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ARTICLE

Influence of physical orthopedic design consideration on access to school facilities by pupils with physical disabilities in public integrated schools in Kitui County, Kenya DR.

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Abstract

This study sought to establish the extent to which infrastructural design considerations influence access to school facilities by pupils with physical disabilities in public integrated schools in Kitui County, Kenya. The research used a descriptive cross-sectional survey and a correlational design within a pragmatic paradigm to support a mixed method approach. There were 159 participants in the study, which had a total population of 767. The respondents comprised of head teachers, standard six and seven class teachers, pupils with special needs in classes six and seven, as well as BOM Chair persons. The instruments were tested in a pilot study to confirm their reliability and validity. Analysis of inferential statistics used Pearson's Product Moment Correlation (r), regression, multiple regression, and stepwise regression (R2) and F-statistics for hypotheses, as well as arithmetic mean and standard deviation in descriptive data. Physical orthopedic considerations in the construction of school infrastructure in Kitui County, Kenya, were shown to have a substantial impact on access for students with special needs at public integrated schools in the county. The study recommends formulation of appropriate policies that supports school infrastructural development and specifically that address physical orthopedic design considerations, Policy provision should support resource allocation, research and implementation. It is important to investigate the same variable in both public and private schools. This will enable comparison of the findings of the current study and the future ones. In addition, secondary school level learners are more mature than those from primary schools and their challenges could be different therefore, another similar study can be carried out at that level to enable comparison of findings.

Key words: Access, school facilities, physical orthopedic disabilities, orthopedic design considerations, public integrated schools.

1 | INTRODUCTION

After the adoption of the Convention on the Rights of the Child (CRC) in 1989 and the World Summit on the Rights of the Child in 1990, which resulted in some encouraging measures, it became clear that states and international organizations were taking their responsibilities toward children very seriously (international save the children alliance 2001). The CRC continues to be a historic agreement that addresses children's cultural, economic, social, political, and civil rights fully. Children's requirements for survival, growth, safety, and involvement are all taken into account in this policy (UNCRPD 2006).

Education is a fundamental right for every child, as stated in numerous international agreements, including the United Nations Human Rights Charter (1948), the Jomtien Forum on Education for All

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(1990), the Convention on the Rights of the Child (1989), the Dakar Framework for Action (2000), and the Kenya Children Act (2001). All children really mean 'All' including the disabled children without anyone assuming that they are just but a minority. Thus, education is right and key investment towards improving lives of people. Most children worldwide are exposed to schooling at some point, and it is the primary mechanism through which societies educate their children for the future (UNICEF, 2006). The disabled children are entitled to good and independent life, and education can give them the necessary skills.

United Kingdom parents play an active role in determining the educational needs of the kids they raise. Local education authorities (LEA) provide all schools with enough money to ensure that all students have the opportunity to study (Randiki 2002). Known as "local management of schools," the British government's market-like system was implemented in the 1980s (LMS). Under the LMS, schools compete for students with special needs in education (SNE) because of higher funding dependent on the number of kids enrolled (Hiulu 2002).

In 1991, Uganda's Ministry of Education and Sports became the first in the nation to implement inclusive education. Education Assessment and Resource Guidance and Counseling, a division devoted to serving students with special needs, was added to this in 2002. This department evaluates students with disabilities in the classroom and conducts appropriate intervention methods to assist them in succeeding (Randiki 2002).

The Kenya Government committed itself to universal primary Education (UPE) by ratifying the Universal Declaration of Human Rights (UN General Assembly Universal Declaration of Human Rights 10 December 1948. Other international policy frameworks ratified and signed by the government include The United Nations Convention on the Rights of the Child (CRC 1989), African charter in the Rights and welfare of the child (1990), United Nations Environment, Scientific and Cultural Organization (UNESCO).

Statement and Action Framework on Special Needs Education, Salamanca, 1994; Millennium Development Goals (MDG 2000). As a human right, education serves as a social vaccine against poverty, and as a crucial vehicle for national progress, integration, and peace, there are many reasons why this commitment has been made. As a fundamental human right, education has been a driving factor in our devotion to this goal. According to pleases & Reaven (2011), children with disabilities in Kenya are educated in either segregated or inclusive settings, despite international requirements to teach the children in an integrated environment.

Child rights are outlined in the Kenyan constitution's chapter 4, section 3 of the Bill of Rights, article 53, which states that children have the right to a free and compulsory primary education; adequate nutrition; shelter; and healthcare; protection from abuse, neglect; harmful cultural practices; all forms of violence; all forms of inhuman treatment and punishment; and hazardous or exploitative labor.

Getting excellent education to underprivileged children with disabilities remains a major concern, according to the EFA Global Monitoring Report 2010. In the United States, disability is one of the least obvious, yet most substantial, drivers of educational exclusion. Many children with disabilities in Africa do not go to school at all, according to the EFA Global Monitoring Report (2007). An estimated one-third of the world's 72 million primary-aged children who do not attend school due to lack of funds.

When it comes to economic standing, children with impairments fall behind their peers. In a World Bank Literature study titled "Poverty and Disability," Neufeldt discovered they are more likely to quit school sooner and have less credentials than other students. Children with and without disabilities may grow up together in a less discriminatory environment thanks to inclusive education. As a result of receiving an education, disabled children are less likely to fall into poverty and act as role models for others. Several of the youngsters claim that inclusive education is about changing the culture and practices of schools in their area, especially those that include children with disabilities, to better serve the diverse student population.

School facilities should be accessible regardless of a student's physical, sensory, intellectual, emotional,

or other requirements' (Salamanca Statement, 1994:6). Pupils with disabilities should be encouraged to attend their neighborhood school as much as possible, according to the'school for all' idea. One of the most significant aspects of an educational environment is the physical structure of the school. In addition to the administrative offices and classrooms, the school has a library, bathrooms, a kitchen, and a dining hall. According to Bell and Rhodes (1996), a school's utilization of resources is vital since it enhances learning possibilities for students.

