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The Impact of School Learning Environment on Students' Academic Performance in Senior
High Schools in the Greater Accra Region, Ghana

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Dedication

This dissertation is dedicated to my late grandmother Catherine Akoua Alaglo who led my first footsteps to school, and to Gilbert Akwasi Appiah-Baafi, Rev. Fr. Lawrence Adiepenah, Gabriel Toulemonde, Michel Jollant, and my dad Joseph Kofi Tawiah Baafi all of the blessed memory who could not live to witness this achievement. I also dedicate this work to all my teachers, professors, benefactors, and benefactresses. You showed me love, care, knowledge, and wisdom. Thank you and celebrate you with this achievement.

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Abstract

Regardless of geography and time, academic performance is usually construed as one of the main determinants of school and educational success. Since the advent of education reforms in 1987, Ghanaian students' performance in senior high schools in WASSCE has been low. Scholars and government agencies have done several studies to establish the causes of the low scores and suggest possible solutions. However, there are no reports on the impact of school learning environment's indicators on students' academic performance. The apparent gap in theory and literature is one of the major reasons for this undertaking. The indicators of school learning environment investigated were student-teacher relationships, academic support, school physical and teaching environment. This study also aimed to establish a prediction model about the influence of school learning environment indicators on students' academic performance.

The research was a quantitative survey, and stratified random sampling was used to select 400 students from four senior high schools in the Greater Accra Region. Data was collected using a questionnaire adapted from School Climate Measure and analysed using Social Sciences Statistical Package. Students' academic performance mean score in English language, mathematics, integrated science, and social studies was investigated. Statistical analysis was done at $p < 0.05$ using various tests including ANOVA, Kaiser-Meyer-Olkin measure Bartlett's Test of Sphericity, factor analysis, Cronbach's alpha measure, normality, auto-correlation, Pearson moment correlation coefficient and linear regression analysis.

All indicators of school learning environment had a strong relationship with students' academic performance: student-teacher relationships ($r = 0.60$; $p < 0.05$), academic support ($r = 0.61$; $p < 0.05$), school physical environment ($r = 0.53$; $p < 0.05$) and school teaching environment ($r = 0.65$; $p < 0.05$). Linear regression coefficients were used to model a relationship between school learning environment indicators and students' academic performance. This study recommends that the government of Ghana and development partners increase resource allocations to senior high schools to improve the school learning environment as a solution to address students' poor academic performance.

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List of Acronyms

ADP	Accelerated Development Plan
ANOVA	Analysis of Variance
BECE	Basic Education Certificate Examination
CFS	Child Friendly School
CIPO	Context Input Process Output
CSSPS	Computerised School Selection and Placement System
ESP	Education Strategic Plan
ESS	Every Student Succeeds
FSHS	Free Senior High School
GES	Ghana Education Service
GPA	Grade Point Averages
GSS	Ghana Statistical Service
GTS	Ghana Teaching Service
ICT	Information Communication Technology
ISTOF	International System for Teacher Observation and Feedback
JHS	Junior High School
KMO	Kaiser-Meyer-Olkin
MOE	Ministry of Education
NAB	National Accreditation Board
NCLB	No Child Left Behind
NCTE	National Council on Tertiary Education
OECD	Organisation for Economic Co-operation and Development
PFSHE	Progressive Free Senior High Education
PTA	Parent Teacher Association
SDG	Sustainable Development Goals
SHS	Senior High School
T-TEL	Transforming Teacher Education and Learning
TVET	Technical Vocational Education and Training
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children’s Fund
WAEC	West Africa Examination Council
WASSCE	West African Senior School Certificate Examination

WHO World Health Organisation

CHAPTER ONE

Introduction

1.0 Background of the dissertation

Education is an integral part of society that points to socio-economic development (Cheek et al., 2015; Mine, Hiraishi, & Mizoguchi, 2001; Türkkahraman, 2012). It offers citizens opportunities to transform and improve knowledge, behaviour, attitude and skills that empower them to meet social needs and individual growth (United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2018). Global initiatives in education have increasingly focused on access, inclusiveness, equity and quality education to facilitate social development (United Nations, 2016). The initiatives' objective is to ensure that all children are enrolled in school and prepared to meet global labour demands (UNESCO, 2013). Education involves teaching and learning and can occur in different contexts through formal, informal and non-formal approaches (Abidogun & Falola, 2020).

Formal education occurs mainly in school systems where learning is organised in a structured environment (Aslam et al., 2012). In this regard, learning is part of the processes and experiences that students encounter during structured interactions (Gauthier, 2014). Every student learns uniquely and demonstrates different levels of understanding, skills, and outcomes (Wilson & Peterson, 2006). Therefore, knowing the differences in students' abilities and interests is essential for teachers in selecting learning approaches (Mantiri, 2013). The learning context determines how teachers structure learning objectives to facilitate effective outcomes (Cameron & Harrison, 2012; Werquin, 2007).

In a school environment, learning is structured according to educational needs and explicit curricula that clearly outline objectives and expectations (Ainsworth & Eaton, 2010). The process is facilitated by teachers who employ various approaches to achieve desired learning outcomes measured systematically (Aslam et al., 2012; Werquin, 2010). Most research on students' academic performance focused on either school curriculum or classroom environment and academic performance (Dorman, 2001; Dorman & Adams, 2004). However, it has been established that many factors, including school learning environment, affect learning outcomes (Aslam et al., 2012; Werquin, 2010). The literature on psychosocial school

learning environment shows that students' perception of school environment accounts for greater variations in learning outcomes more than other factors such as pre-test performance, general ability, or both (Fraser & Fisher, 1982).

Poor academic performance points to one of the significant educational challenges in Ghana educational system, especially in senior high schools (SHS). This is reflected in the high numbers of SHS graduates who fail to qualify for entry into tertiary institutions (Ministry of Education [MoE], 2017). Statistics from West African Senior School Certificate Examination (WASSCE) show that between 50 – 70% of senior high school graduates failed their examination in the last five years (Chowa et al., 2013a). WASSCE is a standardised assessment that qualifies secondary school students to tertiary institutions in West Africa's anglophone countries. The high rate of failure in WASSCE demands attention from all education stakeholders (Vincent & Udeme, 2014). This study reviewed relevant literature to identify gaps in improving students' academic performance in SHS.

This research involved school learning environment and students' academic performance. Effectively, theories that explain how students receive process and relay information during learning are discussed. Learning theories are important for this study because they provide frameworks that explore the relevance of various teaching approaches, which significantly influence students' learning processes and academic performance (Khalil & Elkhider, 2016). The theories include behaviourism, cognitivism, and constructivism. Furthermore, the research considered other theories that show the relationship between environment and students' learning achievement, including academic performance.

Bronfenbrenner's ecological systems theory and Bandura's social learning theory illustrate different aspects of the learning environment relevant to this study. Based on these theories and the reviewed literature, some school learning environment indicators were identified for the formulation of study objectives. The study also explored models that define the relationship between the learning environment and academic performance. Context-input-process-output (CIPO) and educational productivity models provide the link between student assessment and academic performance. The context of this study illustrates various educational interventions and reforms in Ghana and the research setting. The literature discusses empirical studies carried out in different parts of the world to show the influence of various indicators of school learning environment on students' academic performance. Furthermore, key features of the Ghanaian education system which are relevant to the investigation are discussed.

1.1 Problem statement

Over the years, there has been a gradual decline in academic performance among senior high school students in Ghana. The trend provoked national discussions and research to solve this educational challenge (Chowa et al., 2013a). Despite these strenuous efforts, poor academic performance by students in SHS has persisted. In 2018, for instance, only 38% of candidates who sat for WASSCE scored the minimum grade for tertiary institutions admission (Roach, 2019). A considerable number of candidates representing 62% failed to qualify for university admission and entry into alternative tertiary institutions.

While some empirical studies examined the causes of poor students' academic performance in SHS, there are still critical gaps in the current literature that require further research. For example, most researchers explored students' academic performance from the perspective of parental involvement (Owusu et al., 2018), teacher characteristics (Azigwe et al., 2016), and rural-urban schools' disparities (Opoku-Asare et al., 2015). These studies investigated different factors that influence academic performance. However, these factors were studied separately. On the extant literature premise, it is arguable that focusing on the factors separately as isolated variables may not provide sufficient evidence to demonstrate the complex effects of their interplay on students' academic performance.

The literature shows that school learning environment contributes significantly to students' academic performance (Bhavana, 2018; Dincer & Uysal, 2010; Pietarinen et al., 2014). A conducive learning environment is a crucial determinant in students' academic performance (Ado, 2015; Xiong, 2019). In lower-middle-income countries, such as Ghana, there is no extensive research about the influence of school learning environment on students' academic performance. This has caused a limited understanding of diverse factors that impact students' academic performance in senior high schools. This study, therefore, sought to address the gaps by investigating the relationship between indicators of school learning environment and students' academic performance collectively.

1.2 Aim of the study

This study aimed to investigate factors of school learning environment that influence students' academic performance in senior high schools in the Greater Accra Region, Ghana. The research was also to establish the associations between various indicators of school learning environment and students' academic performance. This was to determine how the

indicators interplay to influence students' academic performance. Furthermore, a model that predicts students' academic performance was formulated based on the indicators of school learning environment.

1.3 Significance of the study

This research provides empirical evidence into how indicators of school learning environment interplay to influence students' academic performance. The prediction model on students' academic performance gains insights into contributions of school learning environment indicators. The findings demonstrate factors that affect academic performance and provide a framework for policies formulation to address the decline in academic performance in senior high school. The study shows the significance of student-teacher relationships, academic support, school physical environment and school teaching environment on learning outcomes in SHS. Results of this study would be disseminated through seminars, media sessions and public fora to sensitise parents about the critical role the school learning environment plays in students' academic success.

1.4 Scope and delimitation of the study

The study was conducted in Ghana and exclusively involved public secondary schools. Students who participated in the research were selected from senior high schools in the Greater Accra Region. Participants were SHS students in form one, two, and three. Participation was voluntary. The research focused on student-teacher relationships, academic support, school physical environment and school teaching environment as indicators of school learning environment that influence students' academic performance. However, the inquiry exempted extraneous factors that could manifestly influence academic performance but were out of the scope of this study. The extraneous variables include parents' level of education.

CHAPTER TWO

Literature Review

2.1 Introduction

The chapter presents the theoretical background of this research by reviewing relevant literature. This section examines some theories on learning and how the environment influences learning outcomes. Learning theories are essential for understanding diverse processes that contribute to students' learning outcomes as well as academic performance. The discussion provides theoretical foundations to establish links between learning environment and academic performance. The chapter also explores indicators of school learning environment and their relationships with students' academic performance. Salient characteristics of the education system in Ghana are also presented in this section to elaborate on the context of this research.

2.2 Theories of learning

Various learning theories have established relevant conceptual models to explain how learning involves processes that stimulate students' interest and ability to generate knowledge (Speers, 1989; Wilson & Peterson, 2006). Some of the theories that explain the relationship between the school environment and learning process include behaviourism, cognitivism, and constructivism (Ertmer & Newby, 2013). Behaviourism theory, for instance, associates learning with processes that facilitate change in behaviour through stimuli, response, and reinforcement (Ismail et al., 2017). Behaviourists postulate that learning causes behaviour change that can be observed, measured, and rewarded (Shaffer, 2000). This theory is supported by operant conditioning principles that link students' learning behaviour to stimuli, response, and reward through positive reinforcement (Wilson & Peterson, 2006).

Reinforcement refers to external conditioning forces that influence the learning process and students' academic performance (Vlaev & Dolan, 2015). Learning goals are linked to reinforcement which visibly stimulates the students' learning behaviour (Theodotou, 2014). For example, a teacher of mathematics can introduce a reward system in the subject to motivate low achieving students every time they improve on their scores. The reward becomes an external stimulus for conditioning the students' learning behaviour in mathematics. In the

school environment rewards can provide intervening conditions that enable students to modify their learning behaviour in order to improve their academic performance (Zhou & Brown, 2017). Consequently, conditioning learning through rewards can increase observable behaviour and decrease undesirable attitudes that impede learning outcomes (Woollard, 2011).

The theory further posits that the environment contributes significantly to the conditioning of the learning process and eventual outcomes of targeted students' behaviour that can be observed and measured (Syomwene et al., 2013; Woollard, 2011). For instance, classroom interactions that motivate students' class participation can arouse positive learning behaviour and cause a change in students' attitudes towards learning (Ali et al., 2020; Banks et al., 2014). Proponents of behaviourism argue that reward and punishment in school environment are by-products of operant conditioning to optimise desirable students' learning behaviour and outcomes (Ertmer & Newby, 1993). While behaviourist approaches are criticised as student-passive, teacher-centred learning methods underpinning the theory demonstrate that behaviourist approaches stimulate students to modify their learning behaviours to enhance academic performance (Serin, 2018).

Another theory that explains how learning occurs to transform students' thinking is cognitivism. The theory postulates that learning involves complex processes grounded on personal mental experiences (Kolb & Kolb, 2009). The theory maintains that cognitive structures connect previous experiences' schemas to generate knowledge (Guey et al., 2010). For instance, in introducing a new topic during a lesson, the teacher can lead students to brainstorm on a model to develop definitions. The teacher's role is to initiate the discussion by asking leading questions that provide clues to the topic to enable students to explore and create knowledge.

Cognitive approaches kindle learning interactions between students and the environment to inculcate cognitive skills (Yilmaz, 2011). Cognitivists acknowledge that the environment is a vital element for active cognitive processes that enable learners to explore, manipulate, experiment, question, and search for knowledge independently (Schunk, 2012). Likewise, a cognitivist instructional environment emphasises student-centred learning approaches that enable students to process, create, organise, and personalise their learning web of mental structures. For example, in Integrated Science class, students can be asked to explain the term "energy". Based on the definition, the teacher can ask questions about sources of energy that students use at home as well as their advantages and disadvantages. This learning approach is student-centred and aids students to acquire knowledge based on their experience

and understanding. The cognitivist learning environment, therefore, helps teachers to identify students' learning needs to provide the needed academic support.

Constructivism theory is another learning theory widely used across fields to explain different learning perspectives (Sjøberg, 2010; Taber, 2006). This theory considers learning as the reflection on previous experiences to build structures of understanding and knowledge (Bhattacharjee, 2015). While Piaget views constructivism as involving processes of acquiring knowledge in ongoing constructive stages, Vygotsky posits that social interactions facilitate the construction of mutually shared experiences (Dagar & Yadav, 2016). In a constructivist learning environment, personal background and previous knowledge are essential for learning (Rahimi & Ebrahimi, 2011; Suhendi & Purwarno, 2018). Theorists of constructivism adopt student-centred learning approaches to motivate students to explore their world, personalise knowledge, and take responsibility for learning outcomes (Bhattacharjee, 2015; Suhendi & Purwarno, 2018). For instance, a teacher can ask students to make a presentation about their culture in Social Studies class. This assignment can provide an opportunity for every student to share their culture from personal experience.

Similarly, constructivist approach can assist students to manage their learning processes while teachers intervene as facilitators to improve students' learning outcomes (Tasheva & Bogdanov, 2018). Constructivism theorists further argue that learning contexts can positively or negatively influence the way students personalise learning (Bada, 2015; Mantiri, 2013). The proponents maintain that students are to be supported in constructing knowledge through personal experiences (Rahimi & Ebrahimi, 2011). In selecting teaching approaches, educators are encouraged to pay critical attention to variations in the learning environment and students' experiences to enhance learning outcomes (Koh & Lim, 2008; Mantiri, 2015). Therefore, learning theories are critical in this investigation and help to understand links between school learning environment and students' academic performance. The summary of the learning theories discussed in this study is illustrated in Table 2.1.

Table 2.1*Learning theories*

Learning	Behaviourism	Cognitivism	Constructivism
Intention	Change in behaviour to occur in every situation.	Change in knowledge occurs in memory.	Change in meaning occurs from personal experience.
Characteristic	Very structured towards behaviours' training.	Structured to enable the processing of information efficiently.	Provide guide knowledge construction.
Role of student	Passive. Knowledge is independent of the student.	Active. Knowledge is independent of the student.	Active. Knowledge is constructed by the student and personalised.
Outcomes	Observable and measurable behaviours.	Mental encoding and storing of information.	Personalising interpretation based on interactions and experiences.
Types of learning	Observation and demonstration.	Problem-solving, processing, exploring, and organising.	Analysis, synthesis and evaluation skills.
Learning principles	Reinforcement, stimulus, and response.	Instructions and hierarchies of learning.	Collaboration, scaffolding, and problem-solving.

Source: Author based on Koh and Lim (2008).

2.3 School learning environment

School learning environment refers to an educational setting's overall atmosphere where academic activities occur (Aslam et al., 2012; Weinstein, 1979). UNESCO (2012) describes the school environment as the physical, social, psychological, and academic conditions that facilitate learning in school. Similarly, Organisation for Economic Cooperation and Development (OECD) describes the school as a learning environment that helps students to acquire educational experiences (Organisation for Economic Cooperation and Development

[OECD], 2018a). The school environment comprises the school climate, parental involvement and school leadership where knowledge can be attained (OECD, 2018a). Some scholars also define learning environment as the classroom's physical and social dimensions that influence learning (Guney & Al, 2012; Malik & Rizvi, 2018). This study is underpinned by selected theories that relate learning to the environment to establish the relationship between school learning environment and students' academic performance. Ecological systems and social learning theories are deemed relevant for this investigation.

Ecological systems theory of Bronfenbrenner describes a child's process of development in the context of relationships of systems that define the environment of the child (Bronfenbrenner & Morris, 1998). The theory outlines the environment as complex layers of *microsystem*, *mesosystem*, *exosystem*, *macrosystem* and *chronosystem*, which affect students' development, including their academic performance. The immediate environment encircling the student is *microsystem*. It refers to relationships and interactions which students make with their direct setting. This system's structures include home, teachers, and classroom environments (Rudasill et al., 2018). The relationships between the students and these environments directly or indirectly influence learning progress. For example, student-parent interactions can impact a child's academic performance. However, the child can also influence parents' behaviour and belief in the child's academic progress. *Mesosystem* refers to the interactions that occur in more than two microsystems, such as the interactions between parents and teachers (Bouchard & Smith, 2017). *Exosystem* describes the social system in which students do not participate directly but indirectly affects their development and academic performance. The structures in this layer include in-the-school and out-of-the-school resources that affect the students' academic performance by participation in the microsystem (Iruka et al., 2020).

The *macrosystem* denotes the outermost layer in the students' environment. Structures in this layer include principles controlled by values, policies, and beliefs. These principles define the macrosystem and have cascading effects that can influence interactions of all other layers. For example, male or female students' poor learning attitudes in mathematics or engineering may be attributed to societal normative influences (Seginer, 2006). The *chronosystem* involves the time-related dimension of a student's development and achievement. It includes changes in students' biological maturation, life events, and experiences, which affect students' academic performance (Lau & Ng, 2014).

