

**UNIVERSITY OF EDUCATION, WINNEBA**

**EFFECTS OF INFRASTRUCTURE ON THE ACADEMIC  
PERFORMANCE OF PUPILS OF KALPOHIN S.D.A SCHOOL  
COMPLEX IN THE SAGNARIGU MUNICIPALITY**



**2022**

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OF PUPILS OF KALPOHIN S.D.A SCHOOL COMPLEX IN THE  
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**A dissertation in the Department of Social Studies Education,  
Faculty of Social Sciences, submitted to the School of  
Graduate Studies in partial fulfilment  
of the requirements for the award of the degree of  
Master of Education  
(Social Studies)  
in the University of Education, Winneba**

**APRIL 2022**

## DECLARATION

### Student's Declaration

I, Abukari Mutala declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

**Signature:** .....

**Date:** .....

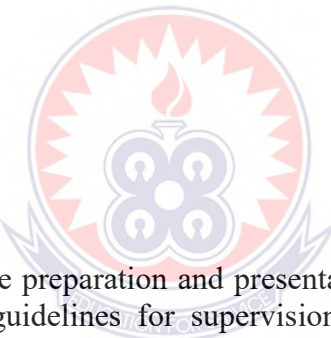
### Supervisor's Declaration

We hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis as laid down by the University of Education, Winneba.

Dr. Gershon Yawo Dake (Supervisor)

**Signature:** .....

**Date:** .....



## **DEDICATION**

To my lovely children Mukrim (Jilma) Suabirah (Suglo), and Sualiha (Hal-sun )



## ACKNOWLEDGEMENTS

I thank God Almighty for his protection and guidance. The successful completion of this dissertation would not have been possible without the assistance and guidance of my supervisor, Dr. Gershon Yawo Dake. Your corrections, suggestions and remarkable virtue are well noted and appreciated. Kindly accept my profound gratitude.

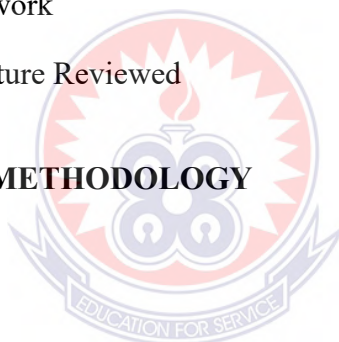
A special gratitude to Chief Alhaji Yakubu Bukari for his encouragement and support for me to pursue this programme.



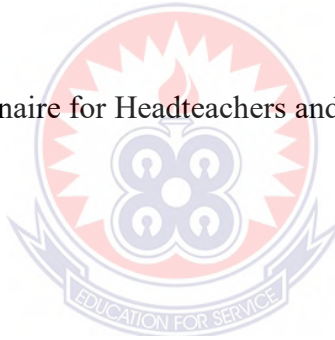
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## ABSTRACT

The case study assessed the effects of infrastructure on the academic performance of pupils of Kalpohin S.D.A. school complex in the Sagnarigu Municipality. The researcher employed qualitative research methods. The population for the case study included head teachers, and teachers. The sample size was 40 respondents. The purposive and convenient sampling techniques was used to select all the forty (40) participants for the study. Questionnaire and personal interview were the main instruments used to gather primary data. The data was analysed. The case study results indicated the effects of infrastructure on the academic performance of pupils of Kalpohin S.D.A. school complex. Moreover, the school buildings were not well maintained. They indicated that classrooms with electricity, computer rooms, and scientific equipment for teaching science were not available at the Kalpohin S.D.A school complex. Moreover, lack of educational resources in the school has been a major problem in the instructional process. Also, the school environment was handicapped by the non-availability of these teaching and learning facilities and this strongly affected the level of students' academic performance. In conclusion the effect of infrastructure resulted in poor academic performance of students at the selected school. The study recommended that the Ghana Education Service through the Municipal Education Directorate should provide adequate educational infrastructure and teaching and learning materials to improve teaching and learning at the selected schools.



## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

Kalpohin Community is located in the Sagnarigu Municipality. The population of the Municipality according to 2010 population and housing census stand at 148,099 with 74,886 males and 73,213 females. The Kalpohin Community is ethnically diverse. The indigenous inhabitant of the community is Dagomba with other ethnic groups such as Gonja, Mamprusi, Akan, Dagaaba, Frafra, Hausa, Grunsi and Moshe. The major religions in the Kalpohin Community are Islam (the dominant religion), Christianity and Traditional religion (Ghana Statistical Service, 2010 Population and Housing census).

Agriculture is the main economic activity of majority of the citizens of the municipality, largely engaged in both crops and animals' farming. The main crops cultivated by farmers in the community are yam, millet, maize, cassava, groundnut, cowpea and soya beans. Livestock farming is also an important agricultural activity in the municipality. Animals such as goat, sheep and cattle are some of the main animals reared in the community. Educationally, Kalpohin has improved remarkable as people have realized the benefit of Education. Some of them are employed in institutions such as Arm forces, Nursing, Police service, teaching service and Members of parliament like the late Hon. Abubakari Sumani (2000-2008), Hon. Alhassan Dahamani (2008-20012) and Hon. Alhassan Suhuyini (2012- Date). Learning is a complex activity that puts students' motivation and physical condition to the test (Lyon, 2002, p 10). It has been a long – held assumption that Curriculum and teaching have an impact on learning. However, it is becoming more apparent that the physical

Conditions of our Schools Can influence students' academic achievement. The school physical facilities are also known as school plant and it include the school building, play grounds/ parks, classrooms furniture, equipment, instructional materials, laboratories, Libraries. In a study conduct by Grubb (2008) teaching and learning Materials or Resources (TML) are sources of supply, support/aid that can be readily drawn upon to assist teachers to give clear and understandable lessons to students.

Inyang–Abia (2008) identified the following categories of instructional materials, Visual, prints, graphic, electronics, projectiles and Audio-visuals, instruction all materials. According to him, when these materials are adequately made available for studies, they will facilitate the teaching and learning process, thereby increasing performance for both the students and teachers. Educational facilities refer to school space, classrooms, furniture, libraries, toilet water, the standard of construction and conditions of facilities and others (Ankomah, F., Tamakloe, E.K, Amedahe F.K., & Atta E.T(2005).

Ghana is one of the developing countries that have a lot of developmental problems confronting the nation. One of these problems is challenges of infrastructure that has been with us for long and even recently several reports from the media indicate that infrastructure is a challenging factor contributing to low/poor performance of pupils/students in most of the school especially the basic schools and the Junior High Schools in Ghana. In view of this, something must be done meaningfully to reduce this problem if not completely eliminated. One of such schools that have been noted for this problem is Kalpohin S.D.A school complex. Is situated or located at the northern parts of Tamale and was established in 1982 by the Adventist Missionaries who came to help increase the number of converts around the Kalpohin Community.

The school is about four kilometres away from town and has a sum total of seven hundred and sixty (760) students. The school is composed of shift 'A' which is the basic level and shift 'B' the junior high school level. Shift 'A' has a population of four hundred and seventy – five pupils where two hundred and forty-eight are girls and two hundred and seventy are boys. Shift 'B' where the researcher is teaching compose or comprises the junior high school with one hundred and eighty-four boys and one hundred and five girls bringing the sum of total of shift 'B' to two hundred and eighty-nine (289). This problem was even aggravated when the authority of the school decided to combine the two shifts for morning.

### **1.2 Statement of the Problem**

Education is a human right and schools are the platforms for which this right is enhanced. A school is capable of facilitating this right when adequate infrastructure such as libraries, classrooms, dining halls, laboratories, furniture and teaching and learning Materials are available. Across the length and breadth of this country schools right from kindergarten to senior high school level seem to be bedevilled with infrastructural challenges- a challenge that keeps making it difficult for the academic success of those who happen to attend these schools.

News reportage on the educational sector especially in the Sagnarigu Municipality reports the following: pupils sitting on the bare floor, pupils learning under trees or in the dilapidated classrooms, pupils learning without requisite teaching and learning materials. The statement is to critically examine the challenges of infrastructure on the academic performance of students in Kalpohin S.D.A school.

### **1.3 Purpose of the Study**

The purpose of the study is to examine the effects of infrastructure on the academic performance of pupils of Kalpohin SDA School Complex in the Sagnarigu Municipality.

### **1.4. Objectives of the Study**

1. Analyse the level of infrastructural availability in the Kalpohin SDA school complex
2. Investigate the influence of school equipment and instructional materials on pupils' academic performance.
3. Examine the extent to which infrastructural challengers affect academic performance
4. identify ways of upgrading infrastructure in the school.

### **1.5. Research Questions**

1. What is the level of infrastructure availability in the school?
2. How are the available infrastructure helped the school performance?
3. How can the infrastructural deficit be overcome?
4. What are the ways of upgrading infrastructure in the school?

### **1.6 Significance of the Study**

The research provided useful information for the Ministry of Education, Headteachers and teachers of Kalpohin S.D.A. School complex.

The significance of the study includes the following

1. Authority to improve infrastructure of Kalpohin S.D.A. school.

2. Parents to contribute through kind or cash towards more infrastructure in Kalpohin S.D.A School.
3. Authorities will get to know better the need for normal class/ school size towards effective teaching and learning in School.
4. N.G.O.'s in and around the community as a matter of urgency come to the aid to the school by helping them (school) with good quality infrastructure to improve academic performance of the school.
5. The need for adequate infrastructure by authorities and in addition the community at large.

### **1.7 Delimitation of the Study**

The scope of the research is confined only to the effects of infrastructure on the academic performance of pupils. There may be other contributing factors.

### **1.8 Limitation of the Study**

Limitation ranges from human to transport among them includes. Coverage is limited to a number of forty (40) respondent, since pupils/students runs a shift system, having their Responses on the effect of poor infrastructure on their academic performance will be difficult. Additionally, the stakeholders of the school were not able to attend to some of my questionnaires.

### **1.9 Definition of Terms / Concept**

School infrastructure – School buildings, classrooms, playgrounds and libraries are aspect of school infrastructure. Spacious and refurbished building and well – ventilated classrooms are a must in schools. Properly planned school infrastructure is an out-and out key factor in effective teaching and learning. Teaching materials – the



resources a teacher uses to deliver instructions. Each teacher requires a range of tools to draw upon in order to assist and support effective teaching and learning of students.

### **1.10 Organization of the Study**

Chapter one of this research takes us back to the background of the community, the research itself and why the research is undertaken. In addition, statement of problem and purpose of the study can still be found under chapter one. Research questions, significance of the study, limitation and delimitation can also be found under chapter one. Chapter two talks about related literature review, this summarizes the review that highlight the most important studies, captures major themes in the review and suggest why we need more research on the research instruments. This was a critical appraisal of both the conceptual, empirical and theoretical review of other people works in relation to the use of school infrastructure to improve students' academic performance. Chapter three is on the methodology adopted in data collection and analysis. It explains in detailed the various methodological approaches used in the study. It included the research design, research approach, the population, sample and sampling method, data collection and analysis used in the study. Chapter four is on the analysis of research findings. Chapter five discussed the results of the study to answer the research questions. Chapter six gave a summary of the findings, conclusions of the study and recommendations.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter contains the literature review related to teaching and learning materials and its usage in the classroom to improve academic performance.

#### 2.2 Theoretical Framework of the Study

##### 2.2.1 Ecosystem Theory of Educational Resources and its impact on resource adoption

Another way to conceptualize the complex relationships between teachers, students, and TLMs or educational resources is based on ecosystem theory. Zhao & Frank (2013) presented an ecosystem model to explain factors influencing technology adoption and use in classrooms. All actors in the ecosystem interact with one another and those interactions are vital to any actor's "survival" in the environment. However, in order for students to interact with meaningful content, they rely on their teacher to make the content accessible. Also, in order for any resource (technological or otherwise) to "survive" in the classroom climate, the teacher has to recognize its value and make it available for student use. With this metaphor, the teacher is the keystone species, computer uses are a "living" species, and the introduction of new resources, such as external educational innovations, can be seen as the "invasions of exotic species" (p. 811).

Zhao and Frank (2013), argue that classroom ecosystems, like biological ecosystems, exist in a state of homeostasis – where the environment is in balance and each species has their role, or niche, in the hierarchy. Therefore, invading species, such as new educational technologies or educational interventions, are unlikely to survive or last

unless they are compatible with the established teaching and learning environment (p. 813). Zhao and Frank (2013) tested the usefulness of an ecosystem model of classrooms for the purpose of understanding educational technology adoption by conducting a study of technology use in 19 different elementary schools in four school districts in mid-western United States.