MOE (2004) official data shows that there has been a substantial lack of infrastructure and permanent classrooms in disadvantaged communities for a long period of time. Meanwhile, the current infrastructure was in a bad state owing to a lack of investment, subpar building standards, and poor upkeep. The congestion and bad circumstances that resulted from the surge in enrollment were detrimental to students' ability to study. Schools are making great strides in meeting the needs of a rapidly expanding student population. KISE, (2000) is a noteworthy achievement in and of itself. It has been decided to make only minimal adjustments to earlier arrangements when developing new buildings and procuring school facilities and equipment, on the idea that similar equipment and institutional materials will serve equally well for the nurturing of all skills among students. Getting about, learning to read and write, and hearing are all difficult tasks for children with exceptional needs. As a result, all individuals with disabilities need access to a broad set of services.

2 | STATEMENT OF THE PROBLEM

Education is universally recognized as a fundamental human right. Article 26 of the Universal Declaration of Human Rights declares that everyone has the right to an education (UN, 1948). In addition, international, regional and national rules and regulations underline the importance of this issue. All children should have access to a basic education under the Jomtien Declaration, often known as Education for All. Attention must be given to children with disabilities and appropriate steps adopted so that all people with disabilities have equal access to school, according to the decree (UNESCO, 1990).

Achieving the goals of universal primary education requires enrolling and completing the primary school cycle for all children, including those with physical disabilities or other special needs. Getting a kid with special needs into school, keeping them there, and seeing them through to graduation is tough. A handicap is one of the least evident but most important causes to educational marginalization, according to UNESCO (2010). The stigma connected to physical or mental handicap is often a factor in social isolation. According to a dearth of scientific data on impairments and educational access, (Fulmer 2008).

'Discrimination on any basis' is prohibited under Kenya's 2010 constitution. There is still significant discrimination in Kenya, despite clear constitutional protections and limits. This may take various forms and affect people of all sexes, ages, and all types of disabilities equally. As an example, those who are deaf or hard of hearing, as well as individuals with autism spectrum disorders, developmental problems, or deaf-blindness and its accompanying impairments, all face distinct kinds of prejudice. Unequal resource allocation and disparate access to education and health care are examples of prejudice that affects people of color in a wide range of contexts, from the workplace to the home.

For school buildings, established demands and baseline technical criteria such as area footages or standardized educational parameters are used to construct the architectural design plans. In the unfortunate inclination to let budgets or value engineering stand in the way of reaching higher order goals like curriculum, utility, accessibility, attractiveness, appropriateness or sustainability as Taylor (2009) pointed out; designs tend to become bogged down by these.

The physical layout of most schools is seldom, if ever, altered in order to solve urgent infrastructure issues or school building renovations. Few, if any, alterations are made to the educational setting in order to accommodate students with disabilities. As a result of the National Government's Constituency Development Fund, new schools are built each year to replace old and deteriorated buildings (NG-CDF).

Despite the significant improvements in education, many new school buildings still lag behind when it comes to providing sufficient facilities for kids with disabilities in schools that are considered inclusive.
Only 39 percent of Kenya's estimated 1.7 million persons with disabilities had attended a mainstream elementary school and only 9 percent had completed high school, according to the Kenya National Survey for Persons with Disabilities (2008). (2008). to keep people in poverty and unable to work, you must prevent them from going to school. In Kenya, special needs education is provided in special schools, integrated units, and inclusive settings inside regular schools, as well as in other settings. Many disadvantaged children, on the other hand, do not attend school. According to the Ministry of Education(200)9, only 22,000 special needs pupils were enrolled in schools in 1999, but that number rose to 26,885 in 2003 and to 45,000 in 2008. However, when compared to the overall number of students in the United States in 2008, this is a poor comparison. According to Njoka, Riech, Obiero, Kemunto, Muraya, Ongoto, and Amenya, over 1 million children of school age remained unenrolled despite the resumption of FPE in 2003. (2012). Marginalized and vulnerable children include those with specific needs, HIV/AIDS sufferers, and youngsters from urban slums. In view of these figures, the aim for conducting this evaluation was to determine the degree to which Kenyan school infrastructure is accessible to children with disabilities so that they may fully engage in education. A more varied and educated society has always been an aim of the global community, and this is no exception. In addition, it was discovered in this research that particular considerations for the requirements of students with disabilities had been included into the infrastructure design. Many studies have focused on the qualities of teachers, economic and social difficulties, curricular issues, and attitudes toward children with special needs. Unanswered questions remain about how schools are constructed and whether or not school architects have made sure that school infrastructure is accessible to students with special requirements. In order to bridge this gap, our research tried to determine the degree to which infrastructure is available to everybody.

3. OBJECTIVE OF THE STUDY

This study was guided by the objective,' to establish the extent to which physical orthopedic design considerations in designing school infrastructure projects influence access to school facilities by pupils with special needs in public integrated schools in Kitui County, Kenya.

4 | HYPOTHESIS

H_1: There is significant relationship between physical orthopedic considerations in designing school infrastructure projects and access to school facilities by pupils with special needs in public integrated schools in Kitui County, Kenya.

5 | LITERATURE REVIEW

The term "accessibility" refers to the ease with which students with disabilities may make use of facilities, services, and other resources. Classrooms, playgrounds, and WASH facilities are all examples of places that fall under the umbrella term "environment." Facilities such as a pump, well, or classroom furnishings are examples of amenities. Computers and other educational resources, as well as books, internet services, and computer software, are examples of resources found in schools (Centre of Inclusive Design and Environmental Access, 2012.)
It's crucial to remember that the term "disabled" does not apply to those who have long-term physical, mental, intellectual, or sensory limitations that prohibit them from fully and equally participating in society. Students with disabilities have a wide range of challenges in obtaining the education they need to lead healthy, productive lives as members of society. These limits, which are recognized in the UNCRC and the UN Convention on the Rights of People with Disabilities, deny a child's right to education (CRPD). As a consequence of these accords, governments promise that all students, regardless of handicap, will be allowed to attend school.