Social learning theory developed by Albert Bandura explains the social context of learning as a consequence of interactions involving persons and the environment (Bandura,

1999). A student's immediate surroundings are essential because learning can occur through observation, imitation, and modelling (Lent et al., 1994; Zimmerman, 1989). The relevance of observation, modelling and imitating others' attitudes, behaviours, and emotional reactions were tested in Bandura's Bobo doll experiment. The investigation involved a group of children in pre-school who watched adults physically and verbally abuse inflatable plastic toys called Bobo dolls. The children were assembled into three groups. The first experimental group observed aggressive adult behaviours, while the second experimental group observed non-aggressive adult behaviours. The third group, the control group, was not exposed to any experimental behaviour models. Over time, the children were observed in the presence of different toys regulated to show aggressive and non-aggressive stimuli. The results showed that children in the aggressive behaviour model displayed significantly higher tendency of aggressive behaviours compared to children in the other two models. After eight months, 90% of children in the aggressive behaviour model exhibited aggressive adult behaviours compared to only 40% in the other groups (Hart & Kritsonis, 2006; Lansford, 2016). It can be inferred from the Bobo dolls experiment that environmental conditions influence learning behaviours that are acquired by observation and modelling.

Retention is another critical element of social learning theory and refers to students' ability to remember what they pay attention to, such as mental images, symbolic coding, motor rehearsal, and cognitive organisation (Fryling et al., 2011). Attention is vital in social interactions and revolves around factors such as prevalence, distinctiveness, functional value, and complexity (Rijn et al., 2019). Social learning theory can provide stakeholders with valuable information to improve students' learning outcomes (Hollis, 2019). The theory refers to learning as outcomes of a persons' social interactions in an environment such as the school (Bandura, 1999). There are ongoing debates among researchers on how to establish associations between school learning environment and academic performance. The debates have elicited global empirical studies to explore the effects of school learning environment on academic performance (Zullig et al., 2014). In this regard, our study investigated how some aspects of the school learning environment functioned independently or concurrently to cause variations in students' academic performance.

Wang and Holcombe (2010) examined students' perceptions of their school environment, school engagement, and academic performance on the East Coast of the United States of America. The research described students' school engagement as school identification, students' self-regulation strategies and participation in educational activities. Students' perceptions comprised of interrelationships between the constructs and students'

academic performance. The grade point average (GPA) of students represented students' academic performance. The study found that school environment plays a vital role in students' cognitive, emotional, and behavioural growth necessary for academic performance. The research further established that teachers' support in learning engagement significantly improved students' academic performance.

Lodhi et al. (2019) studied school environment and students' academic performance in Pakistan. The research was conducted in Punjab province and involved students, teachers, and principals in public high schools. The research aimed at establishing associations between school learning environment and students' academic performance in English language. The study found that factors of school learning environment such as infrastructure, facilities, teacher quality, teaching approaches, academic support, teacher-student, and school-parent relationships were predictors of students' academic performance. The investigation established that a favourable school learning environment enhances students' academic performance in high school. This finding corroborates United Nations Children's Fund (UNICEF) objectives of Child-Friendly Schools (CFS) (Osher et al., 2009). The CFS approach posits that whenever a conducive school learning environment is created, it enhances students' well-being, enabling them to achieve full potentials, including academic performance (Osher et al., 2009b).

There are empirical studies that examined dimensions of school learning environment and students' academic performance. Zullig et al. (2011) explored associations between school's climate and satisfaction and students' academic performance. The study involved students in government middle and high schools in the United States. The research was to ascertain students' perceptions of their school environment and academic performance. The study assessed school climate domains using school climate measure (SCM) tool. The instrument consisted of order, discipline and safety, educational outcomes, social relationships, school facilities and school connectedness constructs. School satisfaction entailed students' feeling about their school environment and grade point average (GPA). The research found associations between school environment domains and students' academic performance. The study identified school climate as key dimensions of school environment which caused significant variations in students' academic performance. The dimensions encompassed academic support, student-teacher relationships, school connectedness, school order and discipline, and academic satisfaction. The findings imply that a conducive school learning environment enhances students' attitude towards learning and improves academic performance (Pianta & Hamre, 2009).

Kibriya and Jones (2020) explored the impact of safe school environment on students' academic performance in Tanzania. The investigation involved students, teachers, and administrators in determining how a safe school environment influences students' academic performance in primary schools. The study instruments included Early Grade Reading Assessment (EGRA), Early Grade Mathematics Assessment (EGMA) and Snapshot of School Management Effectiveness (SSME). The EGRA was used to assess students' literacy abilities by emphasising orthography, fluency, reading and comprehension. Numeracy skills were also tested using EGMA to evaluate students' basic mathematical and problem-solving abilities. The SSME tool measured the school learning environment focusing on students' demographics, management, infrastructure, teaching resources, safety, and management relationships with school community. Students' academic performance measurement entailed students' standardised test scores in English language and mathematics. The study established that school safety was an important indicator of school learning environment that contributed significantly to students' academic performance. It also found that students' demographic characteristics and home factors influenced students' learning. The inquiry, thus, concluded that a congenial school learning environment could improve students' academic performance.

Baidoo-Anu (2018) investigated the influence of school and home environments on students' academic performance in Ghana. The research involved students and teachers in junior high schools because their perceptions provided insight on teaching and learning factors affecting academic performance. The study was carried out at the Asikuma-Odoben-Brakwa District to explore factors related to school and home that affected students' performance in Basic Education Certificate Examination (BECE). The instrument used to assess these factors consisted of two validated pre-test self-design questionnaires for students and teachers. While teachers' tool considered perceptions of home conditions, students' instrument assessed school-related factors. Student academic performance was measured by scores achieved in BECE using WAEC grading system. Findings of the study showed that students' poor academic performance was related to school and home factors. The school factors included insufficient teaching and learning supplies, sub-standard school infrastructure, inadequate school facilities such as library and classrooms. The home factors consisted of lack of parental school involvement, especially in parent-teacher association (PTA) activities. The study also established that parents' inability to provide needed academic support to children negatively affected their academic performance. The research concluded that school teaching environment, parental school involvement, and academic support were significant determinants of students' academic performance. The finding implies that students' academic

performance can improve if school teaching and home environments are favourable for learning.

Pobbi et al. (2018) studied school climate and students' academic performance in 10 administrative regions in Ghana. The research involved students in senior high school and assessed key school climate factors that promoted academic performance using standardised test scores. School climate was defined as classroom environment, interpersonal relationships, and academic support. Academic performance measurement consisted of average scores in Mathematics, English, Integrated Science and Social Studies using WASSCE grading scale. Inventory of School Climate (ISC) and the National School Climate Centre (NSCC) tool was used to measure school climate. The research found that teaching and learning, interpersonal relationships, institutional environment, and school safety were vital school climate dimensions that significantly influenced students' academic performance. The study concluded that school climate plays a crucial role in enhancing students' academic performance.

Asamoah et al. (2020) investigated school environment and students' academic performance in public senior high schools in Ghana. The study was conducted in Kumasi metropolis and explored school environment, teacher and student factors that caused students' poor academic performance in core mathematics in WASSCE. The survey involved students in senior high school and mathematics teachers and used questionnaire for data collection. Academic performance was assessed using standardised test scores in WASSCE. The research found that students' poor academic performance in public senior high schools was caused by teachers and teaching environment factors. The factors included insufficient teaching and learning materials, textbooks for teachers and students, and inadequate continuous teacher professional development programmes. The study also established that teaching methods, teacher subject content mastery, teacher-student relationships, academic support for students' learning and teacher punctuality were predictors of poor academic performance in mathematics. The factors impeded students' academic performance and were related to the school teaching environment. By inference, a school teaching environment is vital for achieving effective learning outcomes. The finding implies that a school with a well-resourced teaching environment can enhance teaching and learning and improve students' academic performance.

Opoku-Asare and Siaw (2015) assessed disparities in rural and urban school learning environments and students' academic performance in Ghana. The study was carried out in Kumasi metropolis and involved students in senior high school to establish factors that accounted for variations in rural and urban students' academic performance in Visual Arts.

Participants included 120 students and 18 teachers randomly selected from six schools. The mixed-methods approach consisting of questionnaire, observation, and interviews was used for data collection. Students' academic performance was measured by grades achieved in WASSCE. The findings attributed variations in students' academic performance to factors like students' entry grades, school facilities, school location, students' background, and motivation. The research also established that students in urban senior high schools performed better than those in rural schools. The disparity in performance was as a result of urban schools attracting students with higher entry grades. Additionally, the study found that students in urban schools were more motivated by their learning environment to achieve higher academic output than their colleagues in rural schools. The study concluded that school location and adequate school facilities are essential factors that improve school learning environment and students' academic performance.

2.4 Academic performance

There is no consensus among educators about the best way to measure students' academic performance, which they consider as one of the most challenging tasks (Chiekem, 2015). The complexity of the challenge is that various approaches can be used to determine learning outcomes, including academic performance (Carini et al., 2006; Lamas, 2015). For instance, while some studies associate student academic performance with examination or assessment outcomes (Odeh et al., 2015), others relate it to success in completing planned learning goals (Bossart et al., 2011). Some researchers have alluded academic performance to assessment indicators like learning aptitude, academic success achieved through mental abilities, and function of intelligence (Brown et al., 1989; Peng & Kievit, 2020; Yahaya et al., 2012). Other literature refers to student academic performance as grade point average (GPA) of students' scores achieved in a course or feedback on mastery of content in a subject (Ahmad, 2014; Allen, 2005; Mushtaq & Khan, 2012). The diversities in assessment approaches of students' academic performance have exemplified challenges that confront educators in measuring academic performance.

Student performance has also been addressed by government policies at various levels of governance across the globe. The federally controlled act in the United States of America, *No Child Left Behind* (NCLB), had the central goal of providing equal quality education and educational opportunities to all students regardless of social and economic backgrounds

(Petersen & Young, 2004). The act aimed at making schools more accountable for learning and academic performance. Furthermore, the state was to provide requisite resources in schools, monitor teaching and learning, evaluate performance of teachers, assist students with learning needs, and involve parents in school activities to optimise students' academic performance (Petersen & Young, 2004; Simpson et al., 2004). A subsequent educational initiative, *Every Student Succeeds* (ESS) act, was signed into law in 2015 but operationalised in 2017. The act was to address the vast disparity in academic performance among students that stemmed from diversity in socio-economic status (Zinskie & Rea, 2016). The act was also committed to restore public confidence in the educational system that every student has full potential to succeed in school (Chenoweth, 2016). The educational system ensures that students acquire quality instruction that can be measured to establish students' learning progress. Therefore, it is essential to explore student assessment systems that effectively measure students' academic performance (Huitt et al., 2009).

Assessment systems are evaluation approaches that enable educators to measure students' skills, abilities, and knowledge (Conley & Darling-Hammond, 2013). The systems provide feedback on how learning progresses to determine every student's abilities and make interventions (Hofman et al., 2009). Therefore, assessment is an integral tool in education systems to help schools collect comprehensive data on every student's learning progress and needs (Caffrey, 2009; Tulu & Tolosa, 2018). There are different ways by which teachers can measure whether students' learning objectives have been achieved as planned or not (Baranovskaya & Shaforostova, 2017). Consequently, students' assessment approaches are useful evaluation strategies for improving learning outcomes and academic performance (Baranovskaya & Shaforostova, 2017; Harlen & Crick, 2002; Nusche, 2013).

Assessment approaches can be formal or informal, depending on their intended purpose (Caffrey, 2009). Formal assessment involves standardised tests from an external body, while informal is school based. For example, during classroom engagement, a teacher can informally assess students for instructional purposes to determine students' learning needs (Black & Wiliam, 2018). This assessment outcome may influence what teaching approaches best support students to achieve expected learning outcomes. By implication, informal assessment helps teachers adapt their teaching skills to meet the frequently evolving student learning needs in day-to-day classroom (Loyd & Koenig, 2008). Similarly, teachers can use *question-and-answer* method to determine students with special learning needs. This approach is useful to predict students' strengths and limitations to provide relevant academic support. Thus, students' assessment can also be used for prediction based on analysis of previous knowledge

(Lim et al., 2010; Thiede et al., 2015). An assessment for predictive purpose is goal-oriented and measures achievement based on learning objectives (Clark, 2012).

Student assessment may be used for diagnostic purposes to estimate the functioning and comprehensive standards of learning vis-à-vis students' holistic development (Shacham & Od-Cohen, 2009). Diagnostic assessment enables school systems to adapt teaching and learning models as benchmarks that enhance learning outcomes (Armbruster et al., 2009). The models identify peculiar needs among students, such as cognitive, behavioural, and social needs that are key indicators for academic performance. For instance, feedback from diagnostic assessment in a subject can expose weaknesses of teaching methods. This input helps to track standards that serve to enhance instructional practices (Caffrey, 2009). On this premise, student assessment is essential for school learning environment and holistic students' development. Therefore, schools are to adopt comprehensive assessment practices that improve teaching and learning quality (Nusche, 2013).

Traditionally, student assessment has been considered summative or formative, depending on its functions in the learning process (Nusche, 2013). Summative assessment evaluates students' learning goals using standardised test criteria (Taras, 2007). It involves accountability during learning process to measure students' abilities and knowledge (Dixson & Worrell, 2016). The assessment process becomes the summary of how learning has occurred over time and is measured through grading systems (Harlen & Crick, 2002). It implies that summative assessment is an instrument to gauge students' learning standards based on content objectives.

Formative assessments are internal evaluations that are done during classroom engagement (Hofman et al., 2009). The process is informal and enables teachers to evaluate the day-to-day progress of students' learning to improve instructional approaches (Caffrey, 2009). A teacher, for example, can test students on a previously taught topic as an end-of-week test. The feedback can verify students' mastery of content and judge their learning progress (Kazu et al., 2005). Assessment in learning is vital for classroom practices since it helps teachers select teaching methods that enhance students' learning (Nusche, 2013). Teachers need to be fair in classroom assessment practices to identify students' learning ability and provide the requisite academic support (Tierney, 2013).

There are models that evaluate the relationship between school learning environment and academic performance to determine variations in students' learning achievement (De Clercq et al., 2013). The frameworks provide a foundation for linking students' assessment processes to academic performance and explain the influence of environment on learning

outcomes. The context-input-process-output (CIPO) model considers education as a process where inputs are processed into outputs (Hulpia & Valcke, 2004). The model comprises context, input, process, and output to offer an analytical basis for assessing the quality of the learning process (Chang & Lin, 2018). Context refers to the policies, environment, and approaches that influence students' academic performance. The input entails resources and infrastructure that students need to excel, while the process includes initiatives to achieve learning objectives (Martínez-Abad, 2019). Output is the feedback that accounts for the learning. This model illustrates the vital role school learning environment plays in learning processes and learning output (Hofman et al., 2009).

Educational productivity model postulates that students' academic performance is the outcome of affective, behavioural, and cognitive activities that show students' learning abilities, including school social environment and instructional factors that affect students' learning (Walberg et al., 1981). The model highlights nine factors that affect students' academic performance, grouped into aptitude, instruction, and school social environment factors (Walberg et al., 1986). Aptitude factors encompass ability, prior achievement, and motivation, while instructional aspects entail time students engage in learning and the quality of instructional interactions. School social environment factors include home, classroom, peer groups, and out-of-school social contacts (Bruinsma & Jansen, 2007). These factors can affect learning as well as students' academic performance.

2.5.1 Student-teacher relationships

Student-teacher relationship is an essential indicator of learning environment and plays critical roles in students' development and learning (Koca, 2016). Among the five systems in Bronfenbrenner's ecological theory that influence a student's development, student-teacher relationships fall within the microsystem (Taylor & Gebre, 2016). This system represents students' interactions with teachers and the immediate environment that impacts learning development (Bronfenbrenner & Morris, 1998; Rudasill et al., 2018). The significance of student-teacher relationships can also be connected to John Bowlby's attachment theory (Keller, 2013). The theory propounds that relationships between adults who are caregivers of children significantly influence children's learning development. The quality of attachment between teachers and their students is essential for learning outcomes (McGrath & Bergen, 2015).

Self-determination theory also demonstrates that student-teacher relationships significantly influence students' learning (Bakadorova & Raufelder, 2018). The theory postulates that students have three basic psychological needs: independence, relatedness, and competence that affect learning motivation (Ryan & Deci, 2000). Teachers can help students set learning goals, connect with the environment, and actualise their potentials. Thus, students are motivated to participate in classroom activities when teachers help them satisfy these psychological needs (Smit et al., 2014; Turner, 2019).

The social context of learning is grounded on student-teacher relationships and is among factors that affect student-teacher interactions, school engagement and motivation among students (Spilt et al., 2011). Supportive and positive student-teacher relationships can enhance students' participation in learning engagement and a sense of belonging (Hughes & Chen, 2011). A constructive relationship with teachers enables students to work independently while teachers provide the needed support. Teachers facilitate the process of support by responding promptly to challenges faced by students. This collaboration motivates students to develop self-belief and promote learning. Likewise, quality student-teacher relationships stimulate students' motivation for higher academic performance (Cornelius-White, 2007; Nurmi, 2012; Roorda et al., 2011). For example, Ruzek et al. (2016) reported that emotionally supportive teacher-student interactions in classes enabled students to experience independence. Thus, cordial student-teacher engagements help students adjust to school environments with intrinsic motivation for learning (Forghani-Arani et al., 2019; Pianta & Hamre, 2009; Ryan & Patrick, 2001).

According to Fredricks et al. (2004), student-teacher engagement types are emotional, behavioural, and cognitive. Emotional engagement refers to students' affective reactions to studies such as interest and attitude. Similarly, students' behavioural engagement includes participation in academic and extra-curricular activities, while cognitive engagement entails mastery of complex learning processes. When teachers show concern for students' wellbeing, it creates positive emotion that can drive students' motivation and behaviour to participate in learning activities (Skinner et al., 2008). While students can externally be motivated to please teachers by seeking attention and approval as a reward, discordant student-teacher engagements characterised by conflict can potentially be detrimental to learning (Furrer & Skinner, 2003; Murray & Murray, 2004).

Positive student-teacher relationships can lead to job satisfaction, while negative student-teacher relationships may cause stress and burnout in teachers, especially when dealing with disruptive students (Chang, 2009; Spilt et al., 2011). The relationship is the emotional

bond that binds teachers and students and is essential for teacher motivation, students' affective needs and learning outcomes (Chang, 2009; Koca, 2016; Omodan & Tsotetsi, 2018; Sabol & Pianta, 2012). Effective student-teacher relationships lead to low levels of conflict and increase student involvement in learning activities, school attendance, and academic performance (Hughes & Kwok, 2006). Students' perception of their relationships with teachers plays a significant role in students' interest in learning (Fan & Williams, 2010). Likewise, the student-teacher relationships provide the needed motivation and support to optimise students' academic performance (Crosnoe et al., 2004). Teachers, therefore, provide relevant structures that facilitate student-teacher relationships by showing concern for students beyond their subject areas and listening to students' challenges. Empirical studies have established that student-teacher relationships are essential factors that can predict students' academic performance (Akiri, 2013a; Skinner et al., 2008).

Liu and Cavanaugh (2012) explored factors that influenced students' academic performance in online algebra class in the United States of America. The research assessed the impact of teacher comments, students' demographic information and learning management system utilisation on students' scores. The study involved high school students in K–12 virtual learning environment. Academic performance entailed final scores achieved by students. Data was analysed using hierarchical linear modelling technique. The study found that several factors, including student-teacher interactions, positively impacted students' final scores.

Xu and Qi (2019) explored student-teacher relationships and students' academic performance in China. The objective of the study was to determine how students' relationships with their mathematics teachers affected their academic performance. The research was conducted in 104 districts of Z Province. Participants included 762 secondary schools and 42,643 students in eighth grade. The data was analysed using hierarchical regression. The findings showed that teacher-student relationships had a positive impact on students' academic performance. Thus, the study concluded that positive student-teacher relationships are essential for predicting academic performance and can significantly improve students' academic performance.