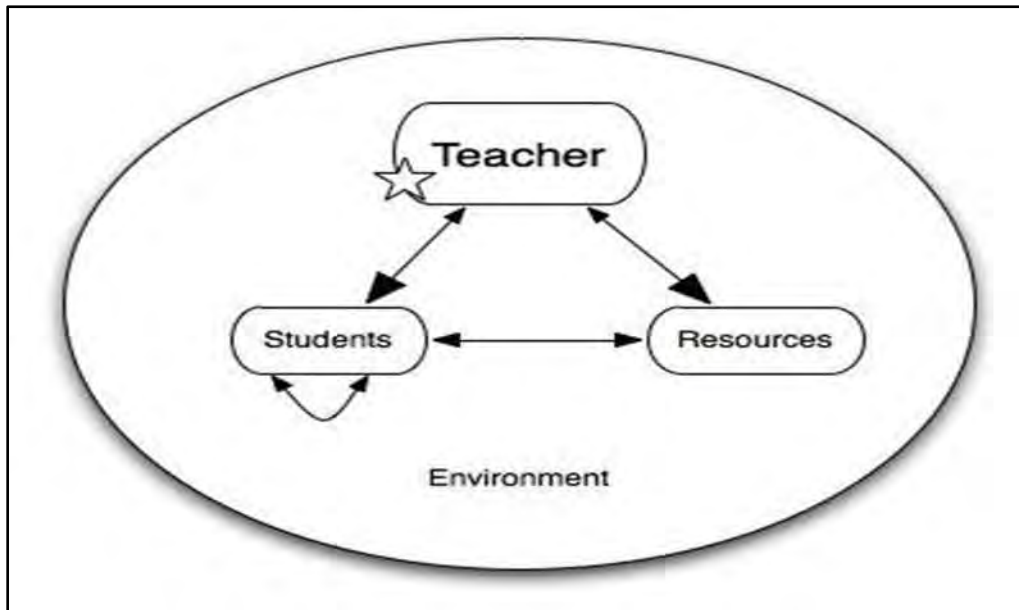
They gathered survey data from all school staff, interviews with administrators and technology staff, and interviews and observations from four of the participating schools - one from each participating district. Once the data was collected, the researchers categorized possible influences of technology use into six categories: the ecosystem, the teacher's niche in the ecosystem, teacher ecosystem interaction, teacher computer predisposition for compatibility, and opportunities for mutual adaptation. They found that technologies found within classrooms, as opposed to computer labs or other locations in the school, were used more often. Zhao and Frank (2013) suggest this is because it costs the teacher considerably more energy to reserve and make use of technology outside their own classrooms than technologies within their classrooms. Also, teachers were the most frequent users of technology, while students were the least frequent users. Teachers often used technology for communicating with colleagues, parents, and administrators. Zhao and Frank (2013) argue that the communicative technologies were compatible with the current teaching environment, since they did not require teachers to change or alter their existing teaching practice.

Furthermore, the communicative technologies were filling a "niche" in the environment, supporting teacher communication, which allowed those technologies to survive and prosper in the classroom ecosystem. In comparison, student use of

technologies both required a reconfiguration of teacher practices and cost considerable energy on the part of the teacher. As such, those technologies were less likely to be used.

Zhao and Frank (2013) also found that teacher-niche in the school ecosystem, as well as their relationship to other “species” in the ecosystem influenced their use of technology. Teachers who perceived pressure from colleagues were more likely to use computers only for their own purposes and were especially resistant to using technology that would require a reconfiguration of their teaching practices. While teachers who received help from colleagues, and had opportunities to experiment with software, were more likely to use computers with their students than for their own purposes.

Remarkably, the perceived relative advantage of student use of technology had no statistically significant effects on what technologies were used in classrooms. This illustrates that teacher rationale for using technology depends most directly on their own uses and needs, supporting their classification as keystone species in the environment. Zhao and Frank conclude that innovations cannot be implemented without a regard to the internal social structures of schools, especially teacher level factors, and expect to survive in the classroom context. An “evolutionary rather than revolutionary” approach to change in school computer use is called for (p. 833).



**Figure 2.1: Instruction**

Source: Cohen, Raudenbush, & Ball, (2012)

### **2.2.2 Taxonomy model of the Use of Educational Resources and impact on student outcomes**

In one such study by Grubb (2008), he defined four categories of classroom resources and evaluated how the presence of these resources impacted factors such as student achievement and continuation of education after high school. Table 2.1 lists and summarizes the four categories of resources in Grubb's taxonomy: simple, compound, complex, and abstract. Traditionally funding structures for education have focused on the increase of simple resources, resources that can be directly bought, in hopes that the increase of these resources would increase student gains. Grubb's study sought to better understand and define the effects of simple resources on a variety of student outcomes, as well as the relationships between varying resources, school level factors, and their impact on students.

**Table 2.1: Summary of Grubb (2008) taxonomy of school resources (TLMs)**

	Type of classroom resource Description
Simple	Resources that are physical objects (e.g. textbooks) or classroom factors (e.g., teacher experience and expertise) that can be directly bought, adjusted, and measured
Compound	Two or more resources that are jointly necessary for success (e.g. class size reduction <i>and</i> adequate teacher preparation)
Complex	Resources that are not easily bought, measured, or adjusted (e.g. instructional approaches and teaching philosophies)
Abstract	Resources that are difficult to discern and measure, and often embedded in a web of relationships and practices within a given school (e.g., collegial decision-making practices, internal teacher accountability, and distributed leadership roles)

Grubb found that “simple” resources, such as textbooks, technology, increased teacher salary, teacher training, or lower pupil to teacher ratios may be necessary in some instances but not sufficient in and of themselves to influence student outcomes (Grubb, 2008; p. 107). For example, if a school decides to reduce class sizes, yet the teachers continue using the same strategies and practices that they would in a larger class then outcomes were not likely to change. They need the “compound” resource of reduced class size *and* modified instructional strategies. Indeed, many of the simple resources that are often stressed and discussed in education research and politics, such as pupil-teacher ratios, technology, and teacher education levels are not among the most powerful factors influencing student achievement.

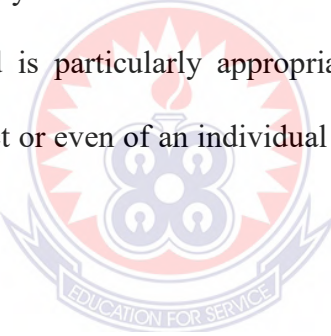
While many of the simple resources were necessary for student achievement, they were virtually never sufficient. On the other hand, there were several “complex” and “abstract” resources that had significant impacts on student outcomes. When teachers felt in control of their classrooms in terms of subject material and

instruction, identified as an abstract resource, students had higher test scores. Also, school climate, an abstract resource reported on by the students, was correlated positively with student test scores (p.125). For example, innovative math teaching was a particularly powerful complex resource, which affected both student achievement scores and their decision to pursue a 2 or 4-year college qualification (p. 124). Many of the influential complex and abstract resources, such as student perception of school climate and teacher perception that their department encourages innovative teaching, were not influenced by monetary resources available but were rather socially constructed within the schools themselves. In past research of student achievement in the United States (Caldas & Bankston, 2007), it has been found that family Socio-Economic Status is one of the strongest predictors of student success.

Nonetheless, Grubb (2008), found that the explanatory power of family background proves to be smaller than school resources when complex and abstract resources were taken into account, and therefore, the theory that school effects are overwhelmed by family influences is incorrect (Grubb, 2008; p. 134). For educators and researchers in search of school reform, this is a hopeful finding. It suggests that efforts to improve school quality based on the increase of school constructed complex and abstract resources could be beneficial. However, such efforts require a deeper understanding of school dynamics and the way resources are employed and even created in the school and classroom contexts.

### **2.2.3 Urie Bronfenbrenner's (2009) ecological systems theory and student academic performance Expectations**

This study adopted Urie Bronfenbrenner's ecological systems theory. He developed the ecological systems theory in an attempt to define and understand human development within the context of the system of relationships that form the person's environment. According to Bronfenbrenner's initial theory (2009), the environment, is comprised of four layers of systems which interact in complex ways and can both affect and be affected by the person's development. These are Microsystems, Mesosystem, Ecosystems and Macrosystem. He later added a fifth dimension that comprises an element of time (Bronfenbrenner, 2009) which he called Chronosystem. This theory can be extended to model the development of an organization as well, and is particularly appropriate for describing the complex systems of a school district or even of an individual school. Each of the four system layers is described below:



#### *2.2.3.1 Microsystem*

The microsystem is defined as the pattern of activities, role, and interpersonal relationships experienced by a developing person in a particular setting with particular physical and material features and containing other persons with distinctive characteristics of temperament, personality, and systems of belief (Bronfenbrenner, 2009). In other words, this layer forms a set of structures with which a person has direct contact, and the influences between the developing person and these structures are bidirectional. The person influences and is influenced by the Microsystem. If this theory is extended from human development to organizational development, and an individual school is the unit of interest, the Microsystem of the school would include students, parents and family members, administration, teachers, and the



surrounding community. The mesosystem, simply stated, comprises the linkages between Microsystems (Bronfenbrenner, 2009). Just as the direction of influence between the school and each

#### *2.2.3.2 Mesosystem structure*

Within the Microsystems is bi-directional, the mesosystem involves bidirectional influences between these various structures. An example of the mesosystem of an individual school can be seen in the interactions and dynamics between two of its microsystems, students and parents. Parental expectations regarding the academic and extra-curricular success of their children can often create a dynamic that directly and indirectly impacts the atmosphere and climate of the school. Unreasonably high expectations and low tolerance for failure can create a dynamic between parent and child that is characterized by tension and fear. These dynamic impacts the school in various direct and indirect ways, including, for example, student behaviour in the classroom resulting from such expectations, pressures to ensure their children success placed on school personnel by the parent, or an attempt by school personnel to shield students from such parental pressures by restricting the amount of information that is communicated regarding student achievement (Johnson, 2008).

#### *2.2.3.3 Exosystem*

The exosystem represents the larger social system, and encompasses events, contingencies, decisions, and policies over which the developing person has no influence. The exosystem thus exerts a unidirectional influence that directly or indirectly impacts the developing person. The exosystem of an individual school

might be comprised of such structures as, for example, state regulations, local economics, district mandates, and local disasters (Johnson, 2008).

#### *2.2.3.4 Macrosystem*

The macrosystem can be thought of as the “social blueprint” of a given culture, subculture, or broad social context and consists of the overarching pattern of values, belief systems, lifestyles, opportunities, customs, and resources embedded therein (Bronfenbrenner, 2009). This system is generally considered to exert a unidirectional influence upon not only the person but the micro-, meso-, and exosystems as well. The macrosystem of an individual school is embodied not only in the cultural, political, social, and economic climate of the local community, but that of the nation as a whole (Johnson, 2008).

#### *2.2.3.5 Chronosystem*

Although not one of the four system layers per se, the chronosystem represents a time-based dimension that influences the operation of all levels of the ecological systems. The chronosystem can refer to both short- and long-term time dimensions of the individual over the course of a lifespan, as well as the socio-historical time dimension of the macrosystem in which the individual lives. The chronosystem of an individual school, therefore, may be represented by both the day-to-day and year-to-year developmental changes that occur in its student body, teaching staff, curricular choices, etc., as well as the overall number of years in operation (i.e., a newer school faces challenges and opportunities that differ from those of a school that has been in operation for a length of time).

In an attempt to understand and investigate the relationship between unavailability of educational resources/teaching and learning materials and poor academic performance in among students of the selected primary schools, one has to take into account the individual students as well as the context within which it occurs. The relevance of this theory to the study is that it impinges on the researcher to view the poor academic performance in the school as a phenomenon that is influenced by wider social systems. The theory opined that school children are directly present within some of these social systems, such as their household, school and immediate neighbourhood, and there are others in which they are not directly represented, but which impinge on their development including their siblings “social networks and their parents “ or carers” friendship, leisure, lack of available teaching and learning materials/educational resources and the workplace relationships (Bronfenbrenner, 2009). In addition, the theory makes us aware of the influences of wider social systems including the cultures, political systems, social institutions, and values that exist in the society and argues that they should be taken into account in children educational upbringing.

By inference, the influences and experiences that result from the interactions between different social systems play a key role in determining the extent to which children perform in school. From the constructs of the ecological theory, the poor performance of the pupils was inextricably linked with the characteristics of social systems like the unavailability of teaching and learning materials. The ecological theory was, therefore, the most appropriate theory for studying the causes of poor academic performance in the school and for locating target(s) of intervention. It was appropriate in that it directs attention to the whole and not to any one part, system, or aspect of the children situation. Consequently, it is within this framework that the

present study seeks to investigate the causes of poor academic performance in relation to the availability of teaching and learning materials and its applications. Since learning outcomes depend on the way it is presented to the learner by his or her teacher, the way the learner interacts with the learning experiences presented to him and the environment within which the learning takes place, it is therefore expected that these entities would be affected by factors associated with the school environment, home and community conditions, teacher, education administration and the pupils themselves.