As stated in the United Nations Convention on the Rights of the Child, children with physical disabilities should have the same rights and freedoms as all other children. Access to school and assistive technology are critical rights for children with physical limitations. They are frequently denied the opportunity to engage in society because of their physical disabilities. This is the reality of life for children with disabilities. As a result, they are often denied the same educational and life-skills opportunities that are accessible to other youngsters. Either they don't have a voice, or their opinions aren't taken seriously. Their testimony is often rejected or discounted, and they continue to be isolated because of their vulnerability to abuse and violence.

Every country's concern is for physically disabled children's right to education and their ability to use assistive technology in their daily lives Nations throughout the globe strive to guarantee that their inhabitants have equitable access to resources (WHOM 2011). From 2002 to 2006, the Convention on the Rights of Persons with Disabilities was negotiated, making it the fastest-negotiated human rights pact. It is required that public spaces and outdoor areas be made accessible as part of the standards governing the construction of new homes and other structures. National and local authorities, as well as organizations and service providers, keep an eye on the built environment to ensure accessibility. Disability awareness is not part of the curriculum for planners, architects, or construction engineers. For the deaf, the use of sign language is not officially sanctioned. Education for deaf people does not utilize it as their first language and it does not serve as a way of communication between the deaf and others.

All children of school age, including those with physical impairments and other special needs, must be enrolled and complete the primary school cycle in order for universal primary education to be accomplished. Children with impairments have significant challenges in attending, participating in, and graduating from school. Unsurprisingly, disability has been identified as a significant contributor to educational exclusion by UNESCO (2010). Stigma is attached to both physical and mental incapacity, which may lead to exclusion from society and schools. Disabilities and access to education have been the subject of little empirical research thus far, though (Fulmer 2008). In recent years, inclusive education has become increasingly prominent in Kenya as a means of achieving the country's educational objectives and ambitions. It's not simply a matter of getting the kids to school; it's also a matter of how they go to school.

Schools, both literally and symbolically, tend to be at the heart of communities. In addition to serving as a gathering place for the local community, schools are regularly called upon to serve as emergency shelters in the case of catastrophes or unrest. Because of this, the whole community benefits when schools are designed with accessibility in mind. In order to promote inclusive education, societal change necessitates changes to school facilities. The inclusion of universal design principles in educational facilities is sometimes seen as prohibitively costly, with the resulting impact on the overall project budget. As a result, the cost of new school building is quite low when accessibility is included into the design process. New building may typically achieve "full compliance with all the requirements of accessibility standards for a one-percent expense," according to the WHO's 2011 World Report on Disability.

Affordability does not have to be a barrier to improving accessibility. When it comes to making a school more accessible to students with disabilities and making it easier to get about, simple fixes like installing handrails on stairs, building a wooden ramp, or re-painting doors may make a big difference. We can see that establishing inaccessible schools has a tremendous cost to society. Indirect expenses arise when students with disabilities are unable to attend school due to inaccessible facilities or curriculum. When a kid is unable to go to school, parents are responsible for the expense of child care, as well as the loss of income if a family member needs to remain at home to care for their child. Building accessible schools alone is not enough to ensure that all children have equitable access to educational opportunity. Access to proper assistive devices and technology to meet the educational requirements of children with impairments may significantly improve their skills. An assistive device is needed for everyday tasks like moving

about the community, lifting an object, or reading a book. Assistive technologies' primary objective is to help people with disabilities maintain their independence. Students with disabilities may benefit from the usage of these tools and technology, whether as a mobility assistance or as a means of communication in the classroom. All students should have the opportunity to attend school, regardless of their ability to walk or use Braille or text-to-speech technology to learn. (UNICEF, Child Friendly Schools, Chapter 3, Location, Design and Construction, 2009, p.1.).

Some communities do not appreciate children with disabilities, and this is frequently reinforced by institutional policies and practices that exclude and isolate them from the general population. In accordance with Article 24 of the CRPD, students with disabilities are granted equal access to education at all levels. According to the Convention on the Rights of the Child, students with impairments have the right to be included in regular classrooms, rather than being separated. Disability is associated with social stigma and negative attitudes. Children with disabilities and their educational experiences are negatively impacted by disability stereotypes (e.g., thinking that the kid is "defective" or that the handicap is a punishment for one's "sins"). As a result, parents and kids with disabilities are discouraged from enrolling in schools because of a lack of assistance for students with impairments. Learning resources and teaching techniques for students with learning difficulties and other sensory impairments are often unavailable in many schools. Students with disabilities should have access to accessible teaching techniques and learning resources in inclusive environments. Students with impairments and their families face physical and architectural obstacles as a result of poor design. This makes it more difficult for students to get access to educational resources, such as services and facilities. The concept of accessibility is sometimes oversimplified, such as by assuming that installing a ramp would suffice to meet all of a school's accessibility requirements. Every step a student takes to go from their house to their classroom should take accessibility into account. Students who are blind or deaf will not benefit from a ramp, for example.

The special requirements of students with disabilities should also be taken into consideration if they are to be successful in school. It is also necessary to provide specific modifications to meet the requirements of particular students, in addition to improving the accessibility of schools as a whole. In the absence of an assistive device to go to and from school, a student with a handicap is denied her right to an education. This is despite the school's many accessible amenities, such as ramps, bigger entrances, and accessible restrooms. In order to accommodate the student's requirements, the school administration should provide him with a wheelchair. If a youngster is visually impaired, has an educational handicap, or has limited use of his hands, completing a written exam may need additional support. A suitable accommodation would be to give the student additional time to complete the exam and to assign a writer to assist him or her. Students with disabilities must have these types of reasonable accommodations if they are to fully achieve their constitutional right to an education.

