every school under investigation featured a parking lot that was utilized by both employees and visitors. The results showed that 90.9% of the parking lots had severe restrictions, compared to just 9.1% with moderate constraints. This was because a larger proportion of the existing parking lots had uneven bituminous surfaces with potholes that were not marked or signposted, in addition to the fact that not all of the schools had designated accessible parking places. Those with disabilities were totally unable to use school parking lots due to the dearth of designated parking spaces and the bad state of the existing lots. The BS8300 (BSI Group 2001), ADAAG (USAB 1990), and Solidere (2004) standards, which stipulate that designated public parking spaces should be provided for both employees and visitors with disabilities to a workplace and that they should be distinguished from spaces designated for other users, were in stark contrast to the state of the existing parking lots. Additionally, every unmarked parking space should be placed as close as possible to the building's main entrance and all other access doors, on level, stable ground with uniform, smooth surfaces. Last but not least, any parking lot with fewer than 50 spots must to provide at least one accessible spot that is wider than 3.60 meters.

Most of the schools had entry points that were impassable and unpaved. Hamzat and Dada (2005) found that 18.4% of buildings, 45.1% of building entrances, and 19.4% of access routes were wheelchair accessible. These results are in good contrast to those of a comparative study on public buildings in Ibadan, Nigeria, which included educational institutions. Hamzat and Dada (2005) only looked at orthopedic impairments unique to wheelchair users, whereas this study examined orthopedic, visual, hearing, tongue-speech, and mental impairments. This could explain the small discrepancy in results between that study and this one.

The Ashanti Region's schools were the sole exception to the poor access routes; there, wheelchair users and other ambulant (those who walked with the aid of walking aids) children were able to move more easily. Because short approaches make it difficult for individuals with disabilities to move around, the BS8300 (BSI Group 2001) mandates that access paths to and around buildings be spacious and free of obstacles, restrictions, and other hazards that could impede free mobility. In order to provide the necessary strong, long-lasting, and secure surfaces, it is imperative that some schools' inaccessible access routes be modified.

It does not absolve schools of duty if their constructed environment, especially their parking lots and access routes, is not disability-friendly, even if most of them have regulations that forbid students with disabilities from being admitted. This is because the report claims that certain schools had employees with disabilities. In addition, a number of parents of children who occasionally attended the schools and tourists also had disabilities. This makes it even more urgent for all schools to provide public access to their facilities.

According to the building instruments, the following design flaws are frequently linked to vertical circulation in buildings: disparities between indoor and outdoor levels; steep and badly designed staircases that make it difficult for people to walk; unsafe railings; handrails that are difficult to grasp; poorly designed ramps; and elevators with inadequate cab space, narrow entry doors, high control button positions, and short opening intervals. The instruments required ramps to be constructed whenever steps impede pedestrian-free access in the absence of lifts. According to the data, the majority of schools fell short of a number of the previously listed requirements.

In schools where accommodations had been made for students with disabilities, especially those who use wheelchairs and other ambulatory people, to be housed in ground-level dormitories and classrooms, vertical circulation was more noticeable. This design could not totally solve the problem because other

vital school facilities, such as laboratories, libraries, and offices, were positioned above the ground floors of buildings, making them inaccessible to students with impairments.

Access routes to and around buildings

Access points to and from buildings Conversely, the bulk of Ashanti Region schools had well-planned bituminous or concrete walkways connecting most of the campus buildings. The eight dorms and other school facilities are connected by an oval-shaped network of asphalt roads at a school in the Western region.

Vertical circulation: Staircases, ramps, and lifts.

Vertical circulation is the term used to describe the vertical movement of people between floors of buildings and services. To get to these heights, frequent building elements include elevators, ramps, and staircases. Most of the buildings evaluated in this study had staircase access and were either two-story (71%) or three-story (3%) buildings. Ramps were added to a few of the staircases, although none of the ramps had railings. For instance, all three of the assessed schools in the Greater Accra Region had a single ramp. One major drawback of the ramps was that their slopes were steeper than the 1:12 gradient ratio required by the construction tools. the year prior. None of the schools had them, even though they were required for all public buildings with more than one level. Second, thresholds (differences between indoor and outdoor spaces) to facilitate wheelchair mobility.