Omodan and Tsotetsi (2018) investigated practices involving student-teacher relationships and students' academic performance in Nigeria. The study aimed to determine the effect of student-teacher relationships on students' academic performance in public secondary schools. The descriptive survey involved 300 participants who were randomly selected. The data collection was done using two self-designed instruments: "Student-teacher relationship questionnaire (STRQ)" and "student academic performance questionnaire

(SAPQ)”. The questionnaires were validated, and test-retest method of reliability was used to investigate the instruments’ reliability. The data was analysed using descriptive and inferential statistics while the hypotheses were tested at 0.05 level of significance. The Pearson product correlation coefficients showed a significant association between student-teacher relationships and academic performance in secondary schools ($r = 0.612$; $p < 0.05$). The study further established that classroom engagement and student motivation were significantly related to students’ academic performance.

Mensah and Koomson (2020) studied student-teacher relationships and academic performance in Ghana. The research which was conducted in Winneba involved 80 students in senior high schools. The research categorised student-teacher relationships into four groups consisting of connectedness, dependent, peaceful, and conflicting. Participants were divided into two strata. Data was qualitatively collected using semi-structured interviews. The study showed that positive relationships between students and teachers created conducive learning environments that promoted students’ academic performance, while negative relationships impeded performance. The research recommended that teachers should show concern for both students’ academic and non-academic activities.

2.5.2 Academic support

According to Bronfenbrenner’s theory, a child’s relationships and interactions with the immediate environment are classified within the microsystem layer. The structures in this layer include parents, teachers, and students’ peers (Rudasill et al., 2018). Among the components in this layer, parents invest the most in their children’s education (Urdan et al., 2007). Parents provide the most significant academic support to students out of the immediate school environment. The support includes providing necessary academic materials and intellectual stimulation, monitoring and time management of academic activities, supervising homework, and discussing school experiences (King & Ganotice, 2014).

The social learning theory posits that learning is a consequence of interactions between students and socialising agents such as teachers, parents, other students and the environment (Bandura, 1999). This theory highlights the importance of inter-relationships between students and socialising agents to support learning. Therefore, academic support involves contributions of the socialising agents in nurturing students’ cognitive development. The support includes direct and indirect learning resources which the home and school environments avail to help

students achieve their academic aspirations. These resources can be in the form of material or emotional support.

Chen (2005) examined the relationship between academic support and students' academic performance in Hong Kong. The research involved 270 secondary school students and aimed at finding out how perceived academic support influenced students' academic engagement and performance. Data was collected using questionnaire. The structural equation modelling technique was used to analyse the data. The research established that academic support from parents reduced cases of students joining deviant peer groups, truancy, and drop-out. The study found that perceived academic support provided by teachers and parents directly influenced students' academic performance.

Malecki and Demaray (2003) explored different academic support provided to students in grades five and eight in the United States of America. The study was conducted in Illinois public urban schools involving 263 students and four schools. The types of support investigated included emotional, informational, appraisal and instrumental. The research aimed to find out the relationship between students' support and learning achievement. The support sources included parents, teachers, fellow students, and close friends. The investigation established that both male and female students receive all kinds of support from parents and teachers. However, female students experience additional support from their peers.

Moreover, emotional, and informational support was the most vastly reported support from parents, while informational support was mostly experienced by teachers. Students' peers provided emotional and instrumental support to their colleagues. Supportive behaviours from parents significantly contributed to students' adjustment in their academic work. Teachers' informational support was an essential predictor of students' social skills and intellectual competence. Likewise, supportive behaviours from teachers also encouraged students to settle in for academic work, especially for students who are new to the school.

McCoy et al. (2014) investigated caregivers' values for education, students' motivation, school attendance, and academic performance in Ghana. The study aimed at generating information for teachers on specific ways to promote school attendance, students' motivation and academic performance. The results showed that most caregivers see education as valuable, while a subgroup exhibited relatively low endorsement of education worth. About half of the students reported being intrinsically motivated to learning than extrinsically. The finding suggests that some members of society have not fully embraced educational values. The study reinforces the need of examining parental influences on students' motivation to achieve their academic goals.

Cheema and Ware (2014) assessed the impact of school environment and peer influences on students' academic performance in Kenya. The study explored the relationship between factors of learning environment and students' academic performance in Vihiga County. The sample involved 777 sixth grade pupils from 41 schools. International System for Teacher Observation and Feedback (ISTOF) questionnaire was used to collect data on pupils' perceptions of the school environment, academic involvement, and ethnic-cultural background. The factor analysis of the data found three factors of school environment that significantly influenced academic performance. The factors were teachers as helpful and good instructors, teachers as promoters of active learning and diversity, and teachers as managers and organisers of classroom activities. The study reported that about 12% of variations in students' performance could be attributed to interactions between pupils and teachers. The research, therefore, recommended that positive student-teacher relationship is a predictor of quality students' learning outcomes.

Chowa et al. (2013) assessed parents' involvement in their children's education in Ghana using a baseline sample of 6252 students. The inquiry involved 100 schools randomly selected from eight administrative regions. The study considered parents' socio-demographic indicators like marital status, academic level, gender as factors affecting parental involvement in students' academic activities. The research found that although most Ghanaian parents are not actively involved in their children's education, parents were not entirely detached. The finding implies that parents are involved to a small extent in students' academic progress. The investigation also demonstrated that parents' discussion of children's learning progress in school was significantly and positively linked with students' academic performance. The result implies that parental involvement is one of the vital approaches to support students' learning and improve academic outcomes. The findings corroborate with the 2002 educational review *Article 6*, which recommended the establishment of parent-teacher association (PTA), whose goal is to involve parents in school management and learning activities (MoE, 2003). PTA provides an opportunity for collaboration between the school and parents to enhance academic support.

Gyamfi and Pobbi (2016) explored parental monitoring activities and students' academic performance in Ghana. The study involved junior high school students from Ashanti, Greater Accra, Central, Northern, and Eastern regions. A mixed-methods approach was used to collect data. The study reported that parental involvement in the monitoring of students' academic activities was low. Activities such as setting television viewing time, study time, duration of playing, time for the children to return from school, monitoring homework, and

selecting the children's television programme were found as key activities of parental monitoring to enhance students' learning. The finding implies that parents active monitoring of the children's learning and leisure activities at home can enhance academic performance.

2.5.3 School physical environment

School physical environment can be described in relation to school or classroom environment (Fisk et al., 2016). According to World Health Organisation [WHO] (2004), school physical environment consists of school infrastructure, classroom furniture and arrangement, and school safety. This environment has a strong influence on children's well-being and can directly influence learning and academic performance. The school physical environment consists of buildings, fittings, equipment, instructional materials, laboratories, library and playground for effective teaching and learning (Debele, 2016). Other aspects that make the school physical environment are machinery, decorative objects, swimming pools, audio-visual machines and playgrounds (Obong et al., 2010). Furthermore, extant literature reports that essential features in school buildings such as temperature, lighting, acoustics, and aesthetic influence students' learning outcomes (Barrett et al., 2015). The findings posit that lack of these vital features in school buildings can hinder students' academic performance. Likewise, congested school buildings and classrooms have been found to negatively affect students' academic performance (Huisman et al., 2012).

Classroom physical environment refers to the learning setting, including arrangement of desks, tables, walls, ceiling, chalkboard, lighting, fittings, decorations and all the physical elements in the classroom (Amirul et al., 2013). These elements represent the classroom's aesthetic and emotional features that can influence students' learning attitudes and academic performance (Shen, 1999). A conducive classroom physical environment stimulates students' active involvement in learning activities to enhance students' academic performance (Akinbobola & Ikitde, 2008). Asiyai (2011) also postulated that creating a favourable physical learning environment is essential for students' safety and active development. Students need a safe physical learning environment to achieve their full potential. Therefore, improving the physical classroom environment is essential in addressing students' sense of belonging, responsibility, independence, and poor academic performance.

Ghani et al. (2011) reported that school's physical climate contributed significantly to effective classroom instructions. The school physical environment factors affect teachers'

instructional strategies and students' learning engagement that promote students' development and learning outcomes (Darling-Hammond et al., 2020). Odeh et al. (2015) carried out a research in secondary schools in Zone "A" Senatorial District of Benue in Nigeria. The study was to determine the impact of school physical environment on students' academic performance. The research used descriptive survey and sampled 250 participants. The research found that prevailing school climate, discipline, and school physical facilities contributed significantly to students' academic performance. The study concluded that an effective school physical environment enhances instructional strategies, learning activities and academic performance.

Abd-Elmotalieb and Saha (2013) examined associations between perceived academic climate and performance among university students in Egypt. The study involved 272 undergraduates. Perceived academic climate measure was developed to collect data. Data was analysed using descriptive statistics, Pearson product-moment correlation, *t*-test, and multiple regressions. The results showed that perceived academic climate and self-efficacy were significantly connected with students' academic performance. The research concluded that students' academic performance and self-efficacy could improve when the school climate is enhanced.

Uline and Tschannen-Moran (2008) investigated school facilities, school climate, and students' academic performance in Virginia. The study sampled 80 teachers from middle schools and used School Climate Index, school facilities scale, and three resource support items like data collection tools. Bivariate correlational analysis was used to explore relationships between quality of facilities, resource support, school climate, and students' academic performance. Multiple regression was conducted to test school climate as the mediating variable between the quality of facilities and academic performance. The results showed a positive relationship between the quality of school facilities and students' academic performance ($r = 0.73; p < 0.01$). The study also found that learning facilities were significantly and positively related to school climate variables. The research concluded that quality school facilities and school climate play a significant role in students' academic performance.

Suleman et al. (2014) explored physical classroom environment and students' academic performance in Pakistan. The research involved secondary school students and examined the impact of physical classroom environment on students' scores. The study employed pre-test-post-test equivalent groups approach for data collection. The study showed that a favourable classroom environment impacts positively on students' academic performance in secondary school. The finding implies that a well-organised and equipped

physical classroom environment facilitates effective teaching and learning and improves students' academic performance.

Wang and Reeves (2006) examined the effect of a web-based learning environment on high school students' learning motivation and academic performance. The study selected 27 students using purposive sampling method. Data was collected using questionnaire. The study found that school physical environment significantly influences students' attitudes towards learning. Furthermore, the research established a significant relationship between school environment and students' attitudes towards learning. Students with positive attitudes in learning achieved higher scores than students who showed negative attitude. The study recommended that teachers employ methods that stimulate positive students' learning attitudes.

Alimi et al. (2012) explored school facilities and students' academic performance in Nigeria. The study investigated the effect of school physical environment, the school's architectural aesthetic, classroom setup, and school location on students' academic performance in secondary school. The findings showed that school architectural design, including classroom arrangement, quality of school facilities, school landscape aesthetic contributed positively to students' academic performance. The study concluded that a school physical environment that provides a favourable environment could improve students' academic performance.

2.5.4 School teaching environment

The primary purpose of teaching at any level of education is to cause a behaviour change and improve learning outcomes, including academic performance (Ambelu, 2011). Several factors that influence students' academic performance can be classified into individual characteristics, school-related and neighbourhood experiences. However, teachers are among the most significant school-related factors that enhance students' academic performance (Wenglinsky, 2002). School teaching engagement and teachers' influence on the learning process can be considered as school teaching environment. An effective teaching environment is characterised by teachers' organisational skills, subject and pedagogical mastery, and interactions with students, parents, and administrators (OECD, 2009). Teacher effectiveness is determined by teachers' performance on the job, including classroom instructional methods and students' academic performance (Oppen, 2019).

Over the past decades, studies confirm that teachers substantially impact students' academic performance (Chetty et al., 2014). Moreover, students' basic psychological needs, including competence, autonomy, and belonging, are met in the classroom through interactions with the teaching environment (Brock et al., 2008). A suitable teaching environment consists of an effective instructional approach, students' active participation in learning activities, articulate curriculum and assessment methods (Kember & Leung, 2005). By implication, the teaching environment is a crucial determinant that enables educators to apply suitable strategies that optimise learning outcomes. There have been debates on improving school teaching environment that emphasises teacher quality to enable students to achieve their academic goals (Chowdhry et al., 2014).

Bonney et al. (2015) carried out a study on the influence of teacher quality and students' academic performance in the Western Region of Ghana. The survey involved teachers and students in junior high school randomly selected in five educational circuits. A questionnaire was used for data collection. Pearson moment correlation, analysis of variance (ANOVA), and descriptive statistics were used in the data analysis. The study found no strong correlation between teachers' high academic and professional qualifications and students' academic performance. This implies that students' academic performance variations can be attributed to other factors, including classroom teaching approaches.

Teaching approaches consist of beliefs, ideas about learning and classroom practices that can be grouped into teacher-centred and student-centred (Ganyaupfu, 2013; Richards & Rodgers, 2001). The approach adopted by a teacher depends on factors such as educational viewpoint, classroom demographic, subject area, and school mission statement (Darling-Hammond et al., 2020; Stemler et al., 2011). Research on teaching approaches found that teacher-centred and student-centred approaches are effective instructional strategies that can be used to improve learning and students' academic performance (Naga & Iyappan, 2018).

Teacher-centred approaches are grounded in behaviourist learning theory and posit that learning is a response to stimuli and reinforcement (Peel, 2005). The approaches are also known as direct instruction, deductive, or expository teaching strategies (Gill & Kusum, 2017). Teacher-centred methods focus on the teacher as an instructor, and learning occurs in a highly organised setting. The instructor takes decisions about the curriculum, teaching approaches, and students' assessment (Kassem, 2019). A teacher plans learning tasks, sets classroom objectives and develops learning activities which enable students to achieve intended learning outcomes (Hancock et al., 2002; Schreurs & Dumbraveanu, 2014). In a school learning environment where teacher-centred approaches are used, teachers' role is to provide

information while students passively receive information (Emaliana, 2017). Instructional strategies are lectures and guided demonstrations while students listen and observe. Likewise, the classroom arrangement in such an environment is designed to portray teachers as central figures who impart knowledge (Garrett, 2008). Teacher-centred approaches rely on extrinsic motivation like rewards to influence students' academic performance (Garrett, 2008).

Student-centred teaching approaches are referred to as discovery, inductive, or inquiry learning and are instructional methods that support students' learning needs, interests, and aspirations (Prince & Felder, 2006). The approaches emphasise students' role in the learning process while teachers adapt teaching methods that effectively engage students (Dong et al., 2019). Learning environments that promote student-centred approaches empower students to demonstrate problem-solving skills, creativity, personal reflections, and knowledge application (Richardson & Mishra, 2018). In a student-centred learning environment, teaching is intertwined with assessment to provide feedback (Motschnig-Pitrik & Holzinger, 2002) continuously. Students' learning progress is assessed through formal and informal methods like tests, projects, and presentation. The classroom set-up in this approach involves arranging students' desks and chairs in circles or small groups rather than rows of desks that face the teacher.

Empirical evidence has demonstrated that teaching and learning approaches affect students' learning outcomes and academic performance. Beausaert et al. (2013) investigated the relationship between teaching and learning approaches and students' learning outcomes in the Netherlands. The cross-sectional study explored students' perceptions of teaching approaches and their effect on students' learning approaches. The research involved 128 randomly selected students in secondary school and employed a questionnaire for data collection. The results showed that teaching approaches significantly influenced students' learning and academic performance.

Ganyaupfu (2013b) assessed teaching approaches and students' academic performance in South Africa. The study involved 109 undergraduates and aimed at exploring the effect of teaching approaches on students' academic performance in college. The research found positive associations between teaching approaches and students' academic performance. Information Communication Technology (ICT) has become an essential tool for improving teaching approaches in a school learning environment (Lawrence & Tar, 2018). ICT integration in the learning process provides a variety of teaching and learning tools that enable teachers and students to explore a rich repertoire of data beyond traditional learning platforms (Kassim

& Ali, 2007). The integration of ICT in the learning process can improve learning outcomes and students' academic performance (Pradeep et al., 2016).

Rapid development in ICT has provided access to information that teachers can select to enhance teaching and learning approaches (Tang & Austin, 2009). The innovations in technology have increased access to information and can improve the quality of education. ICT in education contributes significantly to teaching and learning because it combines various digital tools to facilitate instructions (Ampofo et al., 2020). Integrating ICT into the school learning environment has been a priority intervention by many governments (Light, 2009). For this reason, most governments design a roadmap that aims to incorporate ICT in education (Pelgrum, 2001). However, ICT introduction at different learning levels in schools is a challenging mission (Ghavifekr et al., 2016).

UNESCO's initiative, ICT Transforming Education in Africa, was launched in 2015 to improve human and social development (UNESCO, 2018). The project's implementation was in stages, starting with Mozambique, Rwanda, and Zimbabwe between 2016 and 2019. The project is planned to be implemented in Côte d'Ivoire, Ghana, and Senegal between 2020 and 2023 (Farrell & Isaacs, 2007). Despite efforts by development partners to expand ICT in education, evidence shows that ICT has not significantly been integrated into secondary schools in most developing countries, including Ghana (Agyei, 2013). Empirical studies found that successful integration of ICT into teaching and learning in secondary schools depends on teachers' competence, adequate infrastructure, and resources (Tondeur et al., 2010; Umar & Jalil, 2012). ICT in the school learning environment promotes students' participation and independence in the learning process (Fomunyam, 2019). Therefore, effective ICT integration in the school teaching environment is essential because it provides a bridge between subject matter, pedagogical competence, and learning activities (Arinze et al., 2012).

Wang and Reeves (2006) studied the effects of the web-based learning environment on a high school student's motivation to pursue an earth science course. The study was done in collaboration with a tenth-grade science teacher to design a web-based learning environment (Web-LE). Web-Le was developed to improve students' motivation to study science. Many tools were used to collect data. These included interviews with students and teachers, motivation questionnaires and observations. The study demonstrated that Web-LE learning activities significantly influenced students' motivation to learn earth science. The research further established that web-based approaches can enhance instructional.

Kumar et al. (2008) researched teachers' attitudes and readiness towards the use of technology in the classroom. The study was conducted in Malaysia and involved 358 teachers

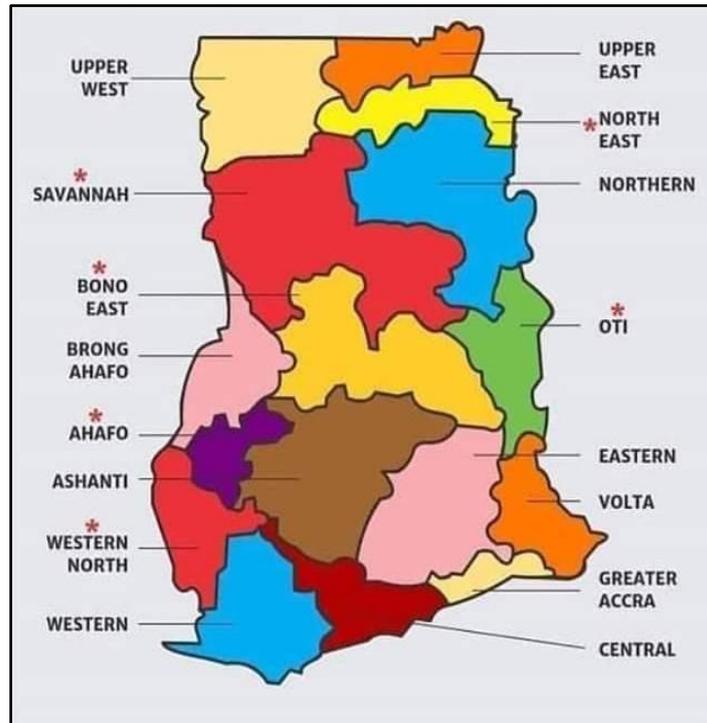
in 65 secondary schools. Self-administered questionnaire was used to collect data. The research found that teachers with positive attitudes towards technology readily integrated ICT in their teaching approaches. The study demonstrated that technology-oriented teachers preferred student-centred approaches in their teaching interactions. Teachers with negative attitudes towards technology showed unwillingness to incorporate ICT in their teaching methods and preferred a teacher-centred approach. Also, teachers who successfully implemented ICT in their teaching methods significantly influenced students' achievement. The study's findings imply that the use of technology in the classroom significantly impacts lesson objectives and academic performance.