For UNICEF's 2014-2017 Strategic Plan 2014-2017 goals of "Improve learning outcomes and inclusive education," as well as "Provide safe drinking water, sanitation and good hygiene facilities in schools," making schools accessible to students with disabilities is a critical component (with a special emphasis on the needs of girls). Construction of inclusive schools instantly helps the Open Working Group's proposed Sustainable Development Goal 4: "provide inclusive and equitable quality education and encourage the chances for lifelong learning for everyone." To that aim, UNICEF's Child Friendly School (CFS) initiatives place a high priority on accessibility. While this study focuses on accessible communication techniques, accessible curriculum materials, and accessible school infrastructure, the larger concepts of inclusive education are essential for ensuring that children with disabilities get the full educational benefits of a school system.

Inclusive education can only succeed if existing and new systems are enhanced. Within schools, access requirements govern how students enter and move around the buildings, but are these guidelines followed in all of our schools? This research tried to determine the existing state of affairs. It is vital that

instructors interact with one another and offer the kid with the tools necessary to learn. Creating an enabling educational environment and providing assistive technologies is necessary for attaining equality of opportunity, exercising human rights, and living in dignity (UN 1993). Under the United Nations Convention on the Rights of Persons with Disabilities (CRPD), states are held accountable for ensuring personal mobility for persons with disabilities while maintaining the greatest possible independence. States are also held accountable for increasing the availability and accessibility of assistive devices for people with disabilities.

6 | THEORETICAL FRAMEWORK

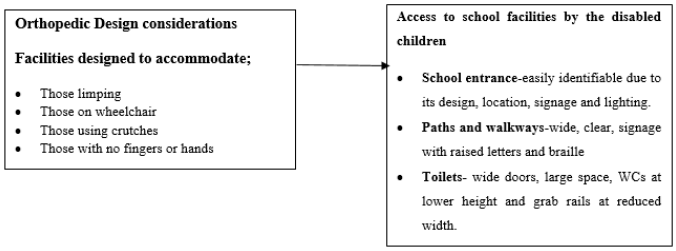
Ludwig von Bertalanffy created the systems approach theory in 1956, and it will guide our investigation. In the following years, Ross Ashby expanded on the idea. There is a hypothesis that a system is an organized collection of components that work together to accomplish certain objectives. Organizations are seen as open systems made up of several subsystems under this paradigm. All of these components are interconnected and interdependent. Communication, decision-making, accountability, relationships, goals, rules, procedures, and other aspects of a coordination mechanism connect multiple organizational subsystems or sections.

The school infrastructure design, the facilities and equipment form part of the system in which learning takes place. For an inclusive school the appropriate design of classrooms, circulation routes, stairs, lifts, toilets among others are paramount in making the school environment friendly to the disabled children hence can affect learning. Inadequate facilities and equipment do affect the children's learning negatively.

Erikson's phases of psychological development theory, Gardner's idea of multiple intelligences, and Bronfen brenner's Ecological system theory will all be used to drive this research. Each of these ideas focuses on a different aspect of the teacher's role in helping students build emotional and behavioral resilience and understanding how mindfulness may be used in the classroom. The Gardeners' (1983) notion of many intelligences gives a larger perspective of human potential than simply language and logical/mathematical aptitudes. According to Gardner, success in school is not only determined by students' abilities in the three core academic subjects of reading, writing, and arithmetic (Gardner &Hatch 1989; Mathews 1994) Gardener (1989) outlines the many types of individual intelligences.

Socio-ecological theory complements Gardner's (1983) more psychologically oriented approach by focusing on the interrelationships between the social system and human development (Lee & Stewart, 2013). To give two examples, Erikson's (1963) theory of stages of psychological development emphasizes the role of social and cultural context at various stages of systems, while Bronfen Brenner's (1989) ecological systems theory examines the reciprocal interaction between the various social contexts in which the developing child is present. These ideas emphasize the link between the development of emotional and mental well-being and the events and environments in which one grows up. In this way, they emphasize the need of including classroom methods that foster mental and emotional well-being learning.

7 CONCEPTUAL FRAMEWORK



8.0 | RESEARCH METHODOLOGY

8.1 | PHILOSOPHY AND DESIGN

A research paradigm (philosophy) used in this study is pragmatism. According to Creswell (2013), pragmatism is a philosophy that emerges from acts and outcomes rather than preconditions, which is why it is often referred to as a "pragmatic"

philosophy. There is a reluctance to put into practice what has been shown to work in the past (Creswell, 2013). It is common for philosophers who believe in the reality of anything contested to be realists, according to May (2001). Rather of focusing on methodology, researchers instead focus on the topic itself, which drives their study.

Pragmatism sheds insight on how different research methods might be used in a productive way. Research methods should be combined in a manner that provides the highest chance of addressing significant research questions (Johnson & Onweugbuzie, 2004). For mixed-mode studies, it highlighted how important it is to concentrate on the research topic and then use a variety of techniques to gather information about it (Creswell, 2013). As a result, the mixed mode approach in this research was guided by the pragmatism paradigm.

8.2 | RESEARCH DESIGN

To conduct this research, we used a cross-sectional descriptive survey and a correlational study design. Both descriptive and inferential examination of data necessitated the employment of the two designs. As an example, a cross-sectional descriptive survey design is all about documenting and documenting the current circumstances.

Data were obtained from a pre-determined population at a single moment in time when cross–sectional surveys were used (Fraenkel & Wallen, 2008). According to Kottari (2004), surveys only look at what is already there, what is happening, what the repercussions are, and what the trends are emerging? Using this design allowed us to collect a wide variety of data, making it the best choice for our investigation. It was also capable of minimizing bias and enhancing dependability.