Horizontal circulation: Entrances, corridors, verandas and floor surfaces

Building entrances, verandas, hallways, and floor surfaces are examples of horizontal circulation building elements found in schools. Of these, 68% had moderate to severe limits, while 32% had not-to-light restrictions. Identification was enhanced by colors that contrasted with the backgrounds of the majority of building doors and entrances. Additionally, door widths were generally suitable, with single doors measuring at least 900 mm and double doors exceeding 1500 mm. Most doors also had typical mortise locks with lever handles. Lever handles were more manageable and hence suitable for people with weak grips than door handles with circular knobs. For instance, seventy-five percent of the doors at West Africa Secondary School, fifty percent at Faith Community School, and eighty-three percent at Presbyterian Boys Senior High School satisfied this ADAAG (USAB 1990) requirement. In contrast, most building entrances were bridged with steps rather than ramps and had thresholds greater than 20 mm. A small number of buildings had polished terrazzo floors, while most had sand and cement screed floors. In addition, the majority of buildings had wide, straight hallways free of obstructions and with level, non-slip surfaces.

Signage and information

About 87% of the signage in the schools, according to the survey, complied with BS8300 requirements with little to no limitations. In these situations, signs and inscriptions were straightforward, unambiguous, and simple enough to read and comprehend. To set the letters apart from their surroundings, contrasting colors were also employed. Conversely, several of the signs in the schools that were reviewed were painted in chalk or faded, and the rains had washed them away. The results also showed that, generally speaking, the majority of schools did not adhere to the building instruments' requirements, which stipulate that accessible areas and facilities must be identified by the international accessibility symbol, which is a wheelchair figure with a square border or background. In order to differentiate the figure from the background, color contrast is also crucial. The majority of school buildings and facilities were inaccessible to individuals with disabilities, as evidenced by the fact that this emblem was not found on any of the 705 items at any of the three schools that were assessed. It is impossible to exaggerate how crucial proper natural and artificial lighting is to enabling visually impaired persons to use buildings in a safe and comfortable manner. Crucial requirements include glare avoidance, color rendering, lighting quality, and interior surface brightness. Older adults and those with

vision problems are more sensitive to glare than younger people. The BS8300 (BSI Group 2001) suggests that lighting be used to highlight the speaker's face in order to make lip reading easier in situations when one-on-one communication is essential, like between a teacher and a student. The results showed that artificial lighting was insufficient in the majority of the schools. Repairing street lights, adding new lights, and changing burned-out electrical bulbs are some remedial measures to enhance artificial illumination, especially for the visually impaired students in schools.

Audible communication systems

Centralized sirens and mechanical bells were the main means of auditory communication in the schools. These devices were used to call or signal students at different areas on their campuses at specific times of the day. Public speaker systems were added to these forms of communication when students congregated in dining halls, assembly rooms, and churches. Over 91% of these gadgets have no constraints at all, compared to just 9% with considerable limitations. Since most of the audible communication devices were operational—that is, able to be heard clearly and loudly at all of the crucial locations in the various schools—they had the highest compliance rate out of the nine items examined in the study.

General lighting

Of all the aspects surveyed in the three institutions, general illumination—which includes both artificial and natural lighting in the built environment—accounted for 24%. Out of the facilities surveyed, 24% had no prohibitions, while 34% had considerable restrictions. Since the majority of the buildings were positioned to benefit from daylight during the day, it was also discovered that natural illumination was generally sufficient in all school buildings and facilities. Artificial illumination was utilized to augment natural lighting on the few occasions when it was not enough. But things were different at night. The outside spaces of the schools, including parking lots, sidewalks, and access points, were either dimly lit or completely dark. Of the facilities surveyed, just one-third had interior spaces that were well-lit at night. Even well-sighted students had to strain their eyes to read or walk around in some of the dimly lit hallways, classrooms, and dorms.

Public telephones

In order for public telephones to remain accessible, the building instruments require that they be placed in easily accessible areas at suitable elevations. Additionally, phones should be orientated so that people may use them while seated. Additionally, phones for the blind and visually impaired should have well-lit keypads and large raised or embossed numbers that contrast with their background in terms of brightness and color. Additionally, the international access symbol and a telephone symbol should be combined to clearly define routes to and from these telephones (BSI Group 2001). All schools possessed public telephones, and all of those schools' public telephones had moderate to severe limits, according to the survey. None of the phones had induction couplers, directional indications, or well-lit pads with raised numerals, which resulted in these limitations. Additionally, every receiver was positioned at a height that wheelchair users could not reach.