## **2.3 Empirical Literature**

### **2.3.1 School level Infrastructure**

Consider next the impact of school level infrastructure, such as libraries, science laboratories, computers, and even the construction of new schools, on students' educational outcomes.

### **2.3.2 Overall School Infrastructure**

Sixty-one estimates from 14 studies estimate the impact of overall school infrastructure on test scores; of these, 26 estimates are insignificant, 5 are significantly negative, and 30 are significantly positive. The definition of overall school infrastructure varies by study, but can include: the overall condition of the school; the average condition of the classrooms based on space, lighting, noise, and desks (Marshall, 2009); the proportion of usable rooms; an index of school quality (Anderson, 2010); physical facilities and teaching materials (Aslam & Siddiqui, 2013); the reliability of electricity; and the number of specialized instructional rooms Engin-Demir, (2009). Overall, the evidence indicates that overall school infrastructure increases student learning outcomes.

Four high quality studies examined the impact of overall school infrastructure on test scores; six of the fourteen estimates are insignificant. Of the eight statistically significant estimates, six are positive (Fehrler et al. 2009; & Yamauchi & Liu, 2013) and two are negative (Glewwe & Jacoby, 2014; & Suryadarma et al., 2006), which suggests a positive impact of school infrastructure on student learning. Turning to Latin America, there were 31 estimates from five studies of the impact of overall school infrastructure on test scores: 27 are positive, of which 21 are significant, and 4 are negative, of which 2 are significant. Most of these results come from the Second Regional Comparative and Explanatory Study (SERCE) which covers 16 countries across Latin America and the Caribbean (Treviño et al., 2010). Thus, the evidence indicates that general school level infrastructure in Latin America seems to increase student learning.

Finally, consider the impact of overall school infrastructure on time in school. Twelve estimates from four studies examine these impacts; of these, eleven are insignificant and one is significantly positive. Thus there is at most only weak evidence that the general condition of school infrastructure increases students' time in school. For overall school infrastructure there is only two high quality studies that examined impacts on time in school (Glewwe & Jacoby, 2014; Lloyd et al., 2003). Seven of the eight estimates were statistically insignificant, and the one that was significant was positive. This offers only weak support for a general impact of school infrastructure on time in school.

## **2.4 Availability of School Libraries and Students Academic performance**

Seven studies provide 26 estimates of the impact of a school library on test scores. Of these 26 estimates, 17 are insignificant, two are significantly negative, and seven are significantly positive, which provides some evidence that school libraries increase student learning. Five of these seven studies are of high quality, providing 20 estimates of the impact of a school library on test scores. Of these, 15 are statistically insignificant, four were significantly positive (Fehrler et al., 2009, Glewwe and Jacoby, 1994; & Sprietsma, 2012), and one was significantly negative (Suryadarma et al., 2006), providing some, but rather weak, evidence that a school library increases students' learning. Each of the four studies with statistically significant results included both urban and rural areas. One of these, Borkum, He and Linden (2013), is an RCT study that estimated the impact of school libraries on test scores in India; all four estimates are negative and statistically insignificant.

One developed country study analysed the impact of library books per student-on-student learning in United States secondary schools: Konstantopoulos and Borman (2011). As seen in the study, of the six estimates, four are insignificant and two have significantly positive impacts. Thus, there is some evidence that library books increase student learning in secondary schools in developed countries. Turn next to the impact of the presence of a school library on test scores in Latin America. Of six estimates from two studies, three are positive and statistically significant, two are negative but insignificant, and one is significantly negative. These findings are from two studies, an analysis of rural primary schools in Colombia by McEwan (2008) and a paper on urban and rural secondary schools in Brazil by Sprietsma (2012). These studies suggest that school libraries in Latin America can increase student learning at both the primary and secondary levels.

Finally, three studies, all of which are high quality studies, estimate the impact of a school library on time in school. The results are somewhat ambiguous. Of the 15 estimates, 10 are insignificant, one is significantly negative and four are significantly positive (all four of which are from the same study). One RCT analysed the impact of a school library on time in school, that of Borkum, He and Linden (2013), who collected data from urban and rural schools in India; yet their results are disappointing since the estimated impact is statistically insignificant.

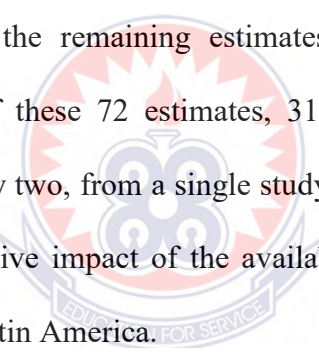
### **2.5 Availability of Computers on Students' Academic Performance**

There are many proponents of the benefits of providing computers and other types of information technology hardware to schools. Six studies analysed the impact of computers on student test scores; 56 estimates are insignificant, 3 are significantly negative, and 20 are significantly positive, which suggests that, in many cases, computers can increase student learning. Four of these studies were high quality (Banerjee et al. 2007; Barrera-Osorio and Linden, 2009; Fehrler, 2009; and Sprietsma, 2012). Fifty-one of the 72 estimates from three different high-quality studies were insignificant, three were significantly negative and 18 were significantly positive. While these results indicate that computers can increase student learning, the 18 significantly positive estimates are from only three different studies, and the three significantly negative estimates are from two different studies, so giving equal weight to each study yields only weak support for computers.

Limiting the evidence to the two RCT studies, Banerjee et al. (2007) and Barrera-Osorio and Linden (2009) yields results which are very similar to those of the four high quality studies, since most of the estimates are from these two RCT studies. Two studies in developed countries estimated the impact of computers on student learning.

Kotte et al. (2005) found a significantly negative impact (of the ratio of computers per student) on reading scores in Germany. On the other hand, Carneiro (2008) found three insignificant results for the impact of computers (number of computers divided by school size) on various test scores in secondary schools in Portugal. Overall, these two studies from developed countries yield no support for a positive impact of computers on student learning.

There are 72 estimates from studies of Latin American countries that attempt to measure the impact of computers on student learning. 14 of these estimates, 38 are from a randomized control trial in Colombia that showed positive, but mostly insignificant, impacts of computers on educational outcomes (BarreraOsorio and Linden, 2009). Most of the remaining estimates come from the SERCE study (Treviño et al. 2010). Of these 72 estimates, 31 from three different studies are significantly positive. Only two, from a single study, are significantly negative. Thus, the results suggest a positive impact of the availability of computers in schools on student's test scores for Latin America.



These estimates include estimates from a working paper by Treviño et al. (2010) that are not included in the “all studies”, “high quality studies” and “RCTs” results because that working paper is not one of the working paper series selected for the review. Only one study, Barrera-Osorio and Linden (2009), analysed the impact of computers on time in school. As seen in Table 11, that study yielded one significantly negative estimate and four insignificant estimates (of which two were negative and two were positive); thus, there is no evidence that computers increase students' time in school.



## 2.6 Availability of School Amenities and Students Academic Performance

Twenty-four estimates from seven studies analysed the impact of school amenities on students' test scores. School amenities range from an index of writing and reading materials, such as pens, pencils, paper, notebooks, a complete set of required textbooks and dictionaries (Glewwe et al. 2015), to computers for administrative use (Lockheed et al. 2010). As seen in the study, ten estimates are insignificant, seven are significantly negative, and seven are significantly positive, and thus the findings are ambiguous.

Limiting the evidence to four high quality studies yields 15 estimates of the impact of school amenities on test scores. Seven of these are insignificant, three (from a study of urban and rural schools in Indonesia by Suryadarma et al., 2006) are significantly negative, and five (from a study of urban and rural schools in South Africa by Van der Berg, 2008) are significantly positive. Thus, the impact of school amenities on test scores is ambiguous even for high quality studies. Note that there are no estimates from RCT studies.

Four studies from Latin America have examined the impact of school amenities, which include ventilation, lighting and noise, on test scores. Of the 11 estimates, five are insignificant, four are significantly positive, and two are significantly negative, which provides at best only weak support that amenities matter. Only one study analysed the impact of school amenities on time in school. The findings of the study's two estimates are at best only suggestive given that there is only one study: both are positive, but one is significant while the other is not. Note that this was a high-quality study, but not an RCT, and that it was from a Latin American country (Brazil).

## **2.7 Availability of Science Laboratories and Students Academic Performance**

Only one study, which is a high-quality study, analysed the impact of science laboratories on students' test scores, and it finds inconclusive evidence. The study of urban and rural schools in Brazil by Sprietsma (2012) yielded two estimates, one of which is significantly negative and the other of which is significantly positive, and thus these results of the impact of science laboratories on test scores are ambiguous. Note that this study is on a Latin American country.

Konstantopoulos and Borman (2011) also analysed the impact of science laboratory facilities on learning, but in a developed country setting: U.S. secondary schools. As seen in Table 14, of the six estimates, three are insignificant and three are significantly positive, which provides some evidence that the availability of science laboratory facilities increases student learning in developed countries. A single study provided 12 estimates from rural schools in China of the impact of science laboratories on time in school (Zhao and Glewwe, 2010). These estimates suggest a positive effect. More specifically, of the twelve estimates, six are insignificant and the other six are significantly positive.

## **2.8 Creation of New Schools**

Finally, four estimates from a single high-quality study show that the creation of a new school has a significantly positive impact on student learning. As seen in Table 10, all four estimates are significantly positive, indicating that the creation of a new school increases test scores, perhaps by reducing students' travel time, which frees up more time for studying (Yamauchi & Liu, 2013). Note that this study is from urban and rural areas of the Philippines, and thus there is no evidence from Latin America.

Two studies, both of which are high quality, have analysed the impact of the creation of a new school on time in school. They provide some evidence that new schools increase time in school. Of the 16 estimates, five are insignificant, two are significantly negative, and nine are significantly positive. While this evidence seems strong, when equal weight is given to each study, the results are more ambiguous; both studies find significantly positive and significantly negative effects. Note that both of these studies are on Latin American countries, one on Guatemala and one on Argentina, and both focus on the availability of pre-primary education facilities.

## **2.9 Availability of Utilities and Students Academic Performance**

The third and last type of school infrastructure examined in this paper is utilities, which includes electricity, drinking water, and toilet facilities.

### **2.9.1 Electricity**

Seven studies provide 28 estimates of the impact of the availability of electricity on students' test scores at the primary and secondary school level. Overall, the evidence indicates that, in many settings, provision of electricity could increase student learning. However, when only high-quality studies are examined, there is no evidence of an impact of electricity on test scores; all 14 estimates from three different studies (Fehrler et al., 2009; Glewwe & Jacoby, 2014; Suryadarma et al., 2006) are statistically insignificant, of which five are negative and nine are positive. Note that there are no RCT studies of the impact of electricity on students' educational outcomes.

Three papers from Latin America estimated the impact of electricity on test scores. The study indicates that, of the 13 estimates, eight estimates from two different studies (McEwan, 2008; Psacharopoulos, 2013, both of which focus on rural areas) are significantly positive, which suggests that provision of electricity in Latin American increases student learning. Note, however, that none of these three papers is a high-quality study. Finally, one Latin American study analyzed the impact of an index of utilities, which includes water, electricity, and a telephone connection. There were 16 estimates from 16 countries, all of which were significantly positive. This suggests that utilities may have a strong impact on student learning in Latin America, but caution is in order because this is based on a single study. Only one study examined the impact of the availability of electricity on time in school. All four estimates were statistically insignificant (Glewwe & Jacoby, 2014).

### **2.9.2 Drinking water facilities**

While adequate drinking water facilities would seem to be desirable for any school, there is no evidence that such facilities promote student learning. In particular, the study shows that all ten estimates from the three studies of the impact of the availability of drinking water facilities are statistically insignificant. Similarly, the eight estimates from two high quality studies of the impact of drinking water are all statistically insignificant (Fehrlert et al., 2009; Glewwe & Jacoby, 2014). There are no RCT studies of the impact of drinking water facilities on students' educational outcomes.

Turning to Latin America, there is one paper, with two estimates, that analyzed the impact of drinking water facilities on test scores. So, there is no evidence from Latin American countries that the provision of drinking water facilities increases student

learning. Finally, consider the impact of drinking water facilities on students' time in school. Two studies, both of which are of high quality, provide 30 estimates of the impact of the availability of drinking water facilities on time in school. Of these estimates, 27 were statistically insignificant and only three had significantly positive impacts on time in school, which suggests at best a weak impact.

### **2.9.3 Toilet facilities**

The last utility variable to consider is sanitation, and more specifically toilet facilities. There are 33 estimates from four studies that examine the impact of the availability of toilets or separate latrines for boys and girls on student learning. These estimates suggest that having access to adequate sanitation facilities increases students' test scores at both the primary and secondary levels. More specifically, of the 33 estimates 11 are insignificantly negative and 6 are insignificantly positive, while 16 estimates from three different studies are significantly positive and none is significantly negative.