8.3 | TARGET POPULATION

The target population for this study was 767 respondents composed of 107 head teachers of integrated schools in Kitui county, 214 standard six and seven class teachers and 339 pupils with special needs from the 107 integrated schools in the county. (Kitui county education office 2021).

8.4 | SAMPLE SIZE

The sample size for this study was 159 participants who consisted of thirty-one head teachers, sixty-two class teachers, thirty-one BOM chairpersons and thirty-five pupils all selected from the schools in the selected five sub-counties in Kitui County.

That which emerges at the conclusion of an extensive research project is nothing more than the care, accuracy, attention and thinking that went into creating the research design and selecting a target audience, according to Leedy (1997) Mutai (2000) argues that sampling is a means of reducing the amount of resources needed to acquire data.

8.5 | SAMPLING PROCEDURE

A mix of stratified random sampling and multi-stage sampling was used in this research because of the many degrees of involvement. A multi-stage sampling approach, according to Huber (2004), would be the best option for a large population since it would ensure that every sub-population is included in the sample.

The first stage selected 30% of the sixteen sub-counties in Kitui County, which is five sub-counties. Sekaran (2003) indicates that in sampling procedures, a minimum of 30% of subpopulations is essential for statistical analysis. The five sub-counties were purposely selected based on the number of integrated schools in each sub-county. The results were as follows;

Table 1: *Sampling Frame*

Total no. of sub-counties	No. of sub-counties sampled (30%)	No. of integrated schools in sampled S/counties	No. of schools sampled (census)	Total no. of SNE children in sampled schools	No .of pupils sampled(std6 & 7 pupils)
16	5	31	31	339	35

Table 3.2 shows the total number of sub-counties in Kitui County, number of sub-counties sampled, number of integrated schools in the sampled sub-counties, the number of special needs children in the sampled schools, and number of special needs children who are in classes six and seven in the sampled schools

Table2: *Criteria for Sampling*

Sub-county	Number of integrated schools	No. of schools sampled	No. of sampled pupils in std 6 & 7	No. of HTs sampled	No. of class teachers sampled	No. of BOM chairpersons sampled
Kitui central	11	11	20	11	22	11
Mwingi central	7	7	6	6	14	7
Kitui west	5	5	5	5	10	5
Matinyani	4	4	2	4	8	4
Chuluni	4	4	2	4	8	4
TOTAL	**31**	**31**	**35**	**31**	**62**	**31**

Data from the selected sub-counties are shown in Table 3.3, which also includes information on the total number of students, instructors, and BOM chairpersons in each integrated school.

The remaining 35 pupils, all of whom were in classes 6 and 7, were chosen in a third-stage process. These two classes were chosen because they had been in school for long;hence, the pupils can give their real life experience within the school build environment and accessibility to different school facilities. They gave practical life experiences of how they had interacted with the school built environment. Class eight pupils were not be selected because they would be busy preparing for their final examination. All the thirty-one head teachers of the selected integrated schools were automatically respondents due to their positions as heads. The classes six and seven teachers were also be participants owing to their responsibilities as class teachers. These were 62 in total. Thirty-one school BOM chairpersons were also respondents.

8.6 | DATA COLLECTION PROCEDURES

To carry out the research, the scientist had to get approval from the National Commission for Science, Technology, and Innovation. In order to gather data, he hired and trained research assistants. Each research assistant was given a set number of elementary schools to gather data from when the permission was obtained. Bookings were made in advance by calling the principals of the schools that were interested in having me come in. It was made clear to every participant, both orally and in writing, that the data they provided would be kept strictly secret and utilized only for academic reasons. The researcher or assistants would personally administer the questionnaires and would be available to handle any clarification sought by the respondents. Before delivering the surveys, participants were given a short explanation of the study's scope and significance. The researcher or specially trained research assistants visited each of the schools in the study area and filled out observation forms and questionnaires with the students.

8.7 | DATA ANALYSIS TECHNIQUE

The four stages of data analysis often utilized in research projects were used to examine the information gathered during this investigation. Cleansing, reducing, differentiating, and explaining data are all part of this process. Cleaning up data included coding and tabulation to identify anomalies and provide numerical values to replies that might be used for further study.

8.8 QUALITATIVE DATA ANALYSIS

Many different techniques and procedures are used in qualitative data analysis to translate the raw data into relevant interpretations of the people and circumstances being studied. This is known as "translation." In the end, the goal is to analyze the significance and symbolic meaning of qualitative data. Data analysis is defined by Bogdan and Biklen (2003) as dealing with data, organizing it, breaking it down into manageable components, coding and processing, synthesizing, and looking for patterns. This process is beneficial in searching for patterns to explain influencing patterns and relationship from the data collected.

The qualitative analysis started at the same time as the collecting of data. It is the purpose of qualitative data analysis to make sense of vast volumes of data by decreasing the volume, identifying key patterns, and offering a representation of what the data implies, according to Best and Khan (2004). Qualitative data was processed and evaluated in three stages. After each interview, we compiled the raw data into daily briefs, which were then grouped into main topic categories. Additional information was sought for those regions that needed it in order to prepare interim reports; the necessary data was found. As part of the mixed mode approach, we conducted a thorough analysis and interpretation of the interim report. This information will be included into the final report. Data gathering and qualitative data analysis were carried either in parallel or sequentially. Table 3.5 illustrates the operationalization of the variables below, which were assessed and evaluated in accordance with the study's goals.

Counterchecking was then performed to verify that no erroneous entries were made after the data was entered into the SPSS version 20 computer software with the necessary codes and variable specification. The framework-based approach proposed by Richie et al. (2003) was utilized to assess the qualitative data gathered from the questionnaire's open-ended questions. When it came to arranging and categorizing information, essential topics, ideas, and categories were taken into consideration.