In their various forms, telephones have emerged as one of the most popular communication devices worldwide. Of Ghana's estimated 24 339 840 inhabitants, 17 436 949 (72%) and 277 897 (1%), respectively, had cell phones and fixed lines in 2010 (CIA World Factbook 2011; National Communications Authority 2011). The density of fixed lines in secondary schools is extremely alarming because, in comparison to the national density, the three schools surveyed had fewer than three fixed line telephones for a total student population of over 40,000.The fact that GES laws forbid cell phone use in all secondary schools nationwide exacerbates the matter by making fixed lines the primary method of contact for students. Telecommunications companies and school administrators should collaborate as

soon as possible to address this problem by making sure that more public phones are not only built but also made available in the different schools.

The building instruments state that problems with disabled-accessible restrooms include cramped interior spaces, poorly placed fixtures and fittings, and challenging-to-reach controls for sanitary appliances. Researchers in Malaysia and the United Kingdom found that public restrooms in their respective nations were inaccessible to individuals with impairments, significantly restricting their use (Kitchen & Law 2001). The results of this study show that, even at Ghana's top secondary schools, individuals with disabilities are frequently excluded from sanitary facilities. The issue needs to be altered since students are unable to remain at schools without utilizing the facilities. Consequently, this will be handled properly by school administrators.

As previously mentioned, the majority of the structures evaluated were constructed before the PDA was adopted in 2006 (Republic of Ghana 2006). Therefore, it's possible that its designers did not think it was crucial to make the built environment fully accessible to those with disabilities. Despite this, no efforts have been made to adapt and make these facilities and buildings accessible to people with disabilities; the school management attributes this to a lack of funding from the federal government. To give reality to its goal of providing universal education to its citizens, the central government should make funds available for this purpose as quickly as feasible. Furthermore, as was already mentioned, Ghana does not have a framework of policies that control and bind the country. The Draft Ghana Building Code (CSIR 1988) and National Building Regulations (Ministry of Works and Housing 1996) should be updated and supported by legislation to make it mandatory for all public buildings to be accessible to individuals with disabilities, as the PDA (Republic of Ghana 2006) has done. It should be mentioned that laws are useless unless they are followed. Therefore, in order to enforce this law through the proper state institutions, such as District, Municipal, and Metropolitan Assemblies, and, if required, punish all of the violators, the government must have the political will.

8. Sanitary accommodation

The study's findings (Table 8) showed that 83% of the bathrooms in La Nkwantanang's senior high schools had significant limitations for those with disabilities. Out of the three schools that were evaluated, not a single sanitary facility could be categorized as having minimal or no restrictions. Broad cubicles, non-slip flooring, relatively wide doors, and taps positioned at the proper heights made up the majority of the 17% of restrooms with mild restrictions for individuals with disabilities. Some instances of obstacles observed at the current sanitary facilities in schools are as follows:

- All schools lacked designated restrooms for people with disabilities, and the ones that did exist lacked grab rails on both the vertical and horizontal axes.
- The existing restrooms' doorways were too narrow to accommodate wheelchair users, and the cubicles lacked enough area for wheelchair users to move around.
- In certain instances, steps and other obstructions were used to rig the restroom entrances.

9. Conclusion

Every community's or nation's future depends on the educational attainment of its people, including those with disabilities. It is clear from the study's findings that the three secondary schools' design and construction hardly took into account the access requirements of people with disabilities. The majority of the buildings assessed were built before to the PDA's enactment in 2006, which contributed to this anomaly (Republic of Ghana 2006). Students with disabilities who attend some of these excellent secondary schools in Ghana have suffered as a result of the generally low percentage of accessibility of the various components.

Therefore, it should come as no surprise that the majority of disabled people wind up asking for charity on the streets and in marketplaces. Due to significant flaws in the constructed environment or architectural design that impede efficient academic work, integrating individuals with disabilities into the mainstream senior secondary education system presents several difficulties. People with disabilities can only attend our senior high schools with the assistance of permanent aides due to the current state of the buildings and infrastructure, which is not feasible or sustainable for the majority of pupils. Therefore, it is imperative that the situation be changed with the assistance of all parties involved in the government, the building industry, and the educational system.