Yet when the evidence is limited to the two high quality studies, there is only modest evidence that access to adequate sanitation facilities increases students' test scores; while nine of the ten estimates from two high quality studies are positive, only two estimates, both from the study of Indonesia by Suryadarma et al. (2006), are significantly positive. Note that there are no RCT studies of the impact of toilet facilities on students' educational outcomes. One Latin American study examined the impact of sanitation facilities on educational outcomes, both test scores and time in school.

The study tracked students in the city of Puno in Peru and showed that the availability of sanitation facilities led to increased reading comprehension (Cueto et al., 2010). More specifically, both of the two estimates in this study were positive, of which one was significantly positive. The same study provides estimates on time in school; the evidence provides no support for this intervention, as there were two insignificantly negative estimates. Finally, one study provides 26 estimates of the impact of the availability of toilet facilities on school attendance, at the elementary school level.<sup>15</sup> Of these 22 were statistically insignificant, one was significantly negative and the other three were significantly positive; all of the estimates come from Afridi (2011) and they provide some, but rather weak, evidence that toilet facilities increase time in school for girls.

### **2.10 School Infrastructural Facilities and Students' Academic Performance**

The school physical facilities are known as school plant and it includes the school buildings, classrooms furniture, equipment, instructional materials, laboratories, libraries, play grounds, etc. Lezotte and Passiroque (2008) carried out a study to find out the effect of school buildings on students' academic achievement. They formulated hypotheses based on prior students' achievement with study background, school building and students' achievement as the dependent variables. A total of 2,500 randomly selected students from 20 modern schools were used as sample.

The Pearson's product moment correlation coefficient statistical tool was employed at 0.05 alpha level of significance. The result showed that the school building accounts for significant variance in academic achievement. They recommended that classrooms should be spacious to promote flexibility of usage in groups and individual activities.

Similarly, classroom plays a vital role in the education of the child. According to Nwachukwu (2014), the physical setting for learning affects the learner. The setting must be attractive enough to make students wish to spend long hours there. What we have presently in most of our secondary schools does not meet these requirements. The typical village classroom is part of an unattractive building.

The roof may still be in place or may have been blown off by wind. If the latter is the case, students are forced to study without being protected from the effects of the weather. This kind of situation as stated by Nwachukwu (2014) in which the physical comfort of the students cannot be guaranteed is not ideal for learning and does not enhance academic achievement. Still on the possible influence of school plant, Klafs and Amhein (2011) conducted research to find out the influence of recreational facilities on students' academic performance in Lagos State. They employed questionnaire, which was administered on 500 randomly sampled secondary school students from 10 schools in Lagos.

Four hypotheses were formulated for the study and analyses were made with chisquare ( $\chi^2$ ) statistics to find out how the scores vary. The investigation revealed significant results for the study. Klafs and his colleague found that availability of recreational facilities does not only lead to increase practice in skill acquisition by individuals but also serve to encourage mass participation in sporting programmes, thereby promoting students' academic performance. In an attempt to discover the factors affecting students' performance in agriculture, Ntekpere (2008) conducted a research. He randomly sampled a total of 207 males with a mean of 21.40 and a standard deviation of 3.58, and 139 female students with a mean of 17.94 and standard deviation of 4.25. Several findings were made.

One among them was the unavailability and lack of teaching materials significantly influenced the academic performance of the students in Agriculture. Still on the influence of physical facilities on students, Essien (2014), embarked on a study titled indicators for self-reliance among Nigeria students in Cross River State as perceived by administrators of tertiary institutions. Four hypotheses involving skills of self-reliance were formulated. From a population of 1,865 tertiary institution administrators, 400 were randomly selected to constitute the sample. Data for the investigation were collected using School Administrators Perception of Self-reliance Questionnaire (SAPSQ) and the hypotheses were tested at 0.05 level of significance using t-test of single mean (population t-test) technique. From one of the results, she observed that the Nigerian students would attain self-reliance in the area of exploitation of human and material resources if the educational system could make adequate provision of infrastructural facilities, equipment and facilities for teaching and learning in our educational institutions.

### **2.11 School Location and Students' Academic Performance**

According to Mbipom (2010), schools are either situated in one geographical location or the other. These geographical locations are either termed rural (remote) where modern facilities such as leisure, easy transportation, cultural heterogeneity, and cosmopolitan population are lacking or urban (city) where there are adequate facilities such as leisure, cinema, easy transportation, cultural heterogeneity, and cosmopolitan population. Unlike the rural schools where the population is relatively small and the students know one another by name, interactions are personal. Urban dwellers live individualistic life and only relate with people they feel like relating with, without any form of permanency.



Ogili (2009) posited that the per capital income among rural people are low and there is general poverty. About 70% of the rural populations are engaged in farming at subsistence level while the urban populations are mostly civil servants, traders and artisans. The effect of nature has compelled man to either settle or dwell in an urban or rural area. This educationally implies that in the rural settlement or location there is poor accessibility to the modern educational facilities and this serves as a hindrance to the motivation of a rural child to learning.

Denga (2008) maintained that each environment plays a part in shaping the development of the child academically and otherwise. Accordingly, a child gets from his environment all he needed to enable him develop best. Students of urban surrounding have more opportunities to radios, educative film shows, electricity, televisions, well equipped laboratories and libraries etc that help or contribute in moulding their approaches when compared to rural location students regarding academic achievement. Effiong (2011) on his part opined that any two individuals with approximately equal intelligence but living in two separate and distinct environments may end up attaining unequal intellectual heights.

Olasunkanmi (2007), in his research on the influence of school location on students' academic achievement in Lagos State, adopted a causal-comparative design with a random sample of 500 students from a population of senior secondary two students in the State. A six-point Likert type scale questionnaire was administered. Independent t-test analysis was used to test the hypotheses at 0.05 levels of significance. From the result, it was observed that students from rural areas tend to perform poorly while those within the urban areas tend to perform better due to the availability of modern educational facilities.

## **2.12 Schools Equipment/Instructional Materials and Students Academic**

### **Performance**

On the issue of instructional materials, Mbipom (2010) described instructional materials as that which the teacher uses to achieve his set objectives. She further observed that lack of educational resources in our schools has been a major problem in the instructional process. She further concluded that ideally, no effective education can take place without equipment, facilities, materials etc. In her observation, a school environment that is handicapped by the non-availability of these teaching and learning facilities may strongly affect the level of students' academic performance. This then implied that learning equipment and materials have their own effects on the academic performance of the students. Instructional materials are channels through which contents stimuli are presented to the learner (Bassey, 2008).

Inyang-Abia (2008) identified the following categories of instructional materials, visual, prints, graphics, electronic, projectiles and audio-visuals, instructional materials. According to him when these materials are adequately made available for studies, they will facilitate the teaching learning process, thereby increasing performance for both the students and teachers. Ajari and Robinson (2010), embarked on several researches which include the importance of instructional materials on students. They sampled 200 respondents through the simple random sampling technique. An ex-post facto research design was adopted for the study.

A four-point Likert type scale questionnaire was used for data collection. The data were analyzed using one way analysis of variance (ANOVA). From the results they observed that educational resources in the school environment are very important in the development of an ideal teaching and learning environment. They further

revealed that poor teaching and learning environment result to poor academic performance. Egbona (2012) in his research to find out to what extent instructional materials are made available for the teaching-learning process, in Ugep educational zonal district discovered that, the most common instructional materials made available for teaching is chalkboard, cardboard, and life specimen even though his findings shows that availability of instructional materials has no significant relationship with academic performance of students, he concluded that they should be made available as they facilitate the teaching – learning process.

In other words, Akpabio (2012) carry out research on the topic Availability and Utilization of instructional and student academic performance in social studies. He formulated three hypotheses and tested them at 0.05, alpha level of significance. One of the hypotheses was test on how availability of instructional materials relates with academic performance of students in social studies. He found out that all the three hypotheses formulated were all significant. He concluded that instructional materials should always be made available during lessons as the present of these materials stimulates the interest of students and equally facilitates the teaching – learning process.

Etim (2011) carried out research on the availability of instructional materials and academic performance of students in economics. He used Calabar municipality as his study area, and adopted stratified and simple random sampling for the selection of his sample. 200 students were used for the study. He discovered that most of the schools he visited did not have any instructional materials for teaching economics. The few schools that have instructional materials available perform better in the achievement test that was given. He therefore concludes that instructional materials

should be made available for teaching economics as their availability will trigger the interest of both the teacher and the students.

Acha (2009) carried out a research on the availability of instructional materials and concluded that the availability of instructional materials could influence and improve students' academic performance if only the instructional materials are constantly made available in the classroom, but that if not constantly made available, may therefore have no influence on the academic performance of students. Samati (2012) carried out a research on the important of teaching social studies with instructional materials. He discovered the availability of instructional materials does not have any significant relationship with students' academic performance in social studies. He justified his findings by saying that instructional materials will depend on how they are used to impact knowledge on students. Laboratory has been conceptualized as a room or a building specially built for teaching by demonstration of theoretical phenomenon into practical terms.

Farombi (2008) argued the saying that —seeing is believing as the effect of using laboratories in teaching and learning of science and other science related disciplines as students tend to understand and recall what they see than what they hear or were told. Laboratory is essential to the teaching of sciences and the success of any science course is much dependent on the laboratory provision made for it.

### **2.13 The School Building Design**

The building design concepts of the schools of today did not begin to evolve until the middle of the twentieth century when architects began to experiment with such design concepts as the round and compact schools and such educational concepts as the open-space plan and team teaching. Schools were not perceived as facilities

revolving around sound educational programs until as late as the 1970s (Castaldi, 2007). Prior to this, the assumption of those who design schools had been that as long as certain minimum standards for size, acoustics, lighting, and heating were met, a productive environment existed when the teaching-learning process would proceed normally (Conners, 2012). This is because the physical environment and the learning cannot be separated and are considered to be an integral part of each other (Conners, 2012).

Christopher (2008) asserted that the purpose of the designed environment is to provide a climate conducive to both teaching and learning. Although it is common knowledge that the fields of both architecture and education understand that there is a connection between school building conditions and student achievement, there has been little specific research to report exactly how and to what extent building influences student achievement. Several studies (Christopher, 2008; Hawkins & Overbaught, 2008) have tried to establish a connection between building condition and student attitude, but they have provided little solid evidence. Since the late 1970s, however, researchers have identified a more sophisticated research methodology to examine and explain the possible relationship between building condition and student achievement and behaviour.

Growing numbers of educators and facility planners are considering the influence of such physical factors as school age, colour, lighting, seating position, classroom design, density, privacy, noise, and presence or lack of windows on student attitudes and achievement. These studies have been well documented in reviews by Weinstein (2009), McGuffey (2012), and Lemasters (2007). One line of research examining the relationship between school building age and student achievement that emerged in

1978 uses the age of the school building as a proxy for the quality of the physical environment. However, the assumption that a newer building might have more modern technology and efficient conditions is not necessarily valid. Consequently, older schools are not automatically in worse condition than newer schools.

In most previous studies, school building age has been treated as an independent variable that indirectly influences student achievement with above standard building conditions being associated with higher student achievement. The age of a school building may reflect a combination of some conditions, such as the overall condition of the building, thermal control, acoustics, lighting, and other aesthetic considerations in the environment (McGuffey & Brown, 2008). But it is not relevant to consider school building age without considering the other physical characteristics of a school that reflect the quality of the school environment. It is also likely that many older buildings have been upgraded or enhanced, perhaps even more recently than newer buildings.

The initial research into the relationship between academic achievement and building condition focused on the impact of one physical condition variable, such as age, colour, lighting on student achievement, but this approach is less favoured today than are other research approaches emphasizing the relationship between the “total” overall building condition and student achievement. In fact, the school age variable can be considered as a surrogate for the condition of the building (Earthman & Lemasters, 2016).

## **2.14 Other Factors affecting Academic Performance**

### **2.14.1 Availability of school libraries and students academic performance**

Seven studies provide 26 estimates of the impact of a school library on test scores. Of these 26 estimates, 17 are insignificant, two are significantly negative, and seven are significantly positive, which provides some evidence that school libraries increase student learning. Five of these seven studies are of high quality, providing 20 estimates of the impact of a school library on test scores. Of these, 15 are statistically insignificant, four were significantly positive (Fehrler et al., 2009, Glewwe and Jacoby, 1994; & Sprietsma, 2012), and one was significantly negative (Suryadarma et al., 2006), providing some, but rather weak, evidence that a school library increases students' learning. Each of the four studies with statistically significant results included both urban and rural areas. One of these, Borkum, He and Linden (2013), is an RCT study that estimated the impact of school libraries on test scores in India; all four estimates are negative and statistically insignificant. One developed country study analyzed the impact of library books per student-on-student learning in United States secondary schools: Konstantopoulos and Borman (2011).