2.6 The context of the study

Ghana is in West Africa and shares borders on the eastern side with Togo, on the northern with Burkina Faso, on the western with Côte d'Ivoire and south with the Atlantic Ocean. The country has a landmass of 238,537 square kilometres that lie by the Gulf of Guinea, stretching southwards on 560 kilometres at the coastline. Ghana became politically independent from British colonial administration on 6th March 1957 and adopted multi-party democracy in 1992 with the executive, legislative and judiciary as the arms of governance. The country's population is estimated at 29.6 million inhabitants spread over 16 administrative regions (Gyampo, 2018). According to the latest population survey, about 50 % of Ghana's total population reside in Ashanti, Eastern, and Greater Accra regions (Ghana Statistical Service [GSS], 2014). The 16 administrative regions are shown in Figure 2.1.

Figure 2.1

Administrative regions in Ghana

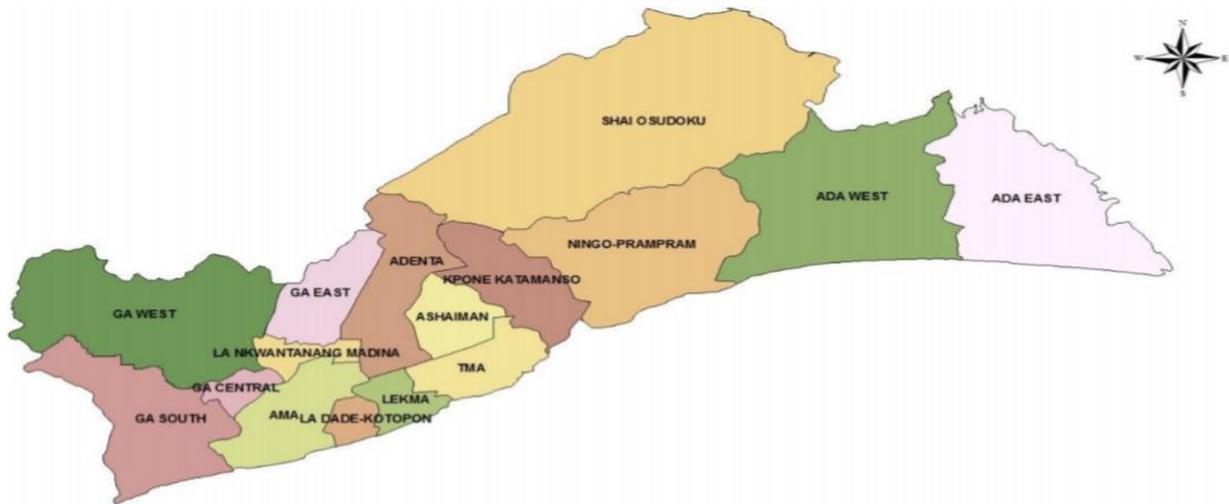


Source: <http://www.ghamanet.com>

The Greater Accra Region, where this study was conducted, is the national and regional administrative headquarters. The city of Accra has, since independence, been the capital of Ghana and the seat of government. This city is unique due to its leading social and economic roles in West Africa. Accra is the hub of trans-national activities that attract people from all the regions (GSS, Ghana Health Service [GHS], 2015). Figure 2.2 shows administrative demarcations of the Greater Accra Region to describe this research's geographical setting.

Figure 2.2

Greater Accra Region



Source: Ohene-Adjei et al. (2017, p. 2).

2.7 Education system and policies

Over the years, Ghana has prioritised the provision of quality and equitable education. Quality education enables students to acquire competencies that actively empower them to participate in society (Bada, 2015). The 1992 Constitution of the Republic of Ghana affirms the importance of education for citizens in Article 25 (Parliament of the Republic of Ghana, 2013, p. 20):

- All persons shall have the right to equal educational opportunities and facilities and with a view to achieving the full realization of that right.
- Basic education shall be free, compulsory, and available to all.
- Secondary education in its different forms, including technical and vocational education, shall be made generally available and accessible to all by every appropriate means, and in particular, by the progressive introduction of free education.
- Higher education shall be made equally accessible to all, on the basis of capacity, by every appropriate means, and in particular, by progressive introduction of free education.
- Functional literacy shall be encouraged or intensified as far as possible.
- The development of a system of schools with adequate facilities at all levels shall be actively pursued.

Education has been enshrined in the constitution of Ghana to show its significance for national socio-economic growth. Various provisions have received constitutional approval to guide the country's education system to achieve the mandate of providing a functional quality education for national development (Republic of Ghana, 2008). Stakeholders are interested in quality education that can effectively prepare citizens with the knowledge, attitudes, abilities, values, and skills necessary to meet national and global labour demands (OECD, 2018b). The effect of the knowledge economy, coupled with advancements in technologies, has heightened schools' role in ensuring the quality of learning corresponds to labour needs (Powell & Snellman, 2004). Therefore, the school has become a catalyst for guaranteeing that the system of education fulfils its core responsibilities.

The education system in Ghana has evolved over the years to enable the provision of quality, equitable, and accessible education that can bring about quality outcomes (Takyi et al., 2019). Successive governments have introduced various educational initiatives to increase citizens' competence in numeracy and literacy skills. For instance, the education act of 1961, known as Act 87, introduced free basic universal primary education. The purpose of the act was to offer the citizenry opportunities to acquire formal education in the post-independence era. The act directed that education be obligatory and free to increase accessibility to all children regardless of social backgrounds (Francis, 2014). This act also decreed that schooling starts at age six. Although the act stressed on massive school enrolment, it was faced with lack of teachers and school facilities to absorb the high enrolment of children. Thus, the system of education became ineffective due to numerous challenges. This development necessitated interventions to address the challenges.

The 1974 education reform was initiated to review the existing system considered dysfunctional (Education Advisory Committee, 1972). The reform referred to as Dzobo Education Advisory Committee was commissioned in 1972 to make recommendations on existing educational challenges (Adu-Gyamfi et al., 2016; Education Advisory Committee, 1972). The committee recommended an overhaul of the educational system, including management and proposed a flexible school duration to cater for students' learning needs. The reform also introduced junior secondary school education as an experimental education system (Adu-Gyamfi et al., 2016). Likewise, the curriculum was to be reviewed with emphasis on practical and vocational subjects, including activities that inculcate creative thinking competencies. The reform posited that *the curriculum of our schools therefore needs to be diversified to develop in pupils the right attitude to work and equip them with the right type of skills that can be employed in our type of society* (Education Advisory Committee, 1972, p. 3).

Ghana Teaching Service (GTS), which used to manage education, was dissolved on the recommendation of the committee. Ghana Education Service (GES) was created in 1974 to replace GTS with additional responsibility to oversee educational policy implementation at pre-tertiary (Konadu, 1994). The 1974 education reforms were faced with many challenges including economic regression in the country as well as lack of collaboration from stakeholders and became antecedent to 1987 education act (Anlimachie, 2019).

The 1987 education reform introduced new approaches to schooling with the primary goal of enhancing the quality of education (Adu-Gyamfi et al., 2016). The key objective was to make basic education more accessible, cost-effective, relevant to social needs and reduce pre-tertiary education duration. The act modified pre-tertiary education that previously lasted 17 years, consisting of six years of primary school, four years of elementary, five years of secondary, and two years of post-secondary was reduced to 12 years (Biney et al., 2014). The new system introduced six years of primary school, three years of junior secondary and three years of senior secondary education (Poku et al., 2013). The reform defined basic education to include primary and junior secondary education (Akyeampong, 2008). Furthermore, the reform established a comprehensive curriculum for basic and secondary education to prepare graduates with employable skills and for higher education (Kadingdi, 2004). Changes introduced by the reform aimed to improve accessibility and quality of education to meet the growing economic demands for skilled labour and solve the rising youth unemployment.

In 2002, a committee was inaugurated to review the education system and propose approaches to address challenges, such as declining students' academic performance (Thompson & Casely-Hayford, 2008). The committee, chaired by Professor Jophus Anamuah-Mensah, was to review the entire system of education with emphasis on national and global needs (President's Committee on Review of Education Reforms, 2002). The committee presented recommendations on basic, secondary, and tertiary education, including funding, management of pre-tertiary, and teacher education. The reform suggested a new structure and content for basic education consisting of two years of kindergarten, six years of primary and three years of junior secondary school. The curriculum was to emphasise on numeracy, literacy, problem-solving skills, and creative arts. Similarly, the review recommended that junior secondary school graduates could enrol in general education, technical/vocational, and agricultural programmes, including structured apprenticeship.

The educational reform also recommended the use of information communication technology (ICT) in education. The report suggested the upgrade of teacher training institutions to colleges of education to enable effective teacher pre-service preparation to solve students'

poor academic outcomes. The committee also recommended improving working conditions for teachers and incentives for teachers in rural areas. The report maintained that the cost of secondary and tertiary education be co-financed. The outcome of the committee's review elicited another educational reform in 2007 (Kuyini, 2013).

The 2007 education reform implemented most of the recommendations from the 2002 review committee (Aziabah, 2018). The reform reorganised pre-tertiary education to encompass two years of kindergarten, six years of primary, three years of junior high and four years in senior high school. The reform classified *English language, mathematics, integrated science and social studies* as core subjects in senior high school (Aziabah, 2018, p. 49). The 2007 education reform led to the enactment of the 2008 education act, referred to as Act 778, that established the legal framework for Ghana's current education system (Right to Education Project, 2012).

The 2008 reform aimed to create a system of education that can train students to gain relevant knowledge, values, aptitudes, and competencies to effectively participate in nation-building (Republic of Ghana, 2008). The reform decentralised supervision at basic and secondary levels to regional, metropolitan, municipal and district directorates. The purpose of the decentralisation was to improve accountability, effective monitoring of teaching and learning, and efficient implementation of policies (Nudzor, 2014). The reform introduced a three-cycle progressive education system consisting of basic, secondary, and tertiary education levels. The basic level consists of a two-year kindergarten, six-year primary and three-year junior high school. At this level, students are assessed at the end of their basic education by a standardised external examination administered by the West African Examinations Council (WAEC) for the award of Basic Education Certificate Examination (BECE). This examination is the entry point to senior high schools for students who have successfully passed the BECE. The act emphatically stated that basic education remained obligatory and free for every Ghanaian child (Parliament of the Republic of Ghana, 2008).

The secondary level involves a three-year senior high school education in general, technical, and vocational programmes. The duration of senior high school, as stated in the act, was four years. However, it was reverted to three years following national fora on second cycle education (Kwofie et al., 2018). Students in senior high school write the West African Senior School Certificate Examination (WASSCE) in the final year. WASSCE is the exit point to tertiary education. Students' academic performance at this level determines admission into tertiary institutions and any further educational pursuit. Thus, students' performance in

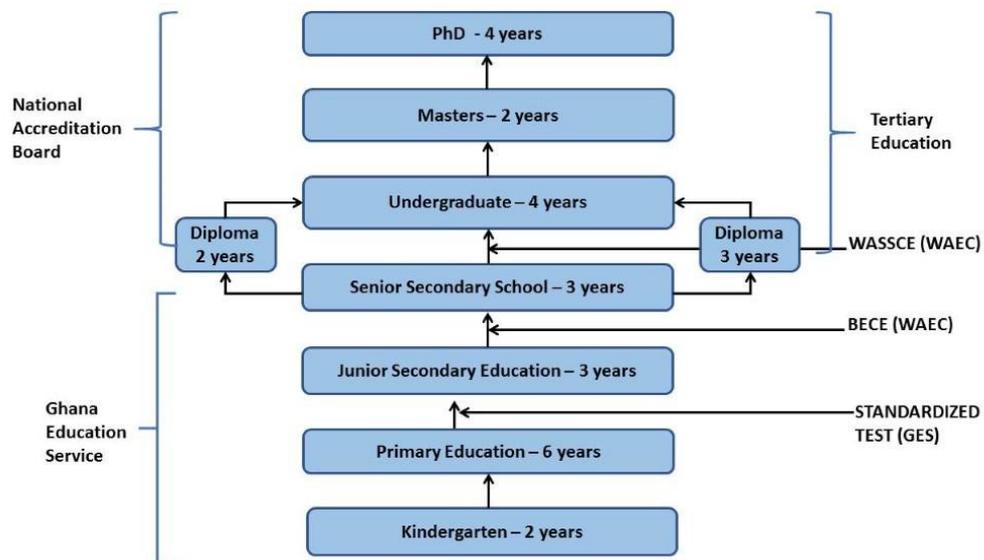
WASSCE is vital because it defines the career orientation and human resources capacity for the national economy.

The tertiary level entails post-secondary and institutions of higher education (Eaton, 2019). The institutions include universities, colleges of education, technical universities, which used to be called polytechnics and accredited institutions that award degrees and diplomas. The duration of tertiary education varies based on programmes. The institutions that provide higher learning are required to receive accreditation from the National Accreditation Board (NAB) to lawfully function. Ministry of Education (MoE) has responsibility for planning, policy, and monitoring education (MoE, 2003). MoE has sub-sector agencies that assist in carrying out its programmes. These include the National Council for Tertiary Education (NCTE), which has responsibility for tertiary education and Ghana Education Service (GES), which manages basic and secondary education, including technical vocational education and training (TVET).

Under Act 936, the government of Ghana decentralised the administration of sectors, including education to metropolitan, municipal and district assemblies (Republic of Ghana, 2016). In compliance with this act, basic and secondary schools were classified into metropolitan, municipal and district education directorates. The mandate of the directorates was to coordinate school activities, cultural and co-curricular programmes in collaboration with school authorities (Republic of Ghana, 2008). Likewise, directorates were to supervise the implementation of educational policies. The central government is responsible for facilitating effective education delivery in schools by providing resources to enable education directorates to carry out their mandate (MoE, 2015). Figure 2.3 illustrates the structure of the system of education in Ghana.

Figure 2.3

Ghana education system's structure



Source: Author.

According to MoE (2019), factors that affect quality teaching and learning outcomes are associated with teacher effectiveness, pre-service teacher preparation, and continuous professional development. Therefore, initiatives were introduced in teacher education to raise the standard of teachers in Ghana. One of the initiatives was *Transforming Teacher Education and Learning (T-TEL)* (Coffie, 2019). This training programme was initiated in all Colleges of Education in 2014 with funding from the United Kingdom government. The programme involved teachers and pre-service trainees. The initiative's objective was to improve teacher effectiveness, teaching and learning standards, and students' academic performance. The programme offered participants the opportunity to acquire knowledge and competencies that were needed for effective teacher practices. The framework of the training was underpinned by classroom practices involving interactive teaching, student-centred, and assessment approaches. The programme was to develop teachers professionally to utilise multi-dimensional instruction approaches to meet students' learning needs (Government of Ghana [GoG], 2017). T-TEL was also to prepare teachers for the introduction of a new national pre-tertiary curriculum (MoE, 2018a).

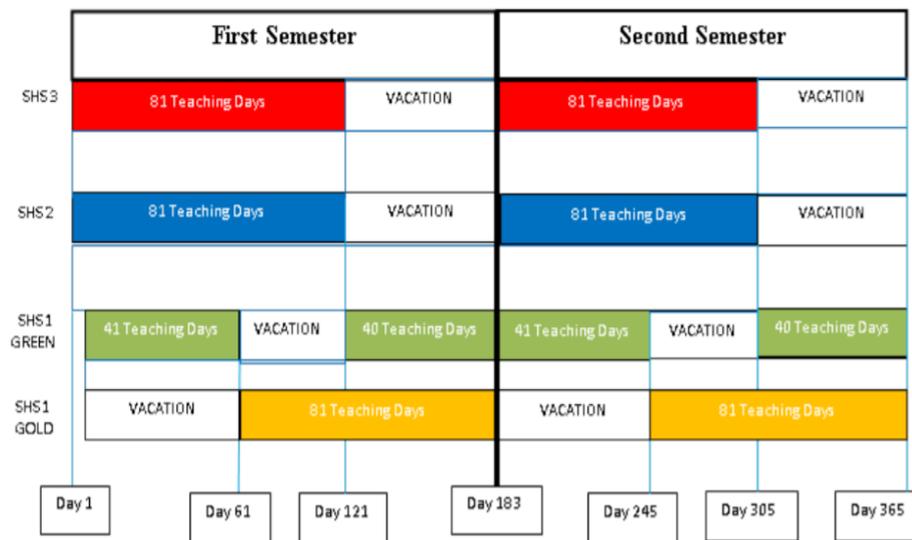
Another notable intervention adopted by the government that significantly impacted the provision of education to youths in Ghana is the Free Senior High School (FSHS) policy. FSHS was introduced in 2017 to enhance secondary education access (Abdul-Rahaman et al., 2018; Tamanja & Pajibo, 2019a). The policy was part of government's determination to extend free compulsory universal basic education from primary to secondary school (Mensah, 2019). Under FSHS policy, students were exempted from paying school fees in public senior high schools (Abdul-Rahaman et al., 2018). The programme improved enrolment in secondary education to prepare the youth for further education and lifelong opportunities (MoE, 2017; Spröte, 2010). The Ministry of Education stated that 484,743 junior high school graduates were admitted into senior high schools in 2018 due to the implementation of FSHS (MoE, 2018). The rising enrolment necessitated the introduction of the track system as a practical solution to curb congestion in SHS.

The ministry adopted a double-track school system as a contingent approach to manage the high enrolment in SHS, inadequate resources, and facilities (Mensah, 2019). The double-track school system was grouped into *Green* and *Gold* and was introduced in 400 schools. The system made provision for students and teachers to be divided into the green and gold colour group to be in school at different times. Whenever the gold track students are in school, for example, students in the green track students proceed on holidays. The sector ministry has also designated a secretariat to coordinate the implementation of the FSHS policy.

Additionally, efforts are being made to address challenges like the expansion of infrastructure, provision of resources, incentives for teachers, and supervision to enhance the quality of learning outcomes (President's Committee on Review of Education Reforms, 2002; Tamanja & Pajibo, 2019). It is envisaged that the policy can address inequalities in access and equity to secondary education and improve students' academic performance (Ansong et al., 2015). An outline of the double-track school system is presented in Figure 2.4.

Figure 2.4

School double-track system



Source: Tamanja & Pajibo (2019, p. 7840).