The following recommendations are made to ensure the accessibility of the above school buildings by persons with disability:

- Workshop and seminars: To raise awareness of the value of barrier-free built environments, the government, legislators, non-governmental organizations, and disability organizations connected to the Ghana Federation of the Disabled should collaborate to host workshops and seminars. It is also possible to conduct public education using print and electronic media. The general public, who frequently lack knowledge of the needs of individuals with disabilities in society, will become more aware of these activities, which will ultimately hasten the pace at which these individuals are assimilated into mainstream society.
- Professional institutions: To retrain and educate their members about the value of barrier-free designs, professional built-environment organizations like the Ghana Institute of Architects, the Ghana Institution of Engineers, the Ghana Institute of Planners, and the Ghana Real Estate Developers Association should host workshops and seminars.
- Educational training: The GES need to encourage universities and polytechnics that educate architects or professionals in the built environment to add universal design courses to their curricula. Their students will be more prepared for their future careers as a result.

Contribution of the study

This study contributes immensely to the intensification of advocacy for persons with disability to guarantee equal educational inclusivity and access for all. Also, the outcome of this study will help to improve and share cases of accessibility of students in schools so that pragmatic solutions will be proffered.

Limitation and Suggestion for further studies

First, the study is limited in the sense that the focus was on the La Nkwantanang municipality. Future studies can consider extending to other municipalities in Ghana. As a result, any attempt to generalize the findings must be done with caution. Second, the study only adopted quantitative methodology. Future studies cam use mixed method to help guarantee detailed information from participants.

References

1. Ainscow, M. (2020). Inclusion and equity in education: Making sense of global challenges. Prospects, 49, 123-134.
2. Chen, S., Huang, Q., Liu, Z., & Wang, H. (2022). Inclusion of young children with special needs in early childhood education in the United States: Advantages and disadvantages. International Conference on Social Development and Media Communication.
3. Graham, B., White, C., & Street, C. (2019). School exclusion: a literature review on the continued disproportionate exclusion of certain. Department for Education. ISBN: 978-1-78105-956-2.
4. Griggs, N., & Moore, R. (2023). Removing systemic barriers for learners with diverse identities:

Antiracism, universal design for learning, and edpuzzle. Journal of Special Education Technology, 38(1), 15-22.
5. HandiKOS. (2020) International Day of Persons with Disabilities.
6. HandiKOS. (2020). Historiku, accessed on November 2020, http://handi kos.org/historiku/ Hanes, R., Brown, I., & Hansen, N. E. (Eds.). (2021). The Routledge History of disability. Routledge.
7. Jackson, M. A. (2022). Models of disability and human rights: informing the improvement of built environment accessibility for people with disability at neighborhood scale?. Laws, 7(1), 10. DOI: 10.3390/laws7010010 [17] [18]
8. Kart, A., & Kart, M. (2021). Academic and social effects of inclusion on students without disabilities: A review of the literature. Education Sciences, 11(1).
9. Kasapolli-Selani, A. (2016). Kosova bën pak për fëmijët me aftësi të kufizuara, accessed on https://www.evropaelire.org/a/27706536.html November 2020
10. Libertun de Duren, N., Salazar, J. P., Duryea, S., Mastellaro, C., Freeman, L., Pedraza, L., ... & Poitier, F. (2021). Cities as Spaces for Opportunities for All: Building Public Spaces for People with Disabilities, Children and Elders (No. IDB-MG-859). DOI: 10.18235/0003064
11. Materechera, E. K. (2020). Inclusive education: Why it poses a dilemma to some teachers.
12. International Journal of Inclusive Education, 24(7), 771-786
13. Mortice, Z. (2019). Design for all requires a culture change in architecture. AIA.
14. UNESCO. (2017). A Guide for Ensuring Inclusion and Equity in Education. United Nations Educational, Scientific and Cultural Organization.
15. United Nations. (2006). Convention on the Rights of Persons with Disabilities.
16. Vaghrodia, S., & Patel, H. (2022). Impact of inclusion education on attitude and social interaction of students with and without disabilities. International Journal of Scientific Research, 11(2), 50-51.
17. Wagner, C. V., Soler, S. G., Eddy, M. B., & Liebergesell, N. P. (2017). Four wheelchair-user architects. Universitat Politècnica de Catalunya, Iniciativa Digital Politècnica.