As seen in the study, of the six estimates, four are insignificant and two have significantly positive impacts. Thus, there is some evidence that library books increase student learning in secondary schools in developed countries. Turn next to the impact of the presence of a school library on test scores in Latin America. Of six estimates from two studies, three are positive and statistically significant, two are negative but insignificant, and one is significantly negative. These findings are from two studies, an analysis of rural primary schools in Colombia by McEwan (2008) and a paper on urban and rural secondary schools in Brazil by Sprietsma (2012). These

studies suggest that school libraries in Latin America can increase student learning at both the primary and secondary levels.

Finally, three studies, all of which are high quality studies, estimate the impact of a school library on time in school. The results are somewhat ambiguous. Of the 15 estimates, 10 are insignificant, one is significantly negative and four are significantly positive (all four of which are from the same study). One RCT analyzed the impact of a school library on time in school, that of Borkum, He and Linden (2013), who collected data from urban and rural schools in India; yet their results are disappointing since the estimated impact is statistically insignificant.

#### **2.14.2 Availability of computers on students' academic performance**

There are many proponents of the benefits of providing computers and other types of information technology hardware to schools. Six studies analyzed the impact of computers on student test scores; 56 estimates are insignificant, 3 are significantly negative, and 20 are significantly positive, which suggests that, in many cases, computers can increase student learning. Four of these studies were high quality (Banerjee et al. 2007; Barrera-Osorio and Linden, 2009; Fehrler, 2009; and Sprietsma, 2012). Fifty-one of the 72 estimates from three different high-quality studies were insignificant, three were significantly negative and 18 were significantly positive. While these results indicate that computers can increase student learning, the 18 significantly positive estimates are from only three different studies, and the three significantly negative estimates are from two different studies, so giving equal weight to each study yields only weak support for computers. Limiting the evidence to the two RCT studies, Banerjee et al. (2007) and Barrera Osorio and Linden (2009) yields



results which are very similar to those of the four high quality studies, since most of the estimates are from these two RCT studies.

Two studies in developed countries estimated the impact of computers on student learning. Kotte et al. (2005) found a significantly negative impact (of the ratio of computers per student) on reading scores in Germany. On the other hand, Carneiro (2008) found three insignificant results for the impact of computers (number of computers divided by school size) on various test scores in secondary schools in Portugal. Overall, these two studies from developed countries yield no support for a positive impact of computers on student learning.

There are 72 estimates from studies of Latin American countries that attempt to measure the impact of computers on student learning. 14 of these estimates, 38 are from a randomized control trial in Colombia that showed positive, but mostly insignificant, impacts of computers on educational outcomes (Barrera-Osorio and Linden, 2009). Most of the remaining estimates come from the SERCE study (Treviño et al. 2010). Of these 72 estimates, 31 from three different studies are significantly positive. Only two, from a single study, are significantly negative. Thus, the results suggest a positive impact of the availability of computers in schools on students test scores for Latin America.

These estimates include estimates from a working paper by Treviño et al. (2010) that are not included in the “all studies”, “high quality studies” and “RCTs” results because that working paper is not one of the working paper series selected for the review. Only one study, BarreraOsorio and Linden (2009), analyzed the impact of computers on time in school. As seen in Table 11, that study yielded one significantly negative estimate and four insignificant estimates (of which two were negative and

two were positive); thus, there is no evidence that computers increase students' time in school.

#### **2.14.2 Availability of school amenities and students academic performance**

Twenty-four estimates from seven studies analyse the impact of school amenities on students' test scores. School amenities range from an index of writing and reading materials, such as pens, pencils, paper, notebooks, a complete set of required textbooks and dictionaries (Glewwe et al. 2015), to computers for administrative use (Lockheed et al. 2010). As seen in the study, ten estimates are insignificant, seven are significantly negative, and seven are significantly positive, and thus the findings are ambiguous.

Limiting the evidence to four high quality studies yields 15 estimates of the impact of school amenities on test scores. Seven of these are insignificant, three (from a study of urban and rural schools in Indonesia by Suryadarma et al., 2006) are significantly negative, and five (from a study of urban and rural schools in South Africa by Van der Berg, 2008) are significantly positive. Thus, the impact of school amenities on test scores is ambiguous even for high quality studies. Note that there are no estimates from RCT studies. Four studies from Latin America have examined the impact of school amenities, which include ventilation, lighting and noise, on test scores. Of the 11 estimates, five are insignificant, four are significantly positive, and two are significantly negative, which provides at best only weak support that amenities matter. Only one study analyzed the impact of school amenities on time in school. The findings of the study's two estimates are at best only suggestive given that there is only one study: both are positive, but one is significant while the other is not. Note

that this was a high-quality study, but not an RCT, and that it was from a Latin American country (Brazil).

### **2.14.3 Availability of science laboratories and students academic performance**

Only one study, which is a high-quality study, analyzed the impact of science laboratories on students' test scores, and it finds inconclusive evidence. The study of urban and rural schools in Brazil by Sprietsma (2012) yielded two estimates, one of which is significantly negative and the other of which is significantly positive, and thus these results of the impact of science laboratories on test scores are ambiguous. Note that this study is on a Latin American country. Konstantopoulos and Borman (2011) also analyzed the impact of science laboratory facilities on learning, but in a developed country setting: U.S. secondary schools. As seen in Table 14, of the six estimates, three are insignificant and three are significantly positive, which provides some evidence that the availability of science laboratory facilities increases student learning in developed countries.

A single study provided 12 estimates from rural schools in China of the impact of science laboratories on time in school (Zhao and Glewwe, 2010). These estimates suggest a positive effect. More specifically, of the twelve estimates, six are insignificant and the other six are significantly positive.

### **2.14.4 Availability of utilities and students academic performance**

The third and last type of school infrastructure examined in this paper is utilities, which includes electricity, drinking water, and toilet facilities.

#### *2.14.4.1 Electricity*

Seven studies provide 28 estimates of the impact of the availability of electricity on students' test scores at the primary and secondary school level. Overall, the evidence indicates that, in many settings, provision of electricity could increase student learning. However, when only high-quality studies are examined, there is no evidence of an impact of electricity on test scores; all 14 estimates from three different studies (Fehrler et al., 2009; Glewwe & Jacoby, 2014; Suryadarma et al., 2006) are statistically insignificant, of which five are negative and nine are positive. Note that there are no RCT studies of the impact of electricity on students' educational outcomes.

Three papers from Latin America estimated the impact of electricity on test scores. The study indicates that, of the 13 estimates, eight estimates from two different studies (McEwan, 2008; Psacharopoulos, 2013, both of which focus on rural areas) are significantly positive, which suggests that provision of electricity in Latin American increases student learning. Note, however, that none of these three papers is a high-quality study. Finally, one Latin American study analyzed the impact of an index of utilities, which includes water, electricity, and a telephone connection. There were 16 estimates from 16 countries, all of which were significantly positive. This suggests that utilities may have a strong impact on student learning in Latin America, but caution is in order because this is based on a single study. Only one study examined the impact of the availability of electricity on time in school. All four estimates were statistically insignificant (Glewwe & Jacoby, 2014).

#### *2.14.4.2 Drinking Water Facilities*

While adequate drinking water facilities would seem to be desirable for any school, there is no evidence that such facilities promote student learning. In particular, the study shows that all ten estimates from the three studies of the impact of the availability of drinking water facilities are statistically insignificant. Similarly, the eight estimates from two high quality studies of the impact of drinking water are all statistically insignificant (Fehrler et al., 2009; Glewwe & Jacoby, 2014). There are no RCT studies of the impact of drinking water facilities on students' educational outcomes. Turning to Latin America, there is one paper, with two estimates, that analyzed the impact of drinking water facilities on test scores. So, there is no evidence from Latin American countries that the provision of drinking water facilities increases student learning. Finally, consider the impact of drinking water facilities on students' time in school. Two studies, both of which are of high quality, provide 30 estimates of the impact of the availability of drinking water facilities on time in school. Of these estimates, 27 were statistically insignificant and only three had significantly positive impacts on time in school, which suggests at best a weak impact.

#### *2.14.4.3 Toilet Facilities*

The last utility variable to consider is sanitation, and more specifically toilet facilities. There are 33 estimates from four studies that examine the impact of the availability of toilets or separate latrines for boys and girls on student learning. These estimates suggest that having access to adequate sanitation facilities increases students' test scores at both the primary and secondary levels. More specifically, of the 33 estimates 11 are insignificantly negative and 6 are insignificantly positive, while 16 estimates from three different studies are significantly positive and none is significantly negative.

Yet when the evidence is limited to the two high quality studies, there is only modest evidence that access to adequate sanitation facilities increases students' test scores; while nine of the ten estimates from two high quality studies are positive, only two estimates, both from the study of Indonesia by Suryadarma et al. (2006), are significantly positive. Note that there are no RCT studies of the impact of toilet facilities on students' educational outcomes. One Latin American study examined the impact of sanitation facilities on educational outcomes, both test scores and time in school.

The study tracked students in the city of Puno in Peru and showed that the availability of sanitation facilities led to increased reading comprehension (Cueto et al., 2010). More specifically, both of the two estimates in this study were positive, of which one was significantly positive. The same study provides estimates on time in school; the evidence provides no support for this intervention, as there were two insignificantly negative estimates. Finally, one study provides 26 estimates of the impact of the availability of toilet facilities on school attendance, at the elementary school level.<sup>15</sup> Of these 22 were statistically insignificant, one was significantly negative and the other three were significantly positive; all of the estimates come from Afridi (2011) and they provide some, but rather weak, evidence that toilet facilities increase time in school for girls.

#### *2.14.4.4 School infrastructural facilities and students' academic performance*

The school physical facilities are known as school plant and it includes the school buildings, classrooms furniture, equipment, instructional materials, laboratories, libraries, play grounds, etc. Lezotte and Passiroque (2008) carried out a study to find out the effect of school buildings on students' academic achievement. They

formulated hypotheses based on prior students' achievement with study background, school building and students' achievement as the dependent variables. A total of 2,500 randomly selected students from 20 modern schools were used as sample. The Pearson's product moment correlation coefficient statistical tool was employed at 0.05 alpha level of significance. The result showed that the school building accounts for significant variance in academic achievement. They recommended that classrooms should be spacious to promote flexibility of usage in groups and individual activities. Similarly, classroom plays a vital role in the education of the child. According to Nwachukwu (2014), the physical setting for learning affects the learner. The setting must be attractive enough to make students wish to spend long hours there. What we have presently in most of our secondary schools does not meet these requirements. The typical village classroom is part of an unattractive building.

The roof may still be in place or may have been blown off by wind. If the latter is the case, students are forced to study without being protected from the effects of the weather. This kind of situation as stated by Nwachukwu (2014) in which the physical comfort of the students cannot be guaranteed is not ideal for learning and does not enhance academic achievement. Still on the possible influence of school plant, Klafs and Amhein (2011) conducted research to find out the influence of recreational facilities on students' academic performance in Lagos State. They employed questionnaire, which was administered on 500 randomly sampled secondary school students from 10 schools in Lagos.

Four hypotheses were formulated for the study and analyses were made with chi-square ( $\chi^2$ ) statistics to find out how the scores vary. The investigation revealed significant results for the study. Klafs and his colleague found that availability of

recreational facilities do not only lead to increase practice in skill acquisition by individuals but also serve to encourage mass participation in sporting programmes, thereby promoting students' academic performance. In an attempt to discover the factors affecting students' performance in agriculture, Ntekpere (2008) conducted a research. He randomly sampled a total of 207 males with a mean of 21.40 and a standard deviation of 3.58, and 139 female students with a mean of 17.94 and standard deviation of 4.25. Several findings were made. One among them was the unavailability and lack of teaching materials significantly influenced the academic performance of the students in Agriculture. Still on the influence of physical facilities on students, Essien (2014), embarked on a study titled indicators for self-reliance among Nigeria students in Cross River State as perceived by administrators of tertiary institutions.

Four hypotheses involving skills of selfreliance were formulated. From a population of 1,865 tertiary institution administrators, 400 were randomly selected to constitute the sample. Data for the investigation were collected using School Administrators Perception of Self-reliance Questionnaire (SAPSQ) and the hypotheses were tested at 0.05 level of significance using t-test of single mean (population t-test) technique. From one of the results, she observed that the Nigerian students would attain self-reliance in the area of exploitation of human and material resources if the educational system could make adequate provision of infrastructural facilities, equipment and facilities for teaching and learning in our educational institutions.