2.8 Senior high school education in Ghana

Secondary education in Ghana is referred to as senior high school and was established by the 2002 educational review (President’s Committee on Review of Education Reforms, 2002). The Education Act 778 states in article 1(3) that *second cycle level of education shall consist of four years of senior high school education, technical, vocational, business and agricultural education, or appropriate apprenticeship training of not less than one year* (Republic of Ghana, 2008, p. 4). Senior high school is pre-tertiary education and offers comprehensive and technical vocational programmes (Abreh et al., 2018). The programmes are grouped into agricultural, general, business, vocational and technical programmes which form elective subjects. However, core subjects are compulsory regardless of secondary education programmes (Abdul-Rahaman et al., 2018). The core subjects include English language, Mathematics, Integrated Science and Social Studies (Anlimachie, 2019). Contrary to the four-year duration stated in Act 778, senior high school is presently three years (Kwofie et al., 2018).

There are currently 1290 public senior high schools and 317 private in 16 administrative regions in Ghana (MoE, 2019b). The schools are single-sex or mixed-gender schools, which provide boarding facilities to students or are purely day secondary schools. Ghana Education

Service has grouped senior high schools into A, B, C, and D categories based on school standards, resourcefulness, facilities, achievements, and students' academic performance. (Danso et al., 2012). The category "A" senior high schools are more endowed while category "D" is least endowed. Ghana Education Service data shows that 55 senior high schools are currently in category "A", while 220 are in category "B". Likewise, there are 370 senior high schools in category "C", and 645 senior high schools are in "D" (MoE, 2019b). The classification shows that half of the public senior high schools in Ghana are in category "D" and less endowed. Table 2.2 presents the categorisation of public senior high schools in Ghana.

Table 2.2

GES 2020 public SHS categorisation

Category	Number of SHS	Percentage %
A	55	4.26
B	220	17.05
C	370	28.68
D	645	50.00
Total	1,290	99.99

Source: Author based on MoE (2019c).

In Ghana, junior high school graduates who have passed their BECE can access senior high schools (Opoku-Asare, Tachie-Menson, & Essel, 2015). BECE grading system comprises aggregates of scores in four core subjects and two elective subjects. The core subjects include English language, mathematics, integrated science, and social studies. However, students must choose two elective subjects. Elective subjects comprise Basic Design Technology (BDT), French, examinable Ghanaian languages, and ICT. The grade aggregate for senior high school admission is calculated according to performance in core and two elective subjects. The quality of students' grade in BECE determines placement in senior high school (Babah et al., 2020). Placement is managed by the Computerised School Selection and Placement System (CSSPS). The objective of CSSPS is to improve equity and access to senior high schools on merit (Babah et al., 2020). The procedure involves students' choice of school and the aggregate of scores in

the six subjects. Students who achieve aggregates 6 to 30 in BECE qualify for admission to senior high school. The grading system for junior high school is shown in Table 2.3.

Table 2.3

WAEC grading system in BECE

Achieved score over 100	Grade aggregate	Grade interpretation
70-79	2	Very Good
60-69	3	Good
45-59	4	Credit
35-44	5	Pass
0-34	6-9	Fail

The curriculum of senior high school is structured into core subjects and elective (Anlimachie, 2019). Core subjects include English language, Mathematics, Integrated Science and Social Studies, and are mandatory (Aziabah, 2018). Elective subjects are optional, and students choose three to four subjects based on the study programme (Abreh et al., 2018). The electives are agriculture, business, technical and vocational, home economics, visual arts, general arts and general science (Abreh et al., 2018; MoE, 2019b; MoE, 2018b; Republic of Ghana, 2008). The syllabus is organised in a three-year learning period divided into units (Bosson-Amedenu, 2018). The unit structure is intended to enhance effective teaching and learning, enabling students to acquire knowledge, skills, and competencies (Bosson-Amedenu, 2018). In the third year, senior high school students take external examinations administered by WAEC. The standardised tests consist of core subjects and three electives.

The quality of students' performance in WASSCE determines access to higher education and early employment opportunities (Atuahene & Owusu-Ansah, 2013). Students are required to achieve grades ranging from A1 to C6 in the four core subjects and three electives to qualify for admission into tertiary institutions (Abreh et al., 2018; Anlimachie, 2019). The disparity in opportunities for further education can be related to the school and students' grades (Muttaqin, 2018). The emphasis on grade shows the importance of academic performance in education. Therefore, improving students' academic performance in senior

high school is vital for national development. Table 2.4 shows the grading system used in WASSCE.

Table 2.4

WAEC grading system in WASSCE

Achieved score over 100	Grade	Aggregate	Grade explanation
80-100	A1	1	Excellent
70-79	B2	2	Very Good
65-69	B3	3	Good
60-64	C4	4	Credit
55-59	C5	5	Credit
50-54	C6	6	Credit
45-49	D7	7	Pass
40-44	E8	8	Pass
00-39	F9	9	Fail

Secondary education continues to attract stakeholders’ attention at various national fora (Duflo et al., 2019). The scope of discussions is related to access, transition, school duration, policy, resources, funding, infrastructure and academic performance (Chanimbe & Prah, 2020; Duflo et al., 2019; Mensah, 2019; MoE, 2018; President’s Committee on Review of Education Reforms, 2002; Republic of Ghana, 2008; The World Bank, 2017). The Ministry of Education reported that school enrolment in Ghana has significantly improved in recent years (MoE, 2017). The report established that between 2011 and 2017, nursery school enrolment increased by 230.000 and primary school enrolment rose by 300.000. Likewise, junior high school enrolment increased by 250.000 students. Admission into senior high school also increased with the implementation of Free Senior High School Policy in 2017 (Abdul-Rahaman et al., 2018; Chanimbe & Prah, 2020; Tamanja & Pajibo, 2019). The trends in enrolment have compelled the sector ministry and stakeholders to transform schools into effective learning environments that can bridge achievement gaps and improve students’ academic performance (Owusu et al., 2018).

Although the government of Ghana instituted programmes to mitigate disparities in students' academic performance, Coleman report hinted that there are still other factors that cause variations in academic performance (Coleman et al., 1966). They include effects of the complex interplay of environmental factors such as school facilities and information communication technology that influence learning outcomes (Rubie-Davies, 2015). Studies have identified teacher-related factors such as student-teacher relationships, instructional approaches and academic support as factors affecting students' academic performance (Hofstein et al., 1996; Viray, 2016). Additionally, the quality of academic performance has increasingly become a key indicator for effective learning (Hanushek & Rivkin, 2006). Thus, exploring indicators of school learning environment that affect students' academic performance is critical (Paulo et al., 2009).

2.9 Definitions of key terms

This section explains the contextual and operational meaning of key terms that are used in this study. The terms include learning, school learning environment, and academic performance. Other terms are senior high school, West African Senior Secondary Certificate Examination, and West African Examinations Council.

Learning: This refers to the dynamic process that occurs in human beings through interactions (Brock et al., 2008). This study refers to learning as teaching processes that engage students to acquire knowledge, skills, and positive behaviour change. The process includes academic activities that take place in school.

School learning environment: This is defined as the setting where academic activities occur (Aslam et al., 2012; Shute et al., 2017; UNESCO, 2012a; Weinstein, 1979). In this study, the school learning environment refers to four constructs: student-teacher relationships, academic support, school physical environment, and school teaching environment.

Academic performance: In this study, academic performance refers to average grades or scores that students achieve in the core subjects in SHS. The grade describes the quantum of learning that has taken place. Students' academic performance is measured by grade to determine the learning quality (Alade et al., 2017a). Academic performance also describes the grades that students achieve in classwork, terminal examinations or WASSCE.

Senior high school: This refers to secondary school education in Ghana. It is a three-year second cycle level of education that comprises general, technical, vocational, business and

agricultural education and structured training programmes (Abreh et al., 2018). Students in this level of education are between 15 to 17 years (Republic of Ghana, 2008). It prepares students for admission into higher education and employment.

3.0 Summary

Theories of learning highlight the central role played by the environment during learning and help to understand the link between environment and learning outcomes. Moreover, academic performance is one of the major approaches to measure learning outcomes. The literature shows that various school learning environment factors influence students' academic performance which remains a critical educational issue in developing countries. This investigation is to explore the interplay of school learning environment indicators on students' academic performance. The indicators include student-teacher relationships, academic support, school physical and teaching environments. The education system of Ghana consisting of basic, secondary, and tertiary levels. Senior high school provides pre-tertiary education and performance in WASSCE determines further academic opportunities for SHS students. WASSCE is a standardised external examination to confirm students' graduation from second cycle education (Alade et al., 2017b). Academic performance trends in WASSCE show that poor academic performance is a major challenge in Ghana's education system which requires intervention based on empirical findings.

CHAPTER THREE

Methods

3.1 Introduction

The chapter describes the research methods used in this study and presents objectives, hypothesis, research design and setting of the study, sampling, instrumentation, and procedures involved in the data collection. This research aimed to investigate how indicators of school learning environment influence students' academic performance in senior high schools in the Greater Accra Region, Ghana. The statistical approaches used in analysing the data are also described in this section.

3.2.1 Objectives of the study

The following objectives were formulated:

1. To determine the influence of student-teacher relationships on students' academic performance.
2. To establish the influence of academic support on students' academic performance
3. To establish the relationship between school physical environment and students' academic performance.
4. To determine the relationship between school teaching environment and students' academic performance.
5. To establish the extent to which school learning environment can predict students' academic performance.

3.2.2 Research questions

In line with the objectives, the following research questions were formulated:

1. How do student-teacher relationships influence students' academic performance?
2. How does academic support influence students' academic performance?
3. How does school physical environment influence students' academic performance?
4. How does school teaching environment influence students' academic performance?

5. To what extent does school learning environment predict students' academic performance?

3.2.3 Hypotheses

The reviewed literature established relationships between indicators of school learning environment and students' academic performance. Based on the study objectives, hypotheses were formulated to be directly and objectively tested. These include:

H1: There is no statistically significant influence of student-teacher relationships on students' academic performance.

H2: There is no statistically significant influence of academic support on students' academic performance.

H3: There is no statistically significant influence of school physical environment on students' academic performance.

H4: There is no statistically significant influence of school teaching environment on students' academic performance.

3.2 Research design

The study was quantitative survey research. This approach was used in this study because it is reliable, objective, and data can be obtained within a short time from a large group of respondents (Choy, 2014). The design also uses statistics to test hypotheses and to describe relationships between variables (Eyisi, 2016). Questionnaire was used in this survey because it was convenient and enabled participants to answer multiple questions during data collection (Roopa & Rani, 2012). The quantitative research design was adopted to establish how indicators of school learning environment influence students' academic performance. Similarly, the design enabled the formulation of a predictive model to indicate the relationships between variables. The indicators investigated were student-teacher relationships, academic support, school physical environment, and school teaching environment.

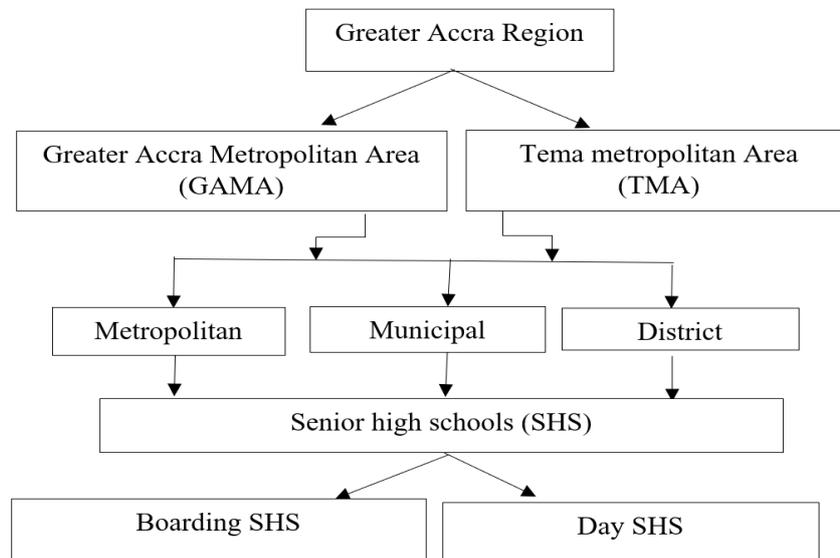
3.3 Study setting

The study was done in the Greater Accra Region. The reason for selecting this region was based on the education ministry's report that the Greater Accra Region (GAR) has the highest number of senior high schools in the country (MoE, 2015). GAR has 89 public senior high schools comprising 20 boarding and 69 day senior high schools (MoE, 2019b). Likewise, the GAR metropolis is the regional and national capital. The metropolis controls national, social, and economic activities, including education. It is reported that senior high schools in Accra have better facilities and attract students from all parts of the country with different demographic characteristics (Addae & Oppelt, 2019). Past results in WASSCE also showed that senior high schools in the region performed better than schools in other regions (MoE, 2017; The World Bank, 2017a). The diversity of the study population allows the findings to be applied to other regions.

Greater Accra Region comprises two metropolises, Tema Metropolitan Area (TMA) and Greater Accra Metropolitan Area (GAMA). TMA has 27 public senior high schools, whereas 62 schools are in GAMA (MoE, 2019b). This study was conducted in GAMA. GAMA is described as a socio-economic hub in the West African sub-region with 4.6 million people representing more than 16 per cent of Ghana's total population (The World Bank, 2017a). The administrative structure of GAR is shown in Figure 3.1.

Figure 3.1

Greater Accra Region administrative structure



Source: Author.

3.4 Population, sampling, and sample

The population of this study was public senior high schools in the Greater Accra Region and students. In terms of location, the schools were categorised into metropolitan or municipal while students' residential status involved boarders or day students. Stratified random sampling was used in this study to obtain a representation of all categories of students in the population. The sampling technique was adopted to obtain accurate data from each group (Acharya et al., 2013). Sampling involved the selection of schools followed by students' selection.

Stratified sampling was used to select schools that participated in the study. This was done to ensure that participating schools proportionately represented the various categories of SHS in the Greater Accra Region. At this stage, all senior high schools in the GAMA were grouped into four different strata. The strata consisted of metropolitan-boarding schools, metropolitan-day schools, municipal-boarding schools and municipal-day schools. The second level was random sampling to select one school from each stratum. This was to enable all senior high schools in the population to have equal opportunity to be sampled. Schools in each stratum were assigned a number, and the computer-based random number generator programme was used to randomly select a number. Each time a randomly sampled school declined participation, it was taken out and the procedure repeated for a replacement. At the end of the selection

process, one from every stratum was selected. Thus, four schools with a population of 3800 students were sampled to participate in the study.

Students were selected using stratified sampling technique. The sampling was based on students' school location, residential status, and year of study. The school location categorised students into metropolitan or municipal while residential status was defined as boarders and day students. The year of study was grouped into one, two and three. At the first stage, students were grouped into four clusters made up of metropolitan-boarding students, metropolitan-day students, municipal-boarding students and municipal-day students. Secondly, each cluster was subdivided into three encompassing metropolitan-boarding students in year one, two, and three; metropolitan-day students in year one, two, and three; municipal-boarding students in year one, two, and three; and municipal-day students in year one, two, and three. The clustering generated 12 groups for sampling. Students were individually assigned numbers in each cluster that enabled a computer-based random number generator programme to randomly select students. A total of 400 students were randomly selected from four senior high schools in GAMA to participate in this research.

The study gathered self-reported data to explore how indicators of school learning environment influenced students' performance in English language, mathematics, integrated science, and social studies. Self-reported data was used for this study because it was the most feasible and convenient data collection approach. This research investigated core subjects since they are compulsory subjects for every senior high student in Ghana. Students demographic characteristics included gender, age, school classification, year of study, academic programme, residential status, parents' level of education. The demographic characteristics of students are presented in Table 3.1.

Table 3.1*Demographic characteristics*

Variable	N	%
Gender		
Female	241	65.1
Male	129	34.9
Age (years)		
11-15	57	15.4
16-20	310	83.8
21-25	3	0.8
Schools		
A	74	20.0
B	78	21.1
C	121	32.7
D	97	26.2
Year of study		
SHS 1	97	26.0
SHS 2	62	17.0
SHS 3	211	57.0
Residential status		
Day students	253	68.4
Boarders	117	31.6
Mothers' level of education		
None	34	9.2
JHS	122	33.0
SHS	122	33.0
Tertiary	92	24.9
Fathers' level of education		
None	14	3.8
JHS	58	15.7
SHS	113	30.5
Tertiary	185	50.0

Results in Table 3.1 showed that female students who participated in this study were 65.1% while male participants were 34.9%. The disparity in gender participation among respondents was attributed to the high number of female students in the participating schools. The results further highlighted that majority of participants were between 16-20 years of age. This corroborated the education sector ministry's report that most students joined senior high

schools at age 16 (Adu-Gyamfi et al., 2016). Most participants were in their final year of study and had a better understanding of school-related factors that affected their academic performance. The results also found that 68.4% of the students who participated in this study attended day schools while 31.6% were boarders. The findings confirmed data from the Ministry of Education, which postulated that 77% of senior high schools in the Greater Accra Region were day schools (MoE, 2019b). Similarly, the results showed that most students had parents with adequate education levels to be involved in their children's learning activities at home and school.

3.5 Instrument

Data collection was done using self-reported questionnaire. This study adapted School Climate Measure (SCM) instrument developed and validated by Zullig et al. (2014). The tool was used to investigate how individual students perceived their school environment in Arizona public schools. The instrument was adapted for this study because it was relevant to the research context. Furthermore, SCM tool had items that made the self-reporting questionnaire feasible. SCM comprised of positive student-teacher relationships, academic support, order and discipline, and physical environment constructs. The 5-Likert scale of the constructs included strongly disagree (1), disagree (2), neither (3), agree (4), and strongly agree (5). Every construct in the tool consisted of items that it sought to explore. Thus, positive student-teacher relationships focused on teachers' understanding of students' problems, teachers' and staff's interest in students' future, and teachers' availability to attend to students' needs. Academic support constructs centred on teachers' expectation of students' academic work and the students' confidence in their school. Order and discipline construct looked at school rules and fairness in their application. Physical environment construct focused on school cleanliness and its friendly set-up. Although the SCM was a psychometric instrument that measured a diversely larger population of adolescent students in Arizona public schools, it was considered a relevant tool for my investigation. This instrument was relevant because students involved in this research were adolescents in public senior high schools. Hence, the research adapted SMC as instrument for data collection with slight modifications to fit the context and objectives of this study.

The questionnaire maintained the SMC scale partially except for the *order and discipline* construct deemed out of this research's scope. Instead, additional constructs were

introduced, bringing to six the constructs in the questionnaire. The constructs were student-teacher relationships, academic support, school physical environment, school technical environment, instructional environment, and parental involvement. The 5-Likert scale measured the responses. The scale included strongly disagree (1), disagree (2), somehow (3), agree (4), and strongly agree (5). Parental involvement was measured using almost never (1), rarely (2), sometimes (3), often (4), and rather often (5).

Based on the objectives of the study, the constructs were purposefully grouped for data analysis. The constructs were student-teacher relationships, academic support that entailed parental involvement, school physical environment, and school teaching environment comprising school technical and instructional environments. Student-teacher relationships had nine items that enabled students to rate their experiences. Some of the items focused on *all teachers in my school are approachable; my teachers seem to take a real interest in my future*. Academic support was merged with parental involvement because teachers and parents are the most important socialising agents that contribute significantly to students' learning outcomes. Merging academic support with parental involvement was deemed relevant to this study to show the interplay of home and school factors that influence students' academic performance. The construct consisted of 31 items. Some of the items included *teachers in my school gave homework after class; in my school all correct teachers homework promptly; teachers in my school expect students to learn hard; I feel that I can do well in this school; my parents help me do my homework; my parents discuss my school progress with me; my parents buy me books which teachers recommend to me; my parents attend my school's PTA meetings; my parents provide me with a quiet space to study when I am home; my parents discuss my school progress with my teachers*.