8.9 QUANTITATIVE DATA ANALYSIS

The mean and standard deviation were computed using descriptive statistics, which are often employed in statistical analysis. Each independent variable (orthopedic, sensory, intellectual, and emotional factors) was correlated with the dependent variable (access to school facilities), which was determined using Pearson's correlation coefficients. Pearson r was utilized in this investigation since the data were measured on an interval scale and the person's correlation coefficient approach is suggested for identifying relationships with such data (Kothari, 2004). The relationship between the variables being rectified is assumed to be linear. This assumption was evaluated using the data by first generating a scatter graph to determine the variables' linear connection. Correlations were calculated using two-tailed tests to account for the chance that the independent variable's effect on the dependent variable may take a positive or negative direction.

Simple linear regression models were used to examine the connections between the independent and dependent variables. To examine the moderating variable, multiple regression and stepwise models were utilized. The significance threshold for evaluating hypotheses in this research was set at 0.05. In order to find out how much an independent variable influences a dependent one, regression analysis was an absolute need.

9 | DISCUSSION, CONCLUSIO AND RECOMMENDATIONS

9.1 | Analysis of Likert-scale Data Type

Likert-scale are used mostly where the researcher wants to evaluate opinions and attitudes (croasmun &Ostrom, 2011). The attitudes are measured in a certain order on a scale (creswell, 2013). It shows the intensity to which the attitude of the respondents

reach. Statements regarding a particular issue of interest are posed to the respondent and for each statement they are asked to give their opinion on how they feel about the statement then this feeling is rated on a Likert scale (Joshi et al., 2015). The scales are of different types however the basic knowledge is that the strong negative feelings are rated low on the scale that is they are given a one which for instance could represent strongly disagree or Very Minimal extent, while the highest positive feeling or attitude is given the score five which for instance may represent strongly agree (Chyung et al., 2017).According to Burke (2013) data that is of Likert type follows the assumption of being equidistant to allow using the parametric tests for analysis. In this study, a five point Likert scale was used as follows; No extent (NE) 1<NE<1.8; Very Minimal Extent (VME) 1.8<VME<2.6; Minimal Extent (ME) 2.6<ME<3.4; Great Extent (GE) 3.4<GE<4.2; and Very Great Extent (VGE) 4.2<VGE<5.0. Mathenge (2020) and Nyaga (2014) successfully used a similar scale in their studies.

9.2 | Access to School Facilities by Students with Special Needs

The accessibility of school amenities for students with special needs was chosen the dependent variable in this research. A follow-up question was then posed, asking respondents whether they felt that these school amenities were accessible to students with special needs. The ten items rated on a five-point Likert scale with the following scoring ranging from; No extent (NE) 1<NE<1.8; Very Minimal Extent (VME) 1.8<VME<2.6; Minimal Extent (ME) 2.6<ME<3.4; Great Extent (GE) 3.4<GE<4.2; and Very Great Extent (VGE) 4.2<VGE<5.0. The mentioned scales give an equidistance of 0.8. Table below shows the frequencies (F), percentages (%), mean (M) and standard deviation (SD) of the responses of the extent to which school facilities were accessible to pupils with special needs. The overall question statement was; Indicate by ticking the extent to which you consider the following facilities are accessible to pupils with special needs.

Table3: *Access to School Facilities*

	Item	No extent at all **Frequency (%)**	Very Minimal Extent **Frequency (%)**	Minimal extent **Frequency (%)**	Great Extent **Frequency (%)**	Very Great Extent **Frequency (%)**	Descriptive measure **Mean (standard error)**	Dispersion measure **Standard Deviation**
15a	Classrooms	2 (1.4)	14 (10.1)	62 (44.6)	60 (43.2)	1 (0.7)	3.32 (0.061)	0.723
15b	Assembly	2 (1.4)	5 (3.6)	48 (34.5)	80 (57.6)	4 (2.9)	3.57 (0.058)	0.682
15c	offices	2 (1.4)	7 (5.0)	47 (33.8)	75 (54.0)	8 (5.8)	3.58 (0.063)	0.742
15d	Staffroom	2 (1.4)	12 (8.6)	40 (28.8)	80 (57.6)	5 (3.6)	3.53 (0.065)	0.764
15e	Kitchen	3 (2.2)	19 (13.7)	90 (64.7)	24 (17.3)	3 (2.2)	3.04 (0.059)	0.696
15f	Door handles	5 (3.6)	86 (61.9)	35 (25.1)	12 (8.63)	1 (0.7)	3.56 (0.056)	0.751
15g	Switches	2 (1.4)	25 (18.0)	57 (41.0)	54 (38.8)	1 (0.7)	3.19 (0.067)	0.788
15h	Washroom	11 (7.9)	72 (51.8)	35 (25.2)	19 (13.7)	2 (1.4)	2.49 (0.075)	0.879
15i	Car Park	2 (1.4)	24 (17.3)	77 (55.4)	34 (24.5)	2 (1.4)	3.07 (0.062)	0.729
15j	Play fields	1 (0.7)	16 (11.5)	48 (34.5)	72 (51.8)	2 (1.4)	3.45 (0.061)	0.711
	Composite mean and standard deviation						3.22 (0.0429)	0.506
	Sample size n = 139	Cronbach alpha = 0.829	Composite mean = 3.22	Standard error of composite mean = 0.0429	Composite standard deviation = 0.506			

From the table the overall composite mean was 3.22, the composite standard deviation was 0.506 and the Cronbach alpha was 0.829. The standard error of the composite mean was 0.0429 which is a low standard error, therefore showing that the composite mean estimate was a true reflection of the population mean. The Cronbach alpha is used to check for internal consistency. A value of 0.7 and above is good, a value of 0.8 is better and 0.9 is the best (Thigpen et al., 2017). Therefore, in this case since the value of Cronbach alpha was 0.8, this shows that the data was consistent.