### **2.14.5 School location and students' academic performance**

According to Mbipom (2010), schools are either situated in one geographical location or the other. These geographical locations are either termed rural (remote) where modern facilities such as leisure, easy transportation, cultural heterogeneity, and cosmopolitan population are lacking or urban (city) where there are adequate facilities such as leisure, cinema, easy transportation, cultural heterogeneity, and cosmopolitan population. Unlike the rural schools where the population is relatively small and the students know one another by name, interactions are personal. Urban dwellers live individualistic life and only relate with people they feel like relating with, without any form of permanency. Ogili (2009) posited that the per capital income among rural people are low and there is general poverty. About 70% of the rural populations are engaged in farming at subsistence level while the urban populations are mostly civil servants, traders and artisans. The effect of nature has compelled man to either settle or dwell in an urban or rural area. This educationally implies that in the rural settlement or location there is poor accessibility to the modern educational facilities and this serves as a hindrance to the motivation of a rural child to learning.

Denga (2008) maintained that each environment plays a part in shaping the development of the child academically and otherwise. Accordingly, a child gets from his environment all he needed to enable him develop best. Students of urban surrounding have more opportunities to radios, educative film shows, electricity, televisions, well equipped laboratories and libraries etc that help or contribute in moulding their approaches when compared to rural location students regarding academic achievement. Effiong (2011) on his part opined that any two individuals with approximately equal intelligence but living in two separate and distinct environments may end up attaining unequal intellectual heights. Olasunkanmi (2007),

in his research on the influence of school location on students' academic achievement in Lagos State, adopted a causal comparative design with a random sample of 500 students from a population of senior secondary two students in the State. A six-point Likert type scale questionnaire was administered. Independent test analysis was used to test the hypotheses at 0.05 levels of significance. From the result, it was observed that students from rural areas tend to perform poorly while those within the urban areas tend to perform better due to the availability of modern educational facilities.

#### **2.14.6 Schools equipment/instructional materials and students academic performance**

On the issue of instructional materials, Mbipom (2010) described instructional materials as that which the teacher uses to achieve his set objectives. She further observed that lack of educational resources in our schools has been a major problem in the instructional process. She further concluded that ideally, no effective education can take place without equipment, facilities, materials etc. In her observation, a school environment that is handicapped by the nonavailability of these teaching and learning facilities may strongly affect the level of students' academic performance. This then implied that learning equipment and materials have their own effects on the academic performance of the students. Instructional materials are channels through which contents stimuli are presented to the learner (Bassey, 2008).

Inyang-Abia (2008) identified the following categories of instructional materials, visual, prints, graphics, electronic, projectiles and audio-visuals, instructional materials. According to him when these materials are adequately made available for studies, they will facilitate the teaching learning process, thereby increasing performance for both the students and teachers. Ajari and Robinson (2010), embarked

on several researches which include the importance of instructional materials on students. They sampled 200 respondents through the simple random sampling technique. An ex-post facto research design was adopted for the study.

A four-point Likert type scale questionnaire was used for data collection. The data were analysed using one-way analysis of variance (ANOVA). From the results they observed that educational resources in the school environment are very important in the development of an ideal teaching and learning environment. They further revealed that poor teaching and learning environment result to poor academic performance. Egbona (2012) in his research to find out to what extent instructional materials are made available for the teaching-learning process, in Ugep educational zonal district discovered that, the most common instructional materials made available for teaching is chalkboard, cardboard, and life specimen even though his findings shows that availability of instructional materials has no significant relationship with academic performance of students, he concluded that they should be made available as they facilitate the teaching – learning process.

In other words, Akpabio (2012) carry out a research on the topic Availability and Utilization of instructional and student academic performance in social studies. He formulated three hypotheses and tested them at 0.05, alpha level of significance. One of the hypotheses was test on how availability of instructional materials relates with academic performance of students in social studies. He found out that all the three hypotheses formulated were all significant. He concluded that instructional materials should always be made available during lessons as the present of these materials stimulates the interest of students and equally facilitates the teaching – learning process.

Etim (2011) carried out a research on the availability of instructional materials and academic performance of students in economics. He used Calabar municipality as his study area, and adopted stratified and simple random sampling for the selection of his sample. 200 students were used for the study. He discovered that most of the schools he visited did not have any instructional materials for teaching economics. The few schools that have instructional materials available perform better in the achievement test that was given. He therefore concludes that instructional materials should be made available for teaching economics as their availability will trigger the interest of both the teacher and the students.

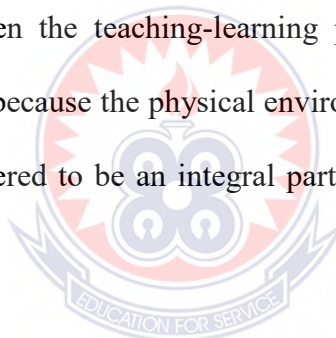
Acha (2009) carried out a research on the availability of instructional materials and concluded that the availability of instructional materials could influence and improve students' academic performance if only the instructional materials are constantly made available in the classroom, but that if not constantly made available, may therefore have no influence on the academic performance of students. Samati (2012) carried out a research on the importance of teaching social studies with instructional materials. He discovered the availability of instructional materials does not have any significant relationship with students' academic performance in social studies. He justified his findings by saying that instructional materials will depend on how they are used to impact knowledge on students. Laboratory has been conceptualized as a room or a building specially built for teaching by demonstration of theoretical phenomenon into practical terms.

Farombi (2008) argued the saying that —seeing is believing as the effect of using laboratories in teaching and learning of science and other science related disciplines as students tend to understand and recall what they see than what they hear or were

told. Laboratory is essential to the teaching of sciences and the success of any science course is much dependent on the laboratory provision made for it.

#### **2.14.7 The school building design**

The building design concepts of the schools of today did not begin to evolve until the middle of the twentieth century when architects began to experiment with such design concepts as the round and compact schools and such educational concepts as the open-space plan and team teaching. Schools were not perceived as facilities revolving around sound educational programs until as late as the 1970s (Castaldi, 2007). Prior to this, the assumption of those who design schools had been that as long as certain minimum standards for size, acoustics, lighting, and heating were met, a productive environment existed when the teaching-learning process would proceed normally (Conners, 2012). This is because the physical environment and the learning cannot be separated and are considered to be an integral part of each other (Taylor & Gousie, 2008).



Christopher (2008) asserted that the purpose of the designed environment is to provide a climate conducive to both teaching and learning. Although it is common knowledge that the fields of both architecture and education understand that there is a connection between school building conditions and student achievement, there has been little specific research to report exactly how and to what extent building influences student achievement. Several studies (Christopher, 2008; Hawkins & Overbaught, 2008) have tried to establish a connection between building condition and student attitude, but they have provided little solid evidence. Since the late 1970s, however, researchers have identified a more sophisticated research methodology to examine and explain the possible relationship between building condition and student

achievement and behaviour. Growing numbers of educators and facility planners are considering the influence of such physical factors as school age, colour, lighting, seating position, classroom design, density, privacy, noise, and presence or lack of windows on student attitudes and achievement. These studies have been well documented in reviews by Weinstein (2009), McGuffey (2012), and Lemasters (2007). One line of research examining the relationship between school building age and student achievement that emerged in 1978 uses the age of the school building as a proxy for the quality of the physical environment.

However, the assumption that a newer building might have more modern technology and efficient conditions is not necessarily valid. Consequently, older schools are not automatically in worse condition than newer schools. In most previous studies, school building age has been treated as an independent variable that indirectly influences student achievement with above standard building conditions being associated with higher student achievement. The age of a school building may reflect a combination of some conditions, such as the overall condition of the building, thermal control, acoustics, lighting, and other aesthetic considerations in the environment (McGuffey & Brown, 2008). But it is not relevant to consider school building age without considering the other physical characteristics of a school that reflect the quality of the school environment. It is also likely that many older buildings have been upgraded or enhanced, perhaps even more recently than newer buildings. The initial research into the relationship between academic achievement and building condition focused on the impact of one physical condition variable, such as age, colour, lighting on student achievement, but this approach is less favoured today than are other research approaches emphasizing the relationship between the “total” overall building condition and student achievement. In fact, the school age

variable can be considered as a surrogate for the condition of the building (Earthman & Lemasters, 2016).

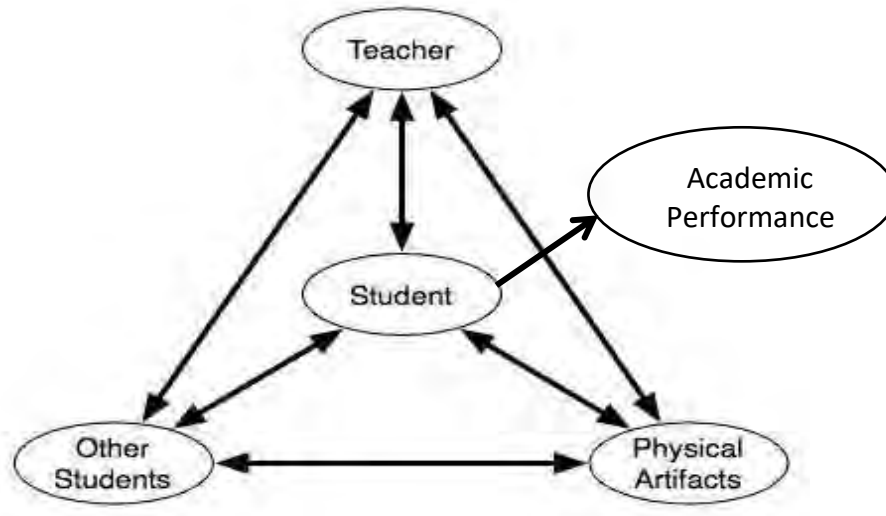
### 2.15 Conceptual Framework of the Study

Educational resources can be framed in a number of ways, including taxonomies (Grubb, 2008) and complex eco-systems (Zhao & Frank, 2013). The conceptual framing of educational resources has impact on how studies are conducted and what phenomenon rise to the notice of researchers. In the current project, possible resources included students, teachers, physical artifacts, and the relationships between them; however, they were not described as resources until they were *enacted* as resources. The critical element of this conceptualization of resource enactment is that resources can be any physical artifact, person, or relationships as long as they are *used* as resources.

Practically speaking, this model of resources had impacts on what was recorded in the data gathering and analysis processes. Specifically, phenomenon noted in analysis were instances in which students and teachers *arranged, modified, attended to, interpreted, or assigned value* to an artifact, actor, or relationship. In short, resources were conceptualized as requiring enactment to truly be a resource, and the current project focused on those enactments. Furthermore, this model of resource enactment is similar in many ways to the model of classroom instruction put forward by Cohen, Raudenbush, & Ball (2013). In both models' teachers and students are potential.



## 2.16 Conceptual Framework



**Figure 2.2: Enacted Educational Resources Model**

Source: Cohen, Raudenbush, & Ball (2013)

The reviews highlight the most important studies and suggest why we need more research on the topic. Professor Anamuah-Mensah (2007) who delivered a speech at first media encounter with managers and senior editors of education said that the standard of education will continue to fall unless the policy target improving infrastructure at the various level of education which would put a hold on the falling standard of education.

Furthermore, a primary school located in the Jasikan District in the Volta Region with population of about seven hundred (700) petitioned the Minister of Education, Youth and Sports about some problems militating against effective academic work of their pupils. The whole school made-up of only one classroom block which also serves as the headmaster's office, administration block, classroom, dormitory and dining hall. This resulted into some of the students/pupils still taking their lessons under trees because the classrooms are not in enough.



Kenn Fisher (2001) who is the Director of Rubida Research in his "DIGEST" went further to explain various challengers of infrastructure on the academic performance of pupils. He first stated that "students' academic achievement improves with improved in good building conditions thus infrastructure". In addition, he stated that "individual factors such as lighting systems or level, air quality, amount of space allocated per pupil/student, the openness of space, the use of underground or windowless facilities, building utilization and temperature have an effect on pupils' behaviours and performance as well, although they are limited quantities available on some of these factors.

On issue of infrastructure such as class size, he made research which indicates that large class size may benefit more affluent students but can have an adverse effect on more impoverished students and vice versa. Report from UNESCO educational building and furniture programme indicated that "that uncomfortable and unsuitable furniture causes problems including backache, poor concentration spans and writing difficulties. On his research for the need to have libraries in our schools he said "pupils'/students behaviours appear to be particularly sensitive in libraries as students work independently outside formal classroom on individual project.

The above ideas of Fisher have encouraged the researcher to find out the challenge of infrastructure on the academic performance of pupils, how it goes a long way to affect effective teaching and learning. The researcher on his research found out that Kenneth Nyalemebge (2001) said that" that the capacity and character of society largely depend on quality of education and infrastructure provided". To add flavour to his statement, he stated again that "a good system of education is one that is holistic and sufficiently provides for the moral, social, and academic orientation of the society. He

went further to add that "a part from tackling certain problems in education such as proper supervision, duration of senior secondary school programme, effort must be made to provide school with quality and appropriate infrastructure. Many basic schools are conducted in unsafe building and even under sheds.