School physical environment construct had eight items. Some of the items included *all classrooms in my school have got furniture; in my school the security men are strict*. School technical and instructional environments were merged to create school teaching environment. This was due to the inter-relatedness of the two constructs in instructional processes. School teaching environment construct examined the use of ICT in school and teaching approaches. The construct had 42 items which included *in my school every classroom has whiteboard; my school has an Information Communication Technology (ICT) laboratory; my school has internet connectivity; there are enough computers in the ICT laboratory for all students; my school has a website; I read online books in my school library; all teachers encourage students to be attentive in class; all teachers in my school encourage students to ask questions in class; all teachers demonstrate in class how we are expected to solve questions; my teachers*

encourage me to participate in school competitions; all teachers in my school come to class on time; my teachers help us develop an interest in their subject.

Students' academic performance measure was self-reported based on WAEC grading system. The 9-Likert scale is the conventional measurement system used by WAEC to grade students in WASSCE. In Ghana, senior high schools have adopted the WAEC grading scale to assess students' academic performance. The grading system consists of a measurement scale that ranges from A1 for the highest score representing excellent to F9 for the lowest grade. The scale measured performance in core subjects. The instrument further described the demographic characteristics of students in section E. Other items in the tool included study programme like general arts, science, home economics, business, visual art, technical and vocational, and year of study as SHS1, SHS2 and SHS3. Data on students' residential status, whether boarding or day, and parents' level of education were collected. The scale on mother's and father's education level comprised *none, JHS, SHS* and *Tertiary*. The instrument for data collection in this study is in Appendix 2.

3.5 Pilot study

A pilot study was conducted in June 2018 to test the instrument's reliability and assess students' interpretation of items in the questionnaire. Similarly, the testing was to find out how much time students needed to complete the questionnaire. The pilot study involved 50 students, comprising 27 females and 23 males, randomly selected, from senior high schools in Accra. The questionnaire had five constructs presented in sections A, B, C, D and E. The constructs were measured on a 5-Likert scale. Students' academic performance involved average scores in English language, mathematics, integrated science, and social studies and was measured by a 9-Likert scale.

The pilot data was analysed to examine the extent of reliability and consistency in different settings (Mohajan, 2017). Cronbach's alpha coefficient was used to confirm constructs' reliability (Tavakol & Dennick, 2011). A construct is reliable when Cronbach's alpha coefficient is 0.70 and above but is considered very good when the value is 0.80 and above (Madan & Kensinger, 2017; Sim & Wright, 2005). The piloting results enabled the review of the tool. The reliability results of the pilot data are shown in Table 3.2.

Table 3.2*Reliability test of constructs*

Scales	Cronbach's alpha coefficient
Student-teacher relationships	0.78
Academic support	0.71
School physical environment	0.31
Instructional strategies	0.82
Parental home involvement	0.78
Parental school involvement	0.76
Student academic performance	0.71

Source: Pilot data, 2018.

Table 3.2 showed that the constructs in the questionnaire had different Cronbach's alpha coefficient values. The coefficients were: student-teacher relationships 0.78, academic support 0.71, school physical environment 0.31, instructional strategies 0.82, parental home involvement 0.78, and parental school involvement 0.76. Students' academic performance scale had a coefficient of 0.71. The results of the analysed data established that the constructs had high reliability with coefficients greater than 0.70 except for the school physical environment construct. The corrected item-total correlation was done to determine which item in the construct caused the low Cronbach's alpha coefficient value. Result of corrected item-correlation is illustrated in Table 3.3.

Table 3.3*Corrected item-correlation of school physical environment*

Item	Corrected item – Total Correlation
My school has beautiful buildings	0.02
My school has a well-equipped Information Communication Technology (ICT) laboratory	0.20
My school has electricity supply always	0.20
My school has a library	0.26

Source: Pilot data, 2018.

Results of corrected item-total correlation as presented in Table 3.3 found that item *my school has beautiful buildings* had a low item-total correlation of 0.02. The low value was an indication either students did not understand the item's meaning or had difficulty interpreting it. Students who participated in the pilot study were engaged using interaction approach to solicit their inputs. The interaction method involved discussion and enquiry. The students indicated that the description *beautiful buildings* was vague, relative, and ambiguous. The ambiguity in the interpretation of this item caused inconsistencies in students' responses. Likewise, item-total correlation confirmed that the item had a coefficient below 0.2. In such instances, it is recommended that the item is removed. Hence, the instrument was reviewed. The questionnaire was, therefore, considered suitable for data collection.

3.6 Data procedures and analysis

Careful recoding and creation of new variables were done on every construct of the research to preserve vital details. The anonymity of the schools was enhanced to adhere to principles of confidentiality. The study referred to the schools by letters A, B, C, and D. The dependent variable was students' academic performance, which was the average of students' scores in the four core subjects. This was in line with multiple regression requirements where

only one continuous dependent variable can be regressed on several independent variables (Wampold & Freund, 1987).

Data analysis was done at 95% confidence level, ($\alpha = 0.05$). Adequacy of the sample for principal component analysis was determined using the Kaiser-Meyer-Olkin Measure (KMO) and Bartlett's Test of Sphericity (Maskey et al., 2018). The principal component analysis was used to reduce the number of items of the various constructs and retain only those responsible for the highest variation. The objective of factor analysis is to regroup data into non-overlapping clusters for the sole purposes of understanding and interpreting relationships and patterns easily (Yong & Pearce, 2013). Only those components with eigen values greater than 1 in the total variance explained were retained for further analysis. Factor analysis dropped constructs that were found to have no significant influence on indicator variables.

The data was subjected to requirements of linear regression. This was the final stage of data preparation and evaluation without which the validity of the results would be compromised. Linear regression requires that the data meets certain sets of conditions. One of the assumptions of a linear regression model is that the error term is normally distributed. To establish this, the Kolmogorov-Smirnov test of normality was conducted. The null hypothesis decision to be rejected was on the condition that p -value is less than 0.05 (Drezner et al., 2010). Autocorrelation determined the degree of correlation between the same variables' values across different observations in the data. Autocorrelation of regression residuals (error terms) can occur if the model is incorrectly specified, this can lead to inefficient estimates, including insignificant results (Huitema & Laraway, 2016). Durbin-Watson test statistics was used to test for the absence of auto-correlation (King, 1995).

Another linear regression requirement is that any pair of the independent variables should not have an exact correlation or near-perfect relationship. Multicollinearity in the data brings redundancy, makes analysis complicated, and hinders explicit identification of individual effects the independent variables have on the dependent variable (Tomaschek et al., 2018). Variance inflation factor (VIF) analysis was used to test for multi-collinearity (Taylor et al., 2007). Pearson correlation coefficient was used to establish relationships among the variables (Mukaka, 2012a). Multiple linear regression model was fitted between the independent variables (school learning environment indicators) and the dependent variable (student academic performance). Normality test was done to confirm the suitability of the data for multiple regression analysis.

Non normally distributed variables or skewed data distort relationships in regression analysis. Another assumption is the linearity of the variables. It is argued that this assumption

is fundamental in establishing the relationship between dependent and independent variables (Keith, 2019). A further assumption of concern is the multicollinearity test. This entails establishing whether the variables are high or less correlated. The analysis of variance (ANOVA) was done to test the hypothesis. The null hypothesis was rejected for all the indicators of school learning environment whose p -values of the test were less than 0.05. The regression coefficient analysis was done, and unstandardized coefficients were used to develop the predictive linear regression model.

3.7 Ethical considerations

This research received ethical approval from Eötvös Loránd University. Application for ethical permission was submitted to the Ethical Committee of the Faculty of Education and Psychology providing details about the study. The request was granted clearance in September 2018, paving the way for field data collection. The ethical approval certificate is found in Appendix 5. For administrative and ethical purposes, letters were written to headmasters (school principals) of selected senior high schools to seek their consent and approval to conduct the study in the participating schools. The letter to schools is found in Appendix 3. As a requirement, students who participated in the study signed a consent form to show that their participation was voluntary. The consent statement described what the study aimed to achieve and assured participants of confidentiality, anonymity, and respect of opinion. The consent also stated that participation was free and with no moral or legal obligations. Participants were free to withdraw their involvement in the study at any point. The data was appropriately managed to protect participants' identity in accordance with ethical principles. Therefore, names, or codes traceable to students who took part in this research were not used. The consent form is presented in Appendix 4.

CHAPTER FOUR

Results and discussion

4.1 Introduction

This chapter presents results and discussion of the analysed data. The overall purpose of this study was to determine how indicators of school learning environment influenced students' academic performance in senior high schools in the Greater Accra Region. The indicators investigated included student-teacher relationships, academic support, school physical environment and school teaching environment as predictors of students' academic performance. Students' academic performance was the dependent variable, and indicators of school learning environment were the independent variables. Pearson product-moment correlation analysis was done to provide statistical evidence of the degree(s) of relationships between the predictor variables and the dependent variable. ANOVA was done to test the null hypotheses. Additionally, multiple linear regression analysis was conducted to establish variations in students' academic performance attributed to the indicators. The analysis enabled the formulation of a model that can predict students' academic performance in senior high schools. Statistical Package for Social Sciences (SPSS) version 26 was used to analyse the data.

4.2 Academic performance

The students' academic performance was measured by a 9-Likert scale, where 1 represented the best performance and 9 the worst performance. The study used students' average scores in English language, mathematics, integrated science, and social studies to measure academic performance. The mean performance and standard deviations for each school were calculated to show disparities in performance among schools. The average scores of students in each school were used to establish statistical relationships between indicators of school learning environment and students' academic performance. The mean performance of the four schools is shown in Table 4.1.

Table 4.1*Mean performance of the schools*

School	N	Mean	Std. Deviation
School A SHS	74	2.7635	1.04266
School B Girls SHS	78	2.6442	1.18604
School C SHS	121	3.1384	1.37839
School D SHS	97	2.7500	1.35353
Total	370	2.8574	1.28195

Table 4.1 shows that School “A” had a mean performance value of 2.76; School “B” had a mean of 2.64; School “C” had 3.14 while School “D” had 2.75. The deviation in students’ academic performance of School “A” was 1.04; School “B” was 1.19; School “C” was 1.38; and School “D” was 1.35. The standard deviations showed that School “A” had the least deviation in students’ academic performance, whereas School “C” had the highest deviation. The mean performance of the schools illustrated that School “B” had the best performance. This academic performance trend corroborates the recent categorisation of senior high schools by the Ghana Education Service (MoE, 2019). Schools are categorised based on infrastructural development, resourcefulness, and excellence in academic performance. This study involved schools in category “B” and “C” considered not too endowed nor too deprived schools. School “B”, which had a mean performance of 2.64, was indexed among category “B” schools. By inference, students in School “B” had a better school learning environment, as supported by findings of Danso, Owusu-Ansah, and Alorwu (2012). ANOVA was carried out to establish if the variations in the mean performance of students were significant. Table 4.2 presents results of the analysis.

Table 4.2*Mean variations in academic performance*

Variation	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	14.872	3	4.957	3.067	0.028
Within Groups	591.545	366	1.616		
Total	606.417	369			

Table 4.2 shows that the mean square of deviations among schools was 4.957, while the deviation of sample scores within students' academic performance was 1.616. The p -value is 0.028, which is less than 0.05. This result demonstrates a significant difference in the mean of students' academic performance in relation to school category. The finding implies that school category (metropolitan or municipal) plays an essential role in students' academic performance. This outcome corroborated an investigation carried out by Opoku-Asare and Siaw (2015) in Ashanti Region about students' academic performance in rural and urban schools. The results pointed to variations in students' academic performance based on the types of schools. The study concluded that students in urban metropolitan schools performed better than those in rural schools.

Post hoc tests were conducted for multiple comparisons to explore the extent of variations in performance between schools. The results showed a significant difference in the mean performance between School "C" and "A" ($p < 0.05$), "C" and "B" ($p < 0.05$), "C" and "D" ($p < 0.05$). This can be attributed to several reasons, including the difference in school category and physical facilities. The findings also demonstrated no significant difference in performance between Schools "A", "B", and "D" at 0.05 significance level. The results are presented in Appendix 1.

4.3 Reliability measurement

Cronbach's alpha test measured the internal consistency of the data and how the variables were closely related. This was to establish the extent of reliability of school learning environment indicators to measure students' academic performance. The acceptable minimum value for Cronbach's alpha coefficient is 0.70 (Ercan et al., 2007). The computed results are presented in Table 4.3.

Table 4.3

Cronbach's alpha coefficients of constructs

Variable	Cronbach's alpha
Student-teacher relationships	0.783
Academic Support	0.700
School Physical Environment	0.723
School Teaching Environment	0.878

Table 4.3 shows that the data collection tool used was reliable since all variables had a Cronbach's alpha coefficient value greater than 0.7. The results were compared with Nwakpa (2015) findings, who investigated the classroom environment and senior high school students' academic performance in chemistry in Nigeria. The reliability of the data collected using the classroom environment questionnaire was determined using Cronbach's alpha test, which had a coefficient of 0.76. By inference, this study's data was reliable and suitable for further analysis to explore the influence of indicators of school learning environment on students' academic performance.

Factor analysis was done to regroup data into non-overlapping items to enable efficient interpretation of relationships patterns (Yong & Pearce, 2013). Sample adequacy measure was performed on school learning environment constructs to determine whether the data was suitable for factor analysis. Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity were done to establish proportions of variance in the variables and whether the data was suitable for factor analysis. Data with KMO value of more than 0.5 is considered ideal for

factor analysis (Maskey et al., 2018). Bartlett’s Test of Sphericity with p -value less than 0.05 indicates that the data is appropriate for factor analysis. Eigenvalues were used to condense the variance into correlation matrix. Only variables with an eigenvalue greater than 1 were retained (Yong & Pearce, 2013). Rotated component matrix was done to demonstrate correlations between the retained variables and the estimated component. Factors with correlations values greater than 0.4 confirm that the variables strongly correlate with the investigated component (Che et al., 2013).

4.4.1 Student-teacher relationships and students’ academic performance

Student-teacher relationships construct had nine items that students used to measure their experience. Some of the items included *all teachers in my school are approachable; my teachers seem to take a real interest in my future*. Table 4.4 presents the results of KMO and Bartlett’s Test of Sphericity for student-teacher relationships.

Table 4.4

KMO and Bartlett’s Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.847
Bartlett’s Test of Sphericity	Approx. Chi-Square
	686.656
	Df
	36
	Sig.
	0.0001

Table 4.4 shows that the KMO value is 0.84 while p -value for Bartlett’s Test Sphericity is 0.0001. The data satisfied conditions for factor analysis. The items of student-teacher relationships construct were subjected to factor analysis. The results are shown in Table 4.5.

Table 4.5*Total variance explained*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.347	37.187	37.187	3.347	37.187	37.187
2	1.034	11.491	48.678	1.034	11.491	48.678
3	0.959	10.661	59.339			
4	0.788	8.757	68.096			
5	0.718	7.976	76.073			
6	0.618	6.871	82.943			
7	0.586	6.509	89.452			
8	0.509	5.659	95.111			
9	0.440	4.889	100.000			

Table 4.5 illustrates the cumulative percentage of the components' contribution to the total variance. Two components accounted for 48.67% of the total variance. The first factor contributed 37.18%, while the second factor accounted for 11.49%. Factors with eigenvalues less than 1 were excluded from further analysis. Rotated component matrix was used to show factor loadings and their corresponding correlations in the factor analysis. The contribution of every factor to the two components is presented in Table 4.6.

Table 4.6*Rotated component matrix*

	Component	
	1	2
STR 1	0.543	
STR 2	0.778	
STR 3	0.716	
STR 4		0.703
STR 5		0.416
STR 6		0.783
STR 7	0.640	
STR 8	0.701	
STR 9	0.651	

STR: Student teacher relationships.

Extraction method: Principal component analysis.

Rotation method: Varimax with Kaiser normalization.

a. Rotation converged in 3 iterations.

Table 4.6 shows the contribution of the two components. Three factors were highly correlated in the first component. The factors included *my teachers seem to take a real interest in my future* with a coefficient of 0.77; *most teachers in my school care about the students* with a coefficient of 0.71; and *in this school, all teachers pay attention to students' problems* with a coefficient of 0.70. Additionally, two factors were highly correlated to the second component. The factors included *my teachers know my parents* with a coefficient of 0.70; and *my teachers know me by my name* with 0.78 coefficient. The rotated component matrix results indicate that there are factors in the construct that contribute significantly to effective student-teacher relationships and academic performance.

Attachment theory posits that the quality of relationships between teachers who are caregivers in schools and students contributes to students' learning outcomes (Keller, 2013). The theory further postulates that positive relationships stimulate positive learning achievement. This study shows that there is a high association between factors of student-

teacher relationships and students' academic performance. For instance, students who feel that teachers care about their future pay attention to teachers' instructions meticulously. The strong correlation attests that effective student-teacher relationships motivate students for higher academic performance, as supported by Smit et al. (2014).

Similarly, the research found that students appreciate the care that they receive from their teachers. The correlation coefficient value for this factor corroborated this finding. By inference, students feel encouraged to work hard in school when teachers care about their welfare and success. Teachers who take time to listen to what their students go through as adolescents show concern and assistance. Students become efficacious when they receive constructive guidance from teachers. Student-teacher interactions significantly influence students' social development and academic performance, as reported by Spilt et al. (2011). The research found that positive relationships between students and teachers enable students to participate in instructional activities actively. Learning activities provide an opportunity for teachers to identify students' learning needs. Thus, student-teacher relationships help address challenges students face in their learning to improve learning outcomes, including academic performance.

This research confirms the importance of student-teacher-parent relationships in improving students' academic performance. Students' response shows that teachers' knowledge about parents of students had a strong correlation coefficient of 0.70. The coefficient implies that collaboration between parents and teachers enables monitoring of students' academic progress. The degree of collaboration provides effective informal communication channels between students, parents, and teachers to discuss academic challenges and prospects. For instance, students who know that their parents are in contact with teachers tend to behave well in school and at home. Likewise, the established collaboration discourages students' truancy and indiscipline. The study also demonstrates that it is essential for teachers to know their students by name. The knowledge associated with the identity of students demonstrates closeness and connectedness between teachers and students. This connectedness can enhance classroom management. The high correlation coefficient of 0.78 of the factors shows that knowing students by their name is essential in improving learning and students' academic performance.

Teachers play a vital role in nurturing and sustaining student-teacher relationships. For instance, teachers can talk to students about matters beyond the coursework to share life experiences. The interactions provide opportunities for students to learn life skills and values outside the curriculum. This supports Hughes and Chen (2011) findings on teacher-student

relationship quality. The study found that *I enjoy being with this child; the child gives me many opportunities to praise him or her; and the child talks to me about things he or she does not want to tell other people* to be highly correlated to academic self-efficacy. The factors in their study had a correlation coefficient of 0.9. The study concluded that supportive and positive relationships between teachers and students promote a sense of belonging and cooperation in classroom activities.

The linear regression analysis was used to establish associations between student-teacher relationships and academic performance. Results of One-sample Kolmogorov-Smirnov test are presented in Table 4.17. The p -value of student-teacher relationships was 0.980, which was greater than 0.05. According to Drezner et al. (2010), the null hypothesis is rejected if p -value of One-sample Kolmogorov-Smirnov test is greater than 0.05. This implies the error term was normally distributed in the population. This study corroborates Eryilmaz and Şimşek (2014) results who evaluated students' performance in adaptive environment in Turkey. The research used One-sample Kolmogorov-Smirnov test for normal distribution of the data and reported that p -value was greater than 0.05.