From the table, classrooms were accessible to pupils with special needs at minimal extent as is shown by 62 (44.6%) of the respondents. The mean of the access to classrooms was 3.32, while its standard error was 0.061 which is a low standard error showing that the mean was a true estimate of the population mean and the standard deviation was 0.723. Assembly was accessible to pupils with special needs at great extent as is reflected by the highest percentage of 80(57.6%). The mean for access to assembly responses was 3.57, while its standard error was 0.058 and the standard deviation was 0. 682. Offices, staffroom and playfields were also accessible to pupils with special needs at great extent as is shown by the corresponding percentages of 75(54.0%), 80(57.6%) and 72(51.8%) respectively. The mean responses for offices access was 3.58 with a standard error of 0.063 and a standard deviation of 0.742, the mean responses for staffroom access was 3.53 with a standard error of 0.065 and a standard deviation of 0.764 and the mean responses for playgrounds was 3.45 with a standard error of 0.061 and a standard deviation of 0.711. The facilities that were accessible to a minimal extent include kitchen, switches and car park. This is reflective from the highest responses on minimal extent as follows; 90 (64.7%) for kitchen, 57 (41.0%) for switches and 77 (55.4%) for car park. The mean responses for kitchen was 3.04 with a standard error of 0.059 and a standard deviation of 0.696, while the mean responses for switches was 3.19 with a standard error of 0.067 and a standard deviation of 0.879 and the carpark facility had a mean response of 3.07 with a standard error of 0.062 and a standard deviation of 0.729.

Only two facilities were accessible to a very minimal extent that is door handles and washrooms. This is evident from the responses of 86 (61.9%) for door handles and 72 (51.8%) for the washrooms. On average the mean responses for door handles were 3.56 with a standard error of 0.056 and a standard deviation of 0.751 while the mean responses for access to washrooms was 2.49 with a standard error of 0.075 and a standard deviation of 0.879.

From the results, most of the facilities were accessible to a minimal extent. These results agree with findings from the study by Mutugi (2018) whose study shown that facilities in schools for pupils with special needs posed a great challenge in schools since they were inadequate. This is insisted by most respondents who while being interviewed said;

"All buildings in schools should be redesigned and rebuilt or features added to ensure that they have provisions that accommodate the needs of special children

9.3 Physical Orthopedic Considerations

The goal of this research was to determine how physical orthopedic design elements in the design of school infrastructure affect access by students with special needs in public integrated schools. To do this, descriptive analysis on the individual independent variable indicators was done, an inferential analysis was also done by checking the correlation between the independent variable that is physical design considerations and the dependent variable that is access to school facilities by pupils with special needs and then simple linear regression was performed. Variables in access to school facilities and physical orthopedic issues were acquired as a composite index will that was calculated by averaging all five Likert scales replies from each responder. A total of twelve items rated on a five-point Likert scale with the following scoring ranging from; No extent (NE) 1<NE<1.8; Very Minimal Extent (VME) 1.8<VME<2.6; Minimal Extent (ME) 2.6<ME<3.4; Great Extent (GE) 3.4<GE<4.2; and Very Great Extent (VGE) 4.2<VGE<5.0. The mentioned scales give an equidistance of 0.8. The table below shows the descriptive characteristics of the items for the physical orthopedic considerations.

Table 4: *Physical orthopaedic considerations Descriptive characteristics*

	Scale F %	NE F %	VME F %	ME F %	GE F %	VGE F %	Mean	SD
14a	School buildings are easily accessible by physically disabled children	6 (4.3)	87 (62.6)	7 (5.0)	33 (23.7)	6 (4.3)	2.61	1.032
14b	The walk paths are wide enough for children on wheelchair, with crutches and limping.	5 (3.6)	96 (69.1)	8 (5.8)	23 (16.5)	7 (5.04)	2.5	0.981
14c	Floors are non-slippery	8 (5.8)	41 (29.5)	10 (7.2)	72 (51.8)	8 (5.8)	3.22	1.110
14d	Raised floors and stairways have ramps	51 (36.7)	60 (43.2)	2 (1.4)	22 (15.8)	4 (2.9)	3.22	1.110
14e	Doors are wide enough for those on wheelchair/crutches to pass through	14 (10.1)	95 (68.3)	8 (5.8)	14 (10.1)	8 (5.8)	2.33	0.988
14f	Door handles, switches, sockets are reachable from sitting position.	13 (9.4)	70 (50.4)	8 (5.8)	45 (32.4)	3 (2.2)	2.68	0.988
14g	Washrooms are easily accessible by physically disabled children	75 (54.0)	38 (27.3)	7 (5.0)	14 (10.1)	5 (3.6)	1.82	1.137
14h	The main entrance is free from steps.	18 (12.9)	36 (25.9)	2 (1.4)	76 (54.7)	7 (5.0)	3.13	1.23
14i	There are ramps where there is change in surface level.	57 (41.0)	56 (40.3)	1 (0.7)	22 (15.8)	3 (2.2)	1.98	1.119
14j	Desks and tables have knee-space clearance for wheelchair users.	17 (12.2)	107 (77.0)	2 (1.4)	12 (8.6)	1 (0.7)	2.09	0.737
14k	School compound is evenly leveled	12 (8.6)	73 (52.5)	7 (5.0)	45 (32.4)	2 (1.4)	2.65	1.068

Sample size n = 139, Cronbach alpha = 0.867, Composite mean =2.4604, Composite standard deviation = 0.698

From the table the composite mean was 2.4604 with a standard error of 0.059. This was a low standard error showing that the mean was a true estimate of the population mean. The composite standard deviation was 0.698, which was also a small value hence there was no much variations in the responses. The value of Cronbach alpha was 0.867, which shows that there was great consistency in the responses to the Likert scale.