Some of the "good structures" are poorly designed, classroom is not airy and are poorly lit as a result of windowless buildings made with design blocks instead of building with windows that are better for lighting and cooling is irregular and unaffordable. He said that lack of quality infrastructure in our educational system result into poor academic of pupils and students and the nation at large. Mr. Fisher (2001) on his part throws more light saying that "that good lighting, both natural and artificial can contribute to aesthetic and psychological character of a learning space, which can affect effective teaching and learning progress. In addition he made it clear that one educational facilities research recommends that twenty percent 20% of wall space be allocated to windows so that pupils can see out from seated position since it encourages effective learning of pupils.

Again, the Asikuma-Odoben-Brakwa district tasked the social service sub- committee to identify the causes of falling of standard of education in district and devise appropriate measures to halt them. It came to light during the deliberation that the district had obtained zero percent at the 2002 B.E.C.E; the D.C.E. had earlier said that despite a massive improvement in the provision of quality teachers, lack of textbooks and provision of educational infrastructure has adversely affected the performance of candidates at the B.E.C. E. In related development Mr. Samuel Tetteh (2003) General Manager of Tema Lube Oil Company Limited (TLOC) said that" that the best gift for a child was education with provision of adequate infrastructure. He further urges

traditional rulers to champion the crusade on education by ensuring that their followers did not only send their children to school but cater for their basic needs to develop their God given talents.

He said this when he was presenting books to Mr. Adjei Appenteng (2003) Acting Greater Accra regional librarian worth twenty thousand Ghana cedis to the Tema library. He further explains that "the company will continue to support in education since it will be recalled that last year it donated books, computer and accessories and furniture worth two hundred and fifty million to the library. This contribution by various stakeholders in the country has made the research to take it upon himself to have a critical cross examination on the effects of poor infrastructure on the academic performance of pupils. Plan international (2003) an international N.G.OS. operating a quality educational programme in communities such as Bawjiase and Mankessim in the central region and Asesewa in the Eastern region said that "that it is their dream to see that each child /pupils of school going age gets the required educational infrastructure for sound studies, leading to effective teaching and learning, the N.G. OS said as of 1999 fifty (50) six classroom blocks, head teacher's office and store had been furnished with sets of furniture and chairs were constructed. Each school had also been furnished with sets of chairs, teacher's desk, cupboards and ten-seater KVIP latrines is provided for each school. The N.G.O. said that through education the citizens would better appreciate the benefits of educational development for brighter future.

Furthermore, the Kete-krachi district Director of Education, Mr. Victor H.K. Mensah (2004) has said out of a total of fourteen thousand (14,000) pupils in the district only two thousand (2,000) have the requisite furniture. Mr. Mensah commend Messer's

Dotts company limited adding that this year's projection is to organize for the community and district levels to discuss and share ideas relating to the fallen standard of education such as poor enrolment, provision of basic infrastructure to promotes effective and efficient teaching and learning. Effects of these infrastructure has greatly affected the academic performance of pupils since out of a total of one thousand, one hundred and seven (1,107) candidates presented by thirty-eight (38) schools during the basic education certificate examination in the Ketekrachi district only four hundred and three constituting thirty-six percent (36%) passed. Six percent (6%) of the total registered. Candidates had aggregates below twenty (20) and schools such as Monica Local Authority (L/A) which presented twenty-seven (27) candidates had all their candidates unsuccessful in the B.E.C.E. exams. This has brought a lot of attention for the researcher to embark on the research to find out the challenge of these facilities on the academic performance of pupils.

Further adding where there are enough textbooks, exercise books, workbooks, furniture to go round every pupil learning, teaching go uninterrupted. He made it clear that infrastructure with few class spaces or inadequate space makes ventilation very poor and class uncomfortable to use. The classroom must therefore be large, well ventilated and should allow for free movement of pupils during teaching. Under class size he stated that for effective class management the class size should not be too large since teachers are not able to control classes which are large. The number of pupils should be thirty-five to forty- five in a normal class to facilitate effective teacher eye contact with pupils. Furthermore, the educational sector of the Gomoa east new has recognize the right of every child to education as enshrined in the 1992 constitution. The district has revealed that provision of school infrastructure has been

supported by NGO's and district assembly. Currently the district has about one hundred and ninety-four (194) schools.

According to available statistics on the educational infrastructure in the district, 33% of kindergarten classroom is in good condition; whilst four (4) their classes under shed and another four (4) also have classes under trees. About nineteen (19) of these classrooms is still in dilapidated conditions which forms about 14.2% of the total classrooms. Again 7.85% primary school classes are being held under sheds whilst 19.9% classrooms are in bad conditions. This situation has brought the attention of the researcher to find out the challenge of infrastructure on the academic performance on pupils particularly Kalpohin S.D.A. primary school.

Ahmed Shariq Khan of Elets News Network (ENN) revealed that there is no denying how significant a school is in shaping up a student's personality and holistic learning process. Like an experienced teacher and teaching pedagogy play a critical role in shaping student's academic lives, infrastructure is also vital. It creates a favourable environment for students' holistic development. It's a common knowledge that every parent's wants to spend money where their kids feel safe and secure while learning and enjoying their student life. They wish to ensuring the schools have ample safety standards and facilities to make learning a joy. There are studies suggesting student in school with poor infrastructure can have lower scores than those with access and better infrastructure facilities. This makes school infrastructure a key element in a child's academic as well as holistic growth.

Preliminary report from centre for Democratic Development (CDD) Ghana survey on tracking public basic school information in five regions revealed that most of the school infrastructure lack basic standard such as adequate classroom, toilet facilities,

water as well as fencing and provide security for both pupils and equipment. According to Francis Tsegah a senior fellow, CDD-Ghana, it was critical to bring some of the challenges of assessing public basic education in Ghana to the fore to enable government to examine, strengthen and implement policies that are geared toward ensuring quality and health outcomes.

School's Digital Infrastructure has emphasis that an overcrowded classroom and stressful environment also affect students learning capabilities. That's why school-teacher ratio is also a key parameter for parents before they admit their ward to any specific school. They further stated that components of an ideal checklist in assessing any school infrastructure are as follows Spacious and well-ventilated classroom

1. Libraries
2. Playgrounds
3. Well-equipped Labs
4. Facilities study tables, chairs, furniture and basic utilities such as water, electricity etc.
5. Study halls
6. Games equipment
7. Assembly Area
8. Well-maintained Sanitation facilities.



Janssen Texeira et al in why education infrastructure Matters for learning said that Buildings, classrooms, laboratories and equipment-education infrastructure are crucial elements of learning environments in schools and universities. There is strong evidence that high-quality infrastructure facilitates better instruction, improves student outcomes, and reduced drop out ratio among others benefit for example, a

recent study from the United Kingdom found that environmental and design elements of school infrastructure together explained 16 percent of variation in primary students' academic progress.

### **2.17 Summary of Literature Reviewed**

The study concluded that the availability of instructional materials could influence and improve students' academic performance if only the instructional materials are constantly made available in the classroom, but that if not constantly made available, may therefore have no influence on the academic performance of student



## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter worked at the choice of methods, techniques data, research design, population and instrument that were used. The essence of the research methodology was to produce research findings that are based on relevant and verifiable evidence to warrant valid conclusion.

#### **3.2. Research Design**

Bless and Higson-Smith (2004) defined research design as a set of procedures that direct the researcher in the procedure of verifying assumption and excluding other possible explanations. The researcher used case study for the research design. A case study allows one to gain concrete, contextual, in-depth knowledge about a specific real-world subject. It allows one to explore the key characteristics, meaning and implications of the case. This research employed qualitative approaches and mainly used primary data in addition to secondary data.

#### **3.3. Population**

In the opinion of Agyedu, Donkor and Obeng (2009), population of a study refers to a complete set of individuals (subject), objects or events having common observable characteristics in which the researcher is interested. They further stressed that population constitutes the target of a study and must be clearly defined and identified. The population for the study included head teachers, and teachers of Kalpohin S.D.A. primary and Kalpohin S.D.A. J.H.S the study populations was 40 respondents.



### **3.4 Sample size and Sampling Technique**

Purposive sampling technique was used to select all the forty (40) participants for the study. A universe may be a place, group of people or a specific locality through which we collected the data. Purposive method is necessary in some cases like population census, for gaining vast knowledge. But in contrary, this method was not applicable as well as needed to some social problems because it was costly and time consuming. It was difficult to study the whole universe because financial aid was required for it to complete the study. For this purpose, we used sampling method to pick up a sample from the whole universe. Data collection through purposive method gave opportunity to the investigator to have an intensive study about a problem. In this method there was higher degree of accuracy in data. Without this method the study of a universe remains uncompleted.

### **3.5 Instrumentation**

The main instrument that was used to collect information for the study was questionnaire. The questionnaire was structured to consist of open-ended type of questions in order to elicit feedback from respondents. The questionnaire was in four (4) sections. Section one contained the demographic information of the respondents, including gender, and educational qualifications of the respondents. Section two investigated the challenges of infrastructure on the academic performance of pupils. Section three investigated the extent to which school infrastructure influence student's enrolment and attendance in school. Section four (4) identified the types of school infrastructures available at the school complex. The questionnaire was conducted after the questionnaires were designed and validated. The questionnaire administration was conducted by the researcher. Respondent were informed of the topic for study and

what the study generally intended to examine. The questionnaire was printed and presented to the respondents to answer by themselves.

### **3.6 Sources of Data**

These are two main sources of data. These are primary data and secondary data. Both primary and secondary data were used for the purpose of the study.

#### **3.6.1 Primary Data**

These are first – hand information collected from the field and it might be the first time of using such information (Bryman 2008). Questionnaire were used in collecting data at the case study institutions. The researcher gathered information from the teachers and head teachers by the use of questionnaires for the needed information.

#### **3.6.2 Secondary Data**

Secondary data are already existing information which might have been used for several times. Secondary hand data were gathered from books, journals and theses.

### **3.7 Data Collection Productive**

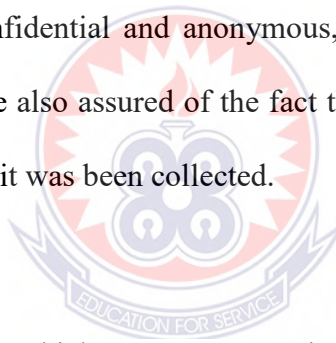
Primary data was collected through a field survey from Kalpohin S.D.A School teachers and head teachers in the Sagnarigu Municipality. Data were collected through the use of written questionnaire hand – delivered to participants in the selected school. Questionnaire were filled out by participants and the researcher went for the questionnaire on the same day of distribution.

### **3.8 Interview**

Another research designs the researcher used in collecting data was personal interviews. Five teachers from the sample size were interviewed. As they were interviewed, the important and salient point were recorded in the researcher's book. 12.5% of the interviewees interviewed shows that massive failure of the pupils was as a result of poor infrastructure coupled with over population, thus large class size.

### **3.9 Ethical considerations**

Ethics in the study as confidentiality, anonymity, access, betrayal, informed content were critically addressed. During the research, high ethical standards were maintained to ensure that no harm was caused to any of the participants. Steps were taken to keep information provided confidential and anonymous, seeking the participants consent was addressed. They were also assured of the fact that the data was to be used solely for the purpose for which it was been collected.



### **3.10 Reliability**

Reliability is the degree to which a measurement instrument can be depended upon to secure consistent results upon repeated application where validity is the degree to which any measurement instrument success in describing what it is to measure (Wagner et al 2008). To ensure the reliability of the instrument test and retest, methods were applied there by the researcher administered the instruments to teachers and head teachers of the school. In this study, Split-half reliability measure was employed by dividing the questionnaires items into two equal parts on the basis of odd and even appearances. The first part of the research instrument having been administered and the result obtained, the second part was subsequently administered and the result noted, Pearson's product moment coefficient of correlation( $r$ ) was used

to compare the two scores obtained and by giving an alpha value of as indicating that the data collection instrument was reliable.

### **3.11 Validity**

In this study validity of the data was ensured in a number of ways. In the first-place feedback from the teachers were used check the acceptability as being logical in the face of it to ensure constructs validity, data was collected from multiple sources (head teachers and teachers) for triangulation this allow for cross verification of the questionnaires. Hence the researcher's bias was reduced to all for objective security of the data.



## CHAPTER FOUR

### ANALYSIS AND DISCUSSION OF RESEARCH FINDINGS

#### 4.1 Introduction

The main purpose of the research was to assess the effect of infrastructure on the academic performance of pupil's of Kalpohin S.D.A school complex in the Sagnarigu municipality. The chapter discussed the following research objectives;

- a) Analyse the level of infrastructural availability in the kalpohin SDA school complex.
- b) Investigate the influence of school equipment's and instructional materials on pupils' academic performances.
- c) examine the extent to which infrastructural challenges affect academic performance.
- d) Examine the extent to which infrastructure challengers affect academic performance
- e) Identify ways of upgrading infrastructure in the school.