Multicollinearity between student-teacher relationships and other constructs of school learning environment was determined using Variance Inflation Factor (VIF). The result is presented in Table 4.19. VIF for student-teacher relationships was 1.48. This implies that there is no multicollinearity between student-teacher relationships and the constructs (Craney & Surles, 2002). The finding agrees with Pérez-López and Ibarrondo-Dávila (2020) results, who studied the academic performance of accounting studies' students in Granada. The research investigated multicollinearity among the variables and reported VIF values of between 1.0 and 1.40. Based on the VIF values, the study concluded that the variables did not have multicollinearity. Pearson product moment correlation was used to determine correlation between student-teacher relationships and students' academic performance ($r = 0.60$; $p < 0.05$). The results show that student-teacher relationships have a strong positive influence on students' academic performance.

The findings imply that students who perceive that teachers are concerned about their academic work and general well-being in school are most likely to focus more on their studies, leading to better academic performance. By inference, positive student-teacher relationships create a conducive learning atmosphere where students feel free to consult teachers on challenging concepts. Teachers who are approachable motivate students to discuss their academic ambitions. Furthermore, this finding corroborates results reported by Omodan and Tsotetsi (2018). The research observed a strong association between student-teacher

relationships and academic performance. The analysis showed that r -value was 0.61 while p -value was lower than 0.05. The values of r in both studies were almost the same. Students who participated in both studies were in public senior high schools and adolescents who may have similar school experiences. Nigeria and Ghana are members of the West African Examination Council who share curriculum. Since the results in Ghana and Nigeria show a strong correlation between student-teacher relationships and students' academic performance, findings can help other WAEC members. This research, therefore, confirms that positive student-teacher relationships significantly influence students' academic performance in senior high school.

4.4.2 Academic support and students' academic performance

Academic support construct had several items. Some of these included: *Teachers in my school gave homework after class; in my school all teachers correct homework promptly; teachers in my school expect students to learn hard; I feel that I can do well in this school; my parents help me do my homework; my parents discuss my school progress with me; my parents buy me books which teachers recommend to me; my parents attend my school's PTA meetings; my parents provide me with a quiet space to study when I am home; my parents discuss my school progress with my teachers.* Factor analysis was done to retain items that contributed significantly to academic support. Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity were carried out to establish the construct's suitability for factor analysis. The results are presented in Table 4.7.

Table 4.7

KMO and Bartlett's Test of Sphericity for academic support construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.790
Bartlett's Test of Sphericity	Approx. Chi-Square	572.320
	Df	78
	Sig.	0.0001

Table 4.7 shows that KMO value of academic support construct is 0.79, while p -value of Bartlett's Test of Sphericity was less than 0.05. Similar results were reported by Muzenda

(2013) who explored the relationship between lecturers' competency and undergraduate students' academic performance in South Africa. The findings showed that KMO value was 0.77, while p -value of Bartlett's Test of Sphericity was less than 0.05 and concluded that the data was suitable for factor analysis. Factor analysis was conducted, and results are illustrated in Table 4.8.

Table 4.8

Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.052	23.476	23.476	3.052	23.476	23.476
2	1.327	10.204	33.680	1.327	10.204	33.680
3	1.129	8.685	42.365	1.129	8.685	42.365
4	1.007	7.744	50.109	1.007	7.744	50.109
5	0.929	7.146	57.254			
6	0.883	6.791	64.046			
7	0.789	6.067	70.113			
8	0.760	5.847	75.960			
9	0.718	5.524	81.483			
10	0.673	5.178	86.661			
11	0.635	4.888	91.549			
12	0.606	4.662	96.212			
13	0.492	3.788	100.000			

Table 4.8 shows that four factors accounted for 50.10% of variations in academic support. The first factor contributed 23.47% of total variations, while the second factor accounted for 10.20%. The third and fourth factors contributed 8.68% and 7.74%, respectively. The factors were *teachers in my school gave homework after class; in my school all teachers*

correct homework promptly; my parents help me do my homework; and my parents discuss my school progress with my teachers. Factors that had Eigenvalues less than 1 were excluded from factor analysis. The loadings for items in academic support construct are shown in Table 4.9.

Table 4.9

Rotated component matrix

	Component			
	1	2	3	4
AS 10			0.771	
AS 11			0.727	
AS 12	0.567			
AS 13	0.648			
AS 14		0.640		
AS 15			0.452	
AS 16		0.614		
AS 17	0.665			
AS 18	0.685			
AS 19				0.478
AS 20		0.673		
AS 21				0.855
AS 22		0.539		

AS: Academic support.

Extraction method: Principal component analysis.

Rotation method: Varimax with Kaiser normalization.

a. Rotation converged in 6 iterations.

Table 4.9 shows that factors retained for analysis had a correlation matrix greater than 0.4. The study used four extraction components to establish the contribution of factors. Four factors accounted for 50.1% of the total variance in the extraction sums of squared loadings. Three themes were developed from the rotated component matrix. The themes included

homework, school rules and discipline, and parent-school collaboration. The themes were based on correlation coefficients. Students' homework, feedback and parents' involvement in homework play a significant role in students' academic performance. Additionally, school rules and discipline were found to influence students' learning outcomes.

Homework and assignments help students develop effective study habits and refresh their minds about concepts learnt in school. Subsequently, homework enables students to have a deeper understanding of their academic work. This helps students acquire independent problem-solving skills, autonomy, and time management skills. The role of parents in students' assignment management is essential. This research found that parents' involvement in students' assignment and time management can enhance academic performance. Apart from the material investment parents make in their children's education, they need to support children by involving in school and home activities. Teachers' feedback on students' homework and timely correction is vital in monitoring students' academic progress.

This study also shows that parents' involvement in helping their children to manage academic work contributes to better performance. For instance, when parents develop an interest in children's school activities and academic progress, the children feel motivated and can freely seek support from parents when they face challenges. By implication, parents can provide relevant information to teachers about their children to enable needed interventions. This supports findings by Chowa et al. (2013) who investigated parents' involvement in the education of their children in Ghana. The study found that parents' interest in their children's school activities is significantly associated with academic performance. Parents' engagement in school activities can be done participation in PTA.

The education review of 2002 established PTA to improve school management in Ghana. PTA mobilises resources to improve school infrastructure among other activities. Many senior high schools have set up learning facilities such as science laboratories, classrooms, and libraries through PTA levies. The facilities enhance the learning environment and have a positive influence on students' academic performance. Additionally, PTA plays an essential role in demanding accountability from teachers and students on learning outcomes. Parents can also share experiences with students to provide role modelling. Through such programmes, students receive guidance on different career paths and motivate them to improve their academic performance. PTA motivates teachers and school administration through open dialogue. This collaboration between parents and the school can enhance students' learning outcomes.

Arora and Singh (2017) investigated factors affecting college students' academic performance in India. The data was tested using principal component analysis, and only factors with an eigenvalue greater than 1 were retained. The factors included teacher effectiveness and family environment and had loadings greater than 0.4. One-sample Kolmogorov-Smirnov normality test found $p > 0.05$, implying that the error terms in the data were normally distributed (Drezner et al., 2010). Similarly, Vilorio and Parody (2016) in a study to develop a predictive model of academic performance for students in Columbia. The study used One-sample Kolmogorov-Smirnov test and reported normal distribution of error terms in the data with $p > 0.05$. Results of the normality test of the construct are shown in Table 4.17.

Multicollinearity between academic support and other constructs was measured using Variance Inflation Factor (VIF). VIF for academic support was 1.58. This indicated that there was no multicollinearity between academic support and other indicators of the school learning environment (Craney & Surlles, 2002). Results are shown in Table 4.19. The results corroborate the findings of Santos et al. (2016) who investigated native and immigrant students' academic performance. The study established the relationship between academic performance and family support and control, school satisfaction and learning environment among Spanish and Latin American primary and secondary schools. VIF of the study ranged between 1.06 and 2.85 which the study concluded that there was no collinearity between the factors affecting students' performance. The absence of collinearity between academic support and other learning environment indicators allows for linear modelling of the relationship between academic support and students' academic performance.

The strength of the relationship between the academic support and students' academic performance was measured using Pearson product moment correlation, and results showed in Table 4.20 ($r = 0.61$; $p < 0.05$). The results showed that academic support is positively and significantly related to student performance. Similar results were reported by Adeeb and Siddique (2018) who explored academic support and academic performance among university students in Southern Punjab in Pakistan. The study reported strong correlation between academic support and student academic achievement ($r = 0.66$; $p < 0.01$). Findings confirm that academic support has a significant influence on students' academic performance.

4.4.3 School physical environment and students' academic performance

School physical environment construct encompassed aspects of buildings within the school as well as security measures. KMO and Bartlett's Test of Sphericity was conducted to explore the construct's suitability for factor analysis. Findings are presented in Table 4.10.

Table 4.10

KMO and Bartlett's Test of Sphericity for school physical environment construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.720
Bartlett's Test of Sphericity	Approx. Chi-Square	605.599
	Df	28
	Sig.	0.0001

Table 4.10 shows that the KMO value for the construct was 0.72. KMO value exceeded the minimum requirement of 0.50 for sampling adequacy. The p -value for Bartlett's Test of Sphericity was 0.0001. This value was less than 0.05. This indicates that the data was suitable for principal component analysis. Consequently, factor analysis was done on the construct's items to eliminate factors that caused the least percentage variance in the construct. Results are presented in Table 4.11.

Table 4.11*Total variance explained*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.629	32.858	32.858	2.629	32.858	32.858
2	1.168	14.605	47.462	1.168	14.605	47.462
3	0.992	12.402	59.864			
4	0.921	11.511	71.375			
5	0.852	10.654	82.028			
6	0.780	9.750	91.778			
7	0.406	5.072	96.850			
8	0.252	3.150	100.000			

Table 4.11 shows that two factors contributed 47.46% of cumulative percentage variance in the dependent variable. The first factor accounted for 32.85% percentage variance while the second factor contributed 14.60%. The factors were *all classrooms in my school have got furniture*; and *security men in my school are strict*. The factors had eigenvalues greater than 1 and were retained for further analysis. Factors that had values less than 1 were excluded from further analysis. Results of rotated component matrix are presented in Table 4.12.

Table 4.12*Rotated component matrix*

	Component	
	1	2
SPE 23		0.629
SPE 24	0.860	
SPE 25	0.797	
SPE 26		0.638
SPE 27		0.532
SPE 29	0.801	
SPE 30	0.470	

SPE: School physical environment.

Extraction method: Principal component analysis.

Rotation method: Varimax with Kaiser normalization.

- a. Rotation converged in 3 iterations.

The factors retained from the principal component analysis showed strong positive associations with items in the school physical environment construct, as illustrated in Table 4.12. School physical environment factors were classified into two components comprising of school facilities and school safety. Facilities such as sickbay and boarding infrastructure played a significant role in students' academic performance. Additionally, facilities like *classrooms, libraries, and cafeterias* were positively correlated with students' academic performance. School safety also had a positive influence on students' academic performance. Similar results were found by Che et al. (2013) who posited that school facilities and safety were critical factors that affect students' academic performance.

Adequate learning facilities create a conducive atmosphere for students' learning. For example, subjects such as Integrated Science are practical based. Most topics that are taught in SHS require specialised approaches and facilities like a laboratory and resource centres. Students enjoy lessons that are delivered with teaching and learning aids. Teaching aids can be used to demonstrate, experiment, and simulate, thereby making the lesson practical. Thus, school facilities promote effective learning and contribute to the retention of knowledge. A safe

school learning environment enables students to develop emotionally, socially and enhances students' ability to focus on their studies leading to improved academic performance.

Normality test was done using One-sample Kolmogorov Smirnov test. Results are shown in Table 4.17. The result showed that $p > 0.05$. This implies that the error terms for the construct were normally distributed (Drezner et al., 2010). The results were in agreement with the findings of Okafor et al. (2016) who investigated school environments and students' academic performance in Nigeria. One-sample Kolmogorov-Smirnov analysis showed that $p > 0.05$. They concluded that the data was normally distributed and suitable for linear modelling. Table 4.19 shows that the variance inflation factor (VIF) for the school physical environment was 1.31. This indicated no multicollinearity between school physical environment and other school learning indicators confirming the suitability of the data for linear modelling (Craney & Surles, 2002). Realyvásquez-Vargas et al. (2020) explored the impact of environmental factors on university students' academic performance in Mexico. In the study, independent variables were lighting, noise and temperature, data analysis was $p < 0.05$ significance level and the VIF value was less than 3.3. The study concluded that there was no collinearity between the independent variables.

The strength of the relationship between school physical environment and students' academic performance was measured using Pearson product moment correlation, and results presented in Table 4.20, ($r = 0.53$; $p < 0.05$). The results showed that the school physical environment is positively and significantly related to students' academic performance. School physical environment includes several aspects that directly influence academic performance, such as facilities required for learning. Classroom arrangement can also affect students' access to learning resources in class and academic performance. Similar results were reported by Iweka (2017) who assessed perceptions of the school learning environment as a correlate of students' academic performance in Integrated Science. The investigation was conducted in River State in Nigeria and involved five secondary schools. The research found that $r = 0.55$ and $p < 0.05$. The correlation was moderately high. These findings imply that a favourable school physical environment significantly influences students' academic performance.

4.4.4 School teaching environment and students' academic performance

The school teaching environment comprised of school technical environment and instructional environment. The construct had 43 items. Factor analysis was required to identify

items in this construct that caused significant variation in students' academic performance. The KMO measure of sampling adequacy and Bartlett's Test of Sphericity were done to establish whether the factors were suitable for factor analysis. Results of KMO and Bartlett's Test are presented in Table 4.13.

Table 4.13

KMO and Bartlett Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.900
Bartlett's Test of Sphericity	Approx. Chi-Square	5345.464
	Df	45
	Sig.	0.0001

Table 4.13 shows that the KMO Measure of Sampling Adequacy for the set of variables analysed was 0.90. This value was higher than 0.50 required minimum value for the measure of sampling adequacy. The *p*-value of Bartlett's Test of Sphericity was less than 0.05. Results of KMO and Bartlett's Test of Sphericity implied that the data was suitable for factor analysis to establish factors in this construct that accounted for the highest variation. Total variance explained was used to establish the components' contributions. The results are presented in Table 4.14.

Table 4.14*Total variance explained*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.680	23.048	23.048	7.376	17.562	17.562
2	2.880	6.857	29.905	2.561	6.097	23.658
3	2.065	4.916	34.821	2.354	5.604	29.262
4	1.650	3.927	38.748	1.832	4.362	33.625
5	1.552	3.694	42.442	1.798	4.280	37.905
6	1.385	3.298	45.741	1.704	4.057	41.961
7	1.311	3.121	48.862	1.686	4.015	45.977
8	1.289	3.069	51.931	1.526	3.633	49.610
9	1.176	2.799	54.731	1.504	3.581	53.191
10	1.081	2.575	57.305	1.395	3.320	56.511
11	1.028	2.448	59.753	1.362	3.242	59.753

Table 4.14 shows that 11 factors in this construct accounted for the highest variations in students' academic performance. School teaching environment contained 11 factors in the construct that contributed significantly to variations in students' academic performance. The items contributed 59.75% of the total variance. This implies that 11 items caused 59.75% of the variances in academic performance attributed to the school teaching environment. The factors included *my school has an Information Communication Technology (ICT) laboratory; my school has internet connectivity; there are enough computers in the ICT laboratory for all students; my school has a website; I read online books in my school library; all teachers encourage students to be attentive in class; all teachers in my school encourage students to ask questions in class; all teachers demonstrate in class how we are expected to solve questions; my teachers encourage me to participate in school competitions; all teachers in my school come to class on time; my teachers help us develop an interest in their subject.* Rotated

component matrix was conducted to show the factor loadings for the school teaching environment. Results of the rotated component matrix are presented in Table 4.15.

Table 4.15

Rotated component matrix

	Component											
	1	2	3	4	5	6	7	8	9	10	11	
STE 31		0.643										
STE 32		0.703										
STE 33		0.445										
STE 34							0.448					
STE 35										0.616		
STE 36		0.523										
STE 37		0.653										
STE 38		0.712										
STE 39							0.746					
STE 40							0.724					
IE 1	0.714											
IE 2	0.675											
IE 3					0.545							
IE 4				0.675								
IE 5												0.524
IE 6					0.595							
IE 7					0.460							
IE 8								0.730				
IE 9						0.491						
IE 10						0.657						
IE 11						0.571						
IE 12				0.585								
IE 13												0.716
IE 14	0.768											
IE 15				0.491								
IE 17	0.574											
IE 18	0.694											
IE 19	0.511											
IE 21									0.768			
IE 22	0.802											
IE 23			0.645									
IE 24			0.494									
IE 25	0.703											
IE 26	0.558											
IE 27			0.499									
IE 28	0.821											
IE 29			0.613									
IE 30	0.693											
IE 31	0.703											
IE 32									0.743			

STE: School technical environment.

IE: Instructional environment.

Extraction method: Principal component analysis.

Rotation method: Varimax with Kaiser normalization.

a. Rotation converged in 17 iterations.

School teaching environment encompassed school technical and instructional environments. The findings established a strong positive relationship between the 11 factors in the construct and students' academic performance. The study summarised the factors into themes consisting of technologies in school and teaching strategies based on the loadings. School technical environment involves information and communication technology in school. Examples include whiteboard, electronic learning materials, websites, and online library. This study found that access to ICT facilities in school motivates students to learn. The result corroborates findings of Wang and Reeves (2006) who explored the effect of a web-based learning environment. The research showed that ICT in school influences students' learning outcomes. For instance, students can carry out a project in the school ICT laboratory and share findings with their peers. The sharing promotes collaboration and peer-to-peer learning.

Similarly, teaching strategies are important for learning and influence students' learning outcomes. Teaching methods that are diverse and multidimensional help sustain students' interest in learning engagements. Teaching approaches motivate students' interest during learning sessions and facilitate the achievement of lesson objectives. The study supports findings by Dong et al. (2019) who established that students' participation depends on teaching approaches that teachers used in the classroom. Diverse abilities are found in the classroom. Therefore, modifying teaching strategies can be helpful to manage different students' learning needs in the classroom.

This study also found associations between teaching strategies and students' curiosity in learning. Students reported that *teachers in my school generally like students to be curious*. The correlation shows that the factor has a strong relationship with the teaching environment. This implies that students enjoy learning in a stimulating environment that engages them. Furthermore, students appreciate rewards and complement in classroom interactions. The study found a strong association between reward and the school teaching environment. *Teachers in my school give good remarks when students excel in their tests* was found to have a high correlation coefficient. This confirms that assessment feedbacks are important in improving students' academic performance.

Normality and multicollinearity tests were done to determine the school teaching environment's suitability for linear regression modelling. The normality test was conducted

using One-sample Kolmogorov-Smirnov test. Results of the test are shown in Table 4.17. The value was $p > 0.05$, implying that the data was normally distributed (Drezner et al., 2010). Similar results were reported by Sookoo-Singh and Boisselle (2018) who investigated the flipped classroom model's effect on students' academic performance in the Caribbean Island of Trinidad. In the study, One-sample Kolmogorov-Smirnov test was used to determine whether the data was normally distributed. The study found that $p > 0.05$ and concluded that the data was normally distributed.