From the table the physical design consideration in designing washrooms infrastructure and putting up ramps where there is change in surface level were considered at no extent at all according to the majority of the respondents that is 75 (54.0%) and 57(41.0%) respectively. This is also reflected in the mean which was 1.82 with a standard error of 0.095 and a standard deviation of 1.119 for the washrooms designs and 1.98 mean with a standard error of 0.095 and a standard deviation of 1.119 for design considerations when there are changes in surface level.Physical design considerations that were considered at very minimal extent include; school buildings 87 (62.6%), wide walk paths that could accommodate wheelchairs, pupils with clutches 96 (69.1%), ramps on raised doors and stairways 60 (43.2%), doors that are wide enough 95 (68.3%), door handles and switches that are reachable 70 (50.4%), desks and tables had knee space 107 (77.0%) and school compound was evenly distributed 73 (52.5%). Of all the indicators of physical design consideration used in this study only two physical designs were considered at great extent that is non-slippery floors 72(51.8%) and the main entrance being free from steps 76 (54.7%).Aiyabei (2016) observed that most physical infrastructure designs did not take into account the demands of learners with special needs. These results are consistent with this research. Open places like playgrounds, according to the majority of those who responded to the researchers' survey, are more suited to accommodate students with special needs than school structures.

9.4 | Correlation Analysis

There was a correlation between the first independent variable, physical orthopaedic design considerations, and the outcome variable, access to school facilities by kids with special needs, as seen in the table below. Using the Pearson product moment method, the correlation value was determined. This technique has been used in previous studies like one done by Odongo and Davidson (2016).

Table 5: *Correlation*

		Access to school facilities by pupils with special needs	Physical orthopedic design considerations
Access to school facilities by pupils with special needs	Pearson Correlation	1	.537**
	Sig. (2-tailed)		.000
	N	139	139
Physical orthopedic design considerations	Pearson Correlation	.537**	1
	Sig. (2-tailed)	.000	
	N	139	139

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient in the table was 0.537. At the 0.01, level of significance, there was a substantial positive link between physical orthopedic design considerations and access to school facilities for students with special needs.

9.5 Regression

This study sought to investigate the hypothesis H1: There is significant influence between physical orthopedic considerations in designing school infrastructure and access by pupils with special needs in public integrated schools in Kitui County, Kenya. To test this hypothesis this research conducted a simple linear regression analysis of the model: Y= a+ B1X1+e, where: Y= access to school facilities by pupils with special needs, a = constant, B1 = coefficient for the predictor variable physical orthopaedic design considerations and X1 =physical orthopaedic design considerations and e=error term. Following an analysis of variance, the accompanying findings were found and given in the following table.

Table 6: *Regression*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F	df 1	df2	Sig. F Change
1	.537[a]	.288	.283	.42843	.288	55.515	1	137	.000

Analysis of Variance (ANOVA)

Model	Sum of squares	df	Mean squares	F statistics	Sig
Regression	10.190	1	10.190	55.515***	0.000
Residual	25.147	137	0.184		
Total	35.336	138			

Coefficients

Model	B	Std error	Beta standardized	t	Sig
Constant	2.265	0.134		16.952***	.000
Beta	0.389	0.052	0.537	7.451***	.000

*** *Significance at 0.01*

There was an R2 of 0.288, showing that physical orthopedic issues in school infrastructure design account for 28.8% of the variation in access to school facilities for students with special needs. This discrepancy may be explained. According to ANOVA, a hypothesis's validity can be determined (Verma, 2013). The regression sum of squares was 10.190, the residual sum of squares was 25.147, and the total sum of squares was 35.336, as shown in the ANOVA table. Mean squared error was 0.184, and F statistic was 55.515. It can be concluded that there was a significant relationship between physical orthopedic considerations in school infrastructure design and access by pupils in public integrated schools in Kitui County in Kenya, with a 95 percent confidence interval, p 0.000, which is less than the 0.05 significance level. Therefore the prediction model is expressed as; Y= 2.265+ 0.389 X1, which was a significant prediction model where the predictor variable was physical orthopaedic considerations. The model shows that a unit increase in the physical orthopedic design considerations would increase access by pupils with special needs by 0.389.

10 CONCLUSIONS

Students with disabilities have a legal right to an appropriate education. Therefore, schools need to ensure that facilities cater for the needs of such pupils as well. Designs that cater for special needs considerations should be encouraged when developing infrastructure in schools. However, little had been done in terms of research to provide empirical evidence to back up these claims. Research conducted in Kitui County, Kenya, sought to identify the elements influencing infrastructure design, project management competencies, and access to educational facilities for children with special needs. The following conclusion was reached based on the empirical data gathered throughout this study: Considerations for kids with sensory demands have a significant impact on learners with special needs' access to school amenities,

11.0 RECOMMENDATIONS OF THE STUDY

The following suggestions for policy, practice, and research technique are based on the study's results.

11.1 Recommendation to Policy

From the findings of his study, it is evident that there is a gap in the infrastructural designs of public school facilities in relation to pupils with special needs. Efforts by the school boards of management cannot bear much result if not supported by sound policies. This study therefore recommends formulation of appropriate policies that supports school in infrastructural development and specifically that address sensory design considerations, and Policy provision should support resource allocation, research and implementation. Besides the policies, and based on the policy provisions, necessary laws need to be enacted to enforce implementation of such policies.

11.2 Recommendation to practice

This study makes it clear that buildings and other school infrastructure - are crucial elements of learning environments in schools and especially where learners living with disability are concerned. This study therefore recommends that project designs for school infrastructure must address the needs of learners living with disability of different nature. This study singled out one area of consideration in these designs sensory design considerations, There is need for capacity building to stakeholders involved in development of public school's infrastructure. These includes but not limited to the school boards of management, school administrators, contractors, and ministry of public works officials who are in charge of approving of project designs and supervising to ensure all the regulatory requirements are met in such infrastructure projects.

11.3 Recommendation to research methodology

A descriptive cross-sectional survey and a correlational design were utilized in this study to support a mixed method approach. For this research, descriptive, correlational, and regression analyses were all possible thanks to this methodology's ability to make conclusions based on these analyses. Therefore, based on this, it can be recommended that future similar studies can adopt the same methodology

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