The analysis of the study was based on these research objectives. The researcher sent 40 questionnaires out for distribution. Out of 40 questionnaires sent out for primary data, 35 questionnaires were properly answered and received by the researcher. This means that the analysis of the study was on 87.5% response rate. This was considered adequate for achieving the objectives of the study. (Source: field servey,2021).

#### 4.2 Demographic Characteristics of Study Participants:

The demographic characteristics of the respondents used for the study, including the respondents' gender, age working experience of the respondents. The research reveals that 2 headteachers representing 5% were males, one headteacher representing 2.5%

was a female. Twenty-two (22) teachers representing 55% were male while fifteen (15) teachers representing 37.5% were females. Again, all three (3) headteachers representing 7.5% were above 30 years, (2) teachers representing 5% were below 25 years, fifteen (15) teaching representing 37.5% were between the age range 25 – 30 years while twenty (20) teachers representing 50% were above age of 30 years. The study results indicated that two (2) headteachers representing 5% were holding Bachelor's and one headteacher representing 2.5% was holding Master's degree, fourteen teachers representing 35% were holding Diploma certificate, twenty teachers' representing 50% were holding Bachelor's degree, while three teachers representing 7.5% were possessing Master's degree.

The case study also indicated that in Kalpohin SDA school complex, twenty-nine (29) of respondent representing 72.5% said that classrooms with electricity were inadequate while eleven (11) respondent representing 27.5% indicated that classrooms with electricity were adequate. More over 82.5% of respondent representing thirty-three (33) participants indicated that laboratories were not available, while 17.5% of participant representing seven participants said that laboratories were inadequate. Also 82.5% of respondent representing thirty-three (33) revealed that libraries were inadequate while 17.5% of respondents representing seven (7) participants said that libraries were adequate. 87.5% of respondents representing thirty-five (35) participants revealed that computer room were inadequate while 12.5% of respondent representing five (5) participants said that computer room were adequate. Moreover 92.5% of respondent representing thirty-seven participants revealed that computer with internet connection were not available at all while 7.5% representing three (3) participants indicated that computer with internet connections were inadequate. Again 90% of respondent representing thirty-

seven (37) participants said that textbooks were inadequate while 7.5% of respondent representing three (3) participants said that textbooks were not available.

The study results shows that 92.5 %of respondent representing thirty-seven (37) participants revealed that scientific equipment for teaching science were not available while 7.5% of respondent representing three (3) participants said that scientific equipment for teaching science was inadequate.

Interviews were conducted to elicit response from respondents:

Respondent one said “the school is growing but suffers from inadequate infrastructure”.

Respondent two said “attendance is growing at a faster rate but the inadequate infrastructure in the school is limiting admission”. The case study also indicated that 70% representing twenty-eight participants agreed that instructional materials are used by teachers to achieve their objectives, 22.5% representing nine participants strongly agreed while 7.5% representing three participants were neutral. Moreover 92.5% representing thirty-seven participants agreed that lack of educational resources in their schools has been a major problem in the instructional process while 7.5% representing three participants were neutral. Also 75% of respondent representing thirty -eight participants agreed that a school environment that is handicapped by the non-availability of these teaching and learning facilities may strongly affect the level of students’ academic performance. 37.5% of respondent representing fifteen participants strongly agreed, while 12.5% of respondent representing five participants were neutral. Furthermore, 72.5% of respondent representing twenty-nine participants agreed that learning equipment and materials have their own effects on the academic

performance of the students, 17.5% of respondent representing seven participants were neutral while 10% of respondent representing four participants disagreed.

The study results revealed that 62.5% of respondents representing twenty-five participants agreed that the availability of educational infrastructure will facilitate the teaching and learning process, thereby improving the performance of both the students and teachers, 27.5% of respondent representing eleven participants strongly agreed, 7.5% of respondent representing three participants were neutral, while 2.5% of respondent representing one participant disagreed. Moreover, 62.5% of respondent representing twenty-five participants agreed that poor teaching and learning environment results to poor academic performance, 25% of respondent representing ten participants strongly agreed while 12.5% of respondent representing five participants were neutral. Also 87.5% of respondent representing thirty-five participants agreed that effective education cannot take place without equipment facilities, materials while 12.5% of respondent representing five participants were neutral. It is evident from the study that, there is a negative insignificant relationship between school infrastructure and academic performance of students.

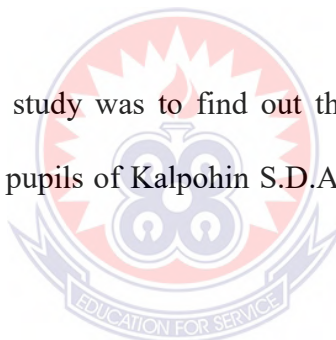
The effective use of instructional materials by teachers to achieve their set objectives negatively influenced the overall performance of students' results in national examination. The availability of educational infrastructure facilitated the teaching and learning process, thereby increasing performance for both the students and teachers and that correlates well with the overall performance of students. Learning equipment and materials have a positive effect on the academic performance of the students. The case study reveals that Kalpoin S.D.A School Complex, pupils enrolment rate increased from 422 in the 2017/2018 academic year to 433 in the 2019/2020 academic



year and went further to increase 453 in the 2020/2021 academic year. At the primary school level, pupils' enrolment increased from 522 in the 2017/2018 academic year to 530 in the 2019/2020 academic year. The enrolment rate increased from 538 in the 2020/2021 academic year. This increase resulted from the increasing population of the community. Again, in Kalpohin S.D.A J.H.S. pupil's attendance rate increased from 30%-50% in the 2017/2018 academic year increased to 50%-69% in the 2019/2020 and 2020/2021 academic year respectively. Moreover, in Kalpohin S.D.A. primary school pupil's attendance rate decreased from 30%-50 % in the year 2017/2018 to 30% - 60% in 2019/2020 academic year and increased to 55%-75% in the 2020/2021 academic year.

#### **4.3 Research Findings**

The main purpose of the study was to find out the effects of infrastructure on the academic performance of pupils of Kalpohin S.D.A school complex in the Sagnarigu Municipality.



The following research objective was used.

Identifying the types of school infrastructures available at the school. In terms of the types of school infrastructure available at Kalpohin S.D.A School complex in the Sagnarigu Municipality. The study indicated that majority of the respondents disagreed that there are enough books, TLMs, educational resources, and libraries for the subject they learnt at school. In terms of availability of learning infrastructure, the study shows that most of the respondents indicate that classrooms with electricity are inadequate, Laboratories were not available, inadequate libraries. Furthermore, computer rooms were not available, computers with internet connection were not also available and textbook were also inadequate. The study results indicated that

educational resources in the school environment are very important in the development of an ideal teaching and learning environment. The study also revealed that poor teaching and learning environment result into poor academic performance.

Acha (2009) carried out a research on the availability of instructional materials and concluded that the availability of instructional material could influence and improve student's academic performance if only the instructional materials were constantly made available in the classroom, but that if not constantly made available, they may have no influence on the academic performance of students.

In terms of the extent to which school facilities influence student enrolment and attendance in Kalpohin S.D.A school Complex in the Sagnarigu Municipality, the study revealed that in Kalpohin SDA J.S.H. in the year 2017/2018 academic year enrolment increased from four hundred and twenty-two (422) to four hundred and thirty-three (433) in the 2018/2019 academic year and further increased to four hundred and fifty-three (453) in the 2020/2021 academic year. Furthermore, in Kalpohin S.D.A primary school pupils enrolment rate increased from five hundred and twenty-two (522) in the 2017/2018 academic year to five hundred and thirty (530) in the 2019/2020 academic year and further increase to five hundred and thirty-eight (538) in the 2020/2021 academic year. This increment in the enrolment rate is as a result of increasing in population of the community.

The study also indicated that, attendance rate of pupils of Kalpohin S.D.A.J.H.S. increased from 30%-50% in the 2017/2018 academic year to 50%-69% in the 2019-2020 academic year and further increase to 55%-75% in the academic year.

At the Kalpohin S.D.A. primary, the attendance rate for primary school increased from 30% - 50% in 2017/2018 academic year to 50% - 69% in 2019/2020 academic year and further increased to 55%-75% academic year.



## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary of findings

The main purpose of the study was to assess challenges of infrastructure on the academic performance of pupils of Kalpohin SDA school complex in the Sagnarigu Municipality. The research used descriptive research design for the study. This research employed quantitative and qualitative research approaches. The population for the study included head teachers, and teachers. The purposive sampling technique was used to select all the forty participants for the study. Questionnaires were the main instruments used to gather primary data.

##### 5.1.1 Major findings of the study

1. The study shows that classrooms with electricity were inadequate. Laboratories, libraries and computer rooms were not available. Also, textbooks were inadequate. Computer with internet connection were not available.
2. The study showed that insufficient instructional materials used by teachers did not help them achieve their set objective. Again, lack of educational resources in the school has been a major problem in the instructional process.
3. Learning equipment and materials have their effects on the academic performance of pupils. The study results indicated that the availability of educational infrastructure would facilitate the teaching learning process, thereby increasing performance of both pupils and teachers.
4. The study result indicates that school equipment and insufficient instructional materials have negative influence on students, pupils' enrolment, attendance rates and overall academic performance.

5. The study result indicates that school lacks basic facilities such as school park/field, toilet, facility and school buildings were not well maintained.

## **5.2 Conclusion**

The study concluded that infrastructure such as inadequate classrooms with electricity; libraries, computers and computer rooms, textbooks, inadequate scientific equipment and materials for teaching science have negative influence on the academic performance of pupils

## **5.3 Recommendation**

The research recommended that,

1. The Ghana education service through the municipal education Directorate should provide adequate educational infrastructure to improve teaching and learning in Kalpohin SDA school complex.
2. The Ghana education service through the Municipal education Directorate should furnish the school with well-equipped and stocked libraries improve upon teaching and learning in the school
3. The Ghana education service through the Municipal education Directorate and the school Parent Teachers Association (PTA) to provide a well-equipped laboratories and computer room with adequate computers and internet connectivity to improve teaching and learning.

## **5.4 Suggestions for Further Research**

The researcher suggest that the geographical scope of the study should be broadened by using selected schools in these municipality as case study.

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## APPENDIX

### Questionnaire for Headteachers and Teachers

**UNIVERSITY OF EDUCATION, WINNEBA**

**FACULTY OF SOCIAL SCIENCES**

**DEPARTMENT OF SOCIAL STUDIES**

Dear respondents

The researcher is a product of UEW, Winneba, North campus conducting a piece of research on **Effects of Infrastructure on Academic Performance of Pupils of Kalpohin S.D.A School Complex.**

I respectfully request that you form part of this research by completing the attached questionnaire. This is seeking to solicit your opinion on the impact of school infrastructure on academic performance of pupils. Anonymity and non-traceability are assured. It is my fervent hope that you participate in the study. May I thank you for your valuable cooperation.

#### **Section A; Demographic Information of The Respondent**

1. What is your gender

Male [    ] female [    ]

2. Age ranges of the respondents

Below 25 years [    ] 26 – 30 years [    ] 31 – 35 years [    ] above 35 years [    ]

#### **Section B: what type(s) of school infrastructure is available in the school.**

Assess the current of the learning infrastructure in your school in the table

shown key:    1 = inadequate, 2 = Adequate, 3 = Not Available

Facilities	1	2	3
3. Classrooms with electricity			
4-Laboratories			
5-Libraries			
6-Computer room			
7-Computer with internet connection			
8-Text books			
9-Scientific equipment for teaching science			

**Section C : what is the influence of school equipment and instructional materials on students’ academic performance:**

Key 1 = strongly Agree, 2: Agree, 3= Strongly Disagree, 4 = disagree

10- Effective education cannot take place without equipment facilities, materials etc.	1	2	3	4
11- Lack of educational resources on our schools has been a major problem in the instructional process				
12. Instructional materials are used by teachers to achieve their set objectives				
13-Poor teaching and learning environment result to poor academic performance				
14. Learning equipment and materials have their own effects on the academic performance of students				
15. The availability of educational infrastructure will facilitate the teaching and learning process, thereby increasing performance of both the students and teacher				
16. A school environment that is handicapped by the non – availability of these teaching and learning facilities may strongly affect the level of students’ academic performance				

17. How would you rate the overall performance of this school in national examinations?

1) Excellent [  ] 2) Good [  ] 3) Average [  ] 4) poor [  ] 5) Very poor [  ]

18. What is the influence of school’s equipment and instructional materials on your students’ academic performance?

Positive influence [  ] Negative influence [  ] Not sure [  ]

19. How do you rate student’s participations in your class when using instructional materials and modern school facilities?

High [  ] Low [  ] Not at all [  ]

20. What is the school pupil enrolment at the beginning 2019/2021 academic year?

21. What is the attendance rate of pupils in your school?

2019/2021 academic year L [> 90% L], 70 – 89% [  ], 50 – 69% [  ], 50% [  ].