Collinearity between school teaching environment and other indicators of school learning environment were investigated. VIF for the school teaching environment was 1.25 as illustrated in Table 4.19. This implies no collinearity between school teaching environment and other indicators of the school learning environment. In the absence of collinearity, the data was considered suitable for linear modelling (Craney & Surlles, 2002). The strength of the relationship between school teaching environment and students' academic performance was measured using Pearson product moment correlation. The results are presented in Table 4.20. The results indicated that $r = 0.656$ and $p < 0.05$. This implies that school teaching environment is positively and significantly related to students' academic performance.

Among indicators of school learning environment investigated in this study, school teaching environment had the most significant correlation coefficient with students' academic performance. This finding confirms that teachers play a central role in students' academic success. Teachers adopt several teaching approaches to ensure that students receive adequate instructions that enable them to acquire knowledge. The approaches are complemented by the integration of ICT in classroom engagement. The results support findings by Okendu (2012) who investigated the influence of instructional process and supervision on students' academic performance in secondary school in Nigeria. The study showed that $r = 0.59$, and $p < 0.05$. The research and concluded that there was a strong correlation between instructional process and students' academic performance.

4.5 Descriptive statistics of school learning environment

The mean and standard deviation of the scale for indicators of school learning environment were computed. This was done to show the extent to which the students agreed or disagreed with items that described the various school learning environment constructs. The results show that, on average, students who participated in this study agreed that indicators of

school learning environment influenced their academic performance. The standard deviations indicate that there were no outliers in the data sets. This implies that students' observations were close to the mean. The descriptive are presented in Table 4.16.

Table 4.16

Descriptive statistics of the scales

Variable	Mean	Std. Deviation
Student-teacher relationships	3.30	0.6853
Academic support	3.90	0.5111
School physical environment	4.01	0.6256
School teaching environment	3.39	0.4494

Table 4.16 shows that student-teacher relationships had a mean of 3.30, while academic support was 3.90. The mean values of the school physical environment and school teaching environment were 4.01 and 3.39, respectively. The findings illustrate that school physical environment and academic support had high mean values. The mean values show the direct influence of students' perceptions about classroom furniture, school safety, teachers, and parents' support on academic performance. Students spend most of the school time in classroom setting and are familiar with the facilities, infrastructure, and safety. The results support findings by Baidoo-Anu (2018) who reported that 36% of students perceived that school furniture, classroom facilities and buildings impacted on their academic performance. Kibriya and Jones (2020) found that school safety contributed significantly to students' academic performance. The finding implies that students accord keen importance to their security in school.

The mean value for academic support shows students' perceptions about the role of teachers and parents in academic success. Homework and prompt feedback on students' assignments enable teachers to reinforce learning outcomes. Likewise, parents follow up on their children's learning process and assist them in time management outside the school. The finding corroborates results by Chen (2005) on perceived academic support on students' academic performance. The study reported mean of 3.44 and standard deviation of 0.49 for

academic support from parents while teachers' support had a mean of 3.43 and standard deviation of 0.47. The research posited that academic support from teachers and parents had a significant influence on students' academic performance.

4.6 Linear regression assumptions

Linear regression was used to measure the association between indicators of school learning environment and students' academic performance. This is a statistical approach to modelling the linear relationship between the dependent and independent variables; the dependent variable can be predicted based on this relationship (Kumari, 2018). Before modelling the linear relationship between indicators of school learning environment and students' academic performance, normality, autocorrelation, and multicollinearity tests were done to establish the suitability of the data for linear regression modelling.

4.6.1 Data normality test results

One of the assumptions of linear regression modelling is that the error term is normally distributed. One-sample Kolmogorov-Smirnov normality test was used to show whether the data was normally spread. One-sample Kolmogorov-Smirnov test the null hypothesis states that the data was normally distributed. The hypothesis is rejected if the p -value is less than 0.05 (Drezner et al., 2010). One-sample Kolmogorov-Smirnov test results are presented in Table 4.17.

Table 4.17*One-sample Kolmogorov-Smirnov test*

		Student-teacher relationships	Academic support	School physical environment	School teaching environment
N		370	370	370	370
	Mean	3.2973	3.8958	4.0054	3.4037
Normal Parameters	Std. Deviation	0.68530	0.51111	0.62555	0.62934
Most Extreme Differences	Absolute	0.024	0.031	0.039	0.046
	Positive	0.024	0.031	0.033	0.046
	Negative	-0.023	-0.016	-0.039	-0.029
Kolmogorov-Smirnov Z(values)		0.470	0.587	0.759	0.885
Asymp. Sig. (2-tailed)		0.980	0.880	0.612	0.413

Results in Table 4.17 show that indicators of school learning environment had p -values of One-sample Kolmogorov-Smirnov were greater than 0.05. Based on the values, the null hypotheses were not rejected. Therefore, the data was considered normally distributed and suitable for linear regression modelling.

4.6.2 Autocorrelation

The linear regression model also assumes no autocorrelation (serial correlation) among error terms of the data. Autocorrelation leads to inefficient estimates as well as insignificant regression results (King, 1995). Durbin-Watson test was used to investigate autocorrelation within indicators of school learning environment. The results of the Durbin-Watson test are presented in Table 4.18.

Table 4.18*Durbin-Watson test*

Model	R	R²	Adjusted R²	Std. Error of the Estimate	Durbin-Watson
1	0.845	0.715	0.711	0.21427	1.806

a. Dependent Variable: performance.

b. Predictors: (Constant), school teaching environment, school physical environment, student-teacher relationships, academic support.

Durbin-Watson statistics ranges in value from 0 to 4. The value of 2 is the ideal indicator that errors are not correlated, although values from 1.75 to 2.25 may be considered adequate. Some scholars consider Durbin-Watson value between 1.5 and 2.5 as acceptable to indicate no autocorrelation (Makori & Jagongo, 2013). Durbin-Watson value of the data was 1.806, indicating no autocorrelation within indicators of school learning environment. The data was deemed suitable for linear regression modelling.

4.6.3 Multicollinearity

Linear regression model fitting requires that any pair of the independent variables do not have an exact correlation. A close linear relationship between the independent variables is called multicollinearity and measured by VIF (Craney & Surles, 2002). VIF was 1, which implies that there was no multicollinearity among the variables. Values between 1 and 4 are suitable indicators of the absence of multicollinearity. Results of VIF is presented in Table 4.19.

Table 4.19*Variance inflation factor (VIF)*

Variables	VIF
Student-teacher relationships	1.475
Academic support	1.578
School physical environment	1.311
School teaching environment	1.259

Results in Table 4.19 show that student-teacher relationships construct had VIF of 1.475, academic support had 1.578, school physical environment had 1.311, and school teaching environment had 1.259. Variance inflation factor illustrated that the predictor variables had values less than 4. This implies that there was no multicollinearity between indicators of school learning environment. Therefore, the multiple regression model was free from highly correlated variables. The data was deemed suitable for linear regression modelling.

4.7 Linearity measurements

Pearson moment correlation coefficient was used to establish the relationship between indicators of school learning environment and students' academic performance. Linearity is measured on a scale of -1 to +1 where -1 implies negative correlation and 0 represents no correlation, while +1 means positive association between dependent and independent variables (Mukaka, 2012b). Results of Pearson moment correlation are presented in Table 4.20.

Table 4.20*Pearson moment correlation coefficients*

		1	2	3	4	5
Student-teacher relationships (1)	Pearson correlation	1				
	Sig. (2-tailed)					
	N	370				
Academic support (2)	Pearson correlation	.519**	1			
	Sig. (2-tailed)	.000				
	N	370	370			
School physical environment (3)	Pearson correlation	.193**	.380**	1		
	Sig. (2-tailed)	.000	.000			
	N	370	370	370		
School teaching environment (4)	Pearson correlation	.394**	.355**	.263**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	370	370	370	370	
Academic performance (5)	Pearson correlation	.600**	.615**	.531**	.656**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	370	370	370	370	370

Results in Table 4.20 show strong positive relationships between indicators of school learning environment and students' academic performance. The relationship was much stronger between school teaching environment and academic performance with a coefficient of 0.65. This confirms that teachers contribute enormously to students' academic performance. Teacher practices and effectiveness are important factors for improving students' academic performance (Akiri, 2013b). School teaching environment is multidisciplinary and depends on how teachers prepare themselves to ensure that learning objectives are achieved. Teaching approaches and integration of ICT in the classroom are vital for sustaining students' interest in learning.

The results also demonstrated that academic support had a strong positive correlation with students' academic performance. Pearson moment correlation coefficient of academic support was 0.61. The construct included contributions of parents and teachers in supporting

students to enhance learning outcomes. Teachers and parents are considered socialising agents and play critical roles in students' academic performance. Parents invest in their children's education with the hope that students will perform. Apart from the role's parents play at home regarding supervision and follow up of academic work, they are also involved in school management affairs through PTA activities. Parental collaboration with the school facilitates effective monitoring of teaching and learning, which are crucial for improving students' academic performance.

Pearson moment correlation coefficient between student-teacher relationships and students' academic performance was 0.60. The coefficient shows a strong positive association between student-teacher relationships and students' academic performance. This finding indicates that student-teacher relationships are important factors that influence students' academic performance. A positive relationship creates a bond that enables students to trust their teachers and share challenges. Effective interactions between students and teachers provide feedback on learning experiences which are important to address learning needs. Improved communication increases students' participation in learning activities that lead to better students' academic performance. School physical environment had a coefficient of 0.53 in relation to students' academic performance. This indicator significantly impacts students' academic performance, implying that school infrastructure is essential for effective learning outcomes.

4.8 Test for hypothesis

Analysis of variance (ANOVA) was done to test the null hypothesis that school learning environment indicators had no significant influence on students' academic performance. This was against the alternative hypothesis that at least one of the indicators had a significant effect on the students' academic performance. Results of ANOVA test are illustrated in Table 4.21.

Table 4.21*Analysis of variance test*

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	41.822	4	10.443	227.449	0.00 ^b
1 Residual	16.708	365	0.046		
Total	58.530	369			

a. Dependent variable: Academic performance.

b. Predictors: (Constant), school teaching environment, school physical environment, student-teacher relationships, academic support.

Results of analysis of variance presented in Table 4.21 shows that p -value is less than 0.05. Based on the p -value the null hypothesis is rejected. This implies that at least one of the school learning environment indicators has a significant influence on students' academic performance. The results in Table 4.22 also showed that indicators of school learning environment had p -value less than 0.05. By inference, the analysis of variance demonstrated that school learning environment indicators had a significant influence on students' academic performance. The findings support the rejection of the null hypotheses under investigation in this study. The summary of the hypotheses is presented in Table 4.22.

Table 4.22*Summary of research hypotheses*

Null Hypothesis	Results
1. There is no statistically significant influence of student-teacher relationships on students' academic performance.	Rejected
2. There is no statistically significant influence of academic support on students' academic performance.	Rejected
3. There is no statistically significant influence of school physical environment on students' academic performance.	Rejected
4. There is no statistically significant influence of school teaching environment on students' academic performance.	Rejected

4.9 Prediction of students' academic performance by indicators of school learning environment

Multiple linear regression analysis was done to establish a model of predicting students' academic performance. The model's accuracy is increased by the principal component analysis (Yang et al., 2018). The prediction model summary shows the extent to which indicators of school learning environment predict students' academic performance. Results of the model summary are shown in Table 4.23.

Table 4.23*Model summary*

Model	R	R²	Adjusted R²	Std. Error of the Estimate
1	0.845	0.715	0.711	0.21427

a. Dependent variable: students' academic performance.

b. Predictors: (Constant), student-teacher relationships, academic support, school physical environment, and student teaching environment.

Table 4.23 shows results of multiple regression analysis. The finding established that the coefficient of multiple regression correlation was 0.845. The coefficient confirms a strong positive correlation between indicators of school learning environment (predictor variables) and students' academic performance (independent variable). The value of R^2 shows that 71.5% of variations in the regression model were accounted for by the predictor variables. The high value of adjusted R^2 (0.711) implies that the model is suitable for predicting students' academic performance. The values of R^2 (0.715) and adjusted R^2 (0.711) demonstrated that indicators of school learning environment accounted for significant variations in students' academic performance. By inference, students' academic performance in senior high school can improve when indicators of school learning environment are enhanced. Therefore, this study shows that factors that influence students' academic performance are associated with student-teacher relationships, academic support, school physical environment and school teaching environment. Other factors that affect performance but were not incorporated in this model accounted for 28.9% of students' academic performance variations.

4.9.1 Linear regression modelling coefficients

Linear regression modelling coefficients of indicators of school learning environment were used to predict students' academic performance. The prediction modelling was possible because normality, autocorrelation, and multicollinearity tests confirmed the suitability of the data for linear. Table 4.24 presents coefficients of linear regression for indicators of school learning environment.

Table 4.24*Linear regression modelling*

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	0.350	0.109		3.212	0.001
Student-teacher relationships	0.159	0.020	0.274	8.046	0.001
Academic support	0.174	0.027	0.224	6.374	0.001
School physical environment	0.185	0.020	0.290	9.474	0.001
School teaching environment	0.348	0.028	0.393	12.495	0.001

a. Dependent variable: students' academic performance.

Table 4.24 shows that indicators of school learning environment had p -values less than 0.05. The coefficients demonstrated that indicators of school learning environment had a significant influence on students' academic performance. Unstandardized coefficients of school learning environment indicators were used to formulate the linear regression model while retaining the measurement for predictor and dependent variables. Thus, a unit increase in an indicator of school learning environment holding other independent variables constant had a unit increase on the dependent variable.

The results also showed that the constant term or Y intercept was 0.35. By implication, the model's contribution to the dependent variable is 0.35 when all predictor variables are zero. All constructs of school learning environment were positively correlated with students' academic performance. This implies that a unit increase in the constructs increases students' academic performance. School teaching environment accounted for 34.8% of the regression model. Similarly, school physical environment contributed 18.5% to the regression model, while 17.4% of the regression variance was attributed to academic support. Student-teacher relationships also contributed 15.9% to the regression model. Since p -values were less than 0.05, this study concluded that indicators of school learning environment significantly

influenced students' academic performance. The linear regression model used to predict students' academic performance in senior high schools in the Greater Accra Region is illustrated in Equation 4.1.

Equation 4.1

Predictive model on students' academic performance

$$Y_i = 0.350 + 0.159X_1 + 0.174X_2 + 0.185X_3 + 0.348X_4 + \varepsilon_i \dots\dots\dots (4.1)$$

Where Y_i is academic performance, X_1 is student – teacher relationships,
 X_2 is academic support,
 X_3 is school physical environment and X_4 is school teaching environment.

Equation 4.1 is a model that can predict academic performance based on indicators of school learning environment. This prediction model implies that when other factors are constant, every unit change in student-teacher relationships, students' academic performance increases by 15.9%; likewise, for every unit change in academic support, students' academic performance is enhanced by 17.4%; for every unit change in school physical environment, students' academic performance improves by 18.5%; and for every unit change in school teaching environment, students' academic performance increases by 34.8%. The model demonstrated that the school teaching environment accounts for the highest contribution in students' academic performance among all indicators of school learning environment. By implication, this model provides insight into the importance of the school learning environment and its influence on students' academic performance.

CHAPTER FIVE

Conclusions and implications

5.1 Introduction

This chapter presents the conclusions and implications of the study. Findings on the influence of school learning environment indicators on academic performance among senior high school students in the Greater Accra Region are also illustrated. The conclusions are aligned with the study objectives, research questions and results. The implications of this research and recommendations are presented to add to existing knowledge in the field.

5.2.1 Student-teacher relationships and students' academic performance

This study investigated how student-teacher relationships influence students' academic performance. The hypothesis that there was no statistically significant association between student-teacher relationships and students' academic performance was rejected. Instead, the findings established that student-teacher relationships significantly influenced students' academic performance in senior high school (SHS). In addition, the research showed that teachers who take time and listen to challenges that students encounter beyond the coursework impacted on students' performance positively.

Similarly, the findings of this study extrapolated that positive student-teacher interactions are developed when teachers take a keen interest in students' future aspirations. Students are motivated to study when teachers exhibit good interpersonal relationships with them. For a positive relationship to exist, teachers have a vital role to play by showing concern for students' work and being available to assist. Student-teacher relationships, therefore, represent the social context where learning occurs and is an essential factor for improving students' academic performance, as reported by Spilt et al. (2011). Existing empirical studies support the findings of this research.

Hughes and Chen (2011) found that supportive and positive relationships between teachers and students promote a sense of belonging. This relationship encourages students to be cooperative in classroom activities which can improve academic performance. Koca (2016) established that positive relationships between students and teachers are important for students'

emotional needs, contributing significantly to positive learning outcomes. Likewise, Mensah and Koomson (2020), who explored student-teacher relationships and students' academic performance in Ghana, reported that positive relationships between students and teachers create environments that promote academic performance while negative relationships stifle performance. Equally, Hughes and Kwok (2006) found that positive student-teacher relationships increase students' participation in learning activities and reduce student-teacher conflicts. The study further established that positive student-teacher relationships influence academic performance significantly.

Findings of this investigation also showed that students' academic performance thrives on positive student-teacher relationships. School authorities can introduce activities that lead to an effective school learning environment. Interactive school activities enable teachers to appreciate students' dispositions and provide them with guidance. The activities can promote positive student-teacher interactions that can enhance learning outcomes. Students' diverse socio-economic characteristic in the Greater Accra Region provides an opportunity to teachers to implement approaches that take into account students' backgrounds.

5.2.2. Academic support and students' academic performance

This research explored how academic support influenced students' academic performance and hypothesised no statistically significant relationship between academic support and students' academic performance in SHS. However, the results showed that academic support substantially influences students' academic performance; hence the hypothesis was rejected. Academic support consists of direct and indirect resources necessary for promoting academic performance. This study found that academic support provided by teachers and parents influenced students' academic performance significantly.

This research demonstrated that teachers promote students' academic independence and learning culture through assignments and homework. Homework improves retention and problem-solving skills, including learning habits that promote academic performance, as reported by Bempechat (2004). The study found that when parents are involved in children's academic progress, it motivates them to improve their academic performance. The findings corroborate conclusions made by previous studies in the field. For instance, Chen (2005) found that teachers and parents' academic support reinforce positive behaviours like school attendance, which directly influence students' academic performance. Similarly, King and

Ganotice (2014) concluded that parents provide the most significant academic support to students among socialising agents. The support includes providing valuable learning resources, supervision, assistance in homework, and discussions on academic-related matters.

In Ghana, Gyamfi and Pobbi (2016) reported minimal involvement of parents in children's activities such as regulation of television viewing time, study time, playing time, time to return from school, monitoring homework, and selecting the television programme. Likewise, Chowa et al. (2013) observed that Ghanaian parents had low involvement in children's education. The studies demonstrated that active parental participation in students' educational activities contributed positively to academic performance.

The findings of this study have established that parental engagement in students' learning activities such as homework, discussion of academic progress and cooperation with teachers improve learning outcomes. Parental guidance to students complements school learning engagement. Thus, parents need to establish effective collaboration with the school to provide academic support to students in order to improve students' academic performance. In Ghana, the 2002 educational review established the parent-teacher association (PTA) to strengthen parental participation in school management. The framework of PTA enables parents to actively engage in school management as one of the stakeholders in education and contribute to the enhancement school learning environment.

5.2.3. School physical environment and students' academic performance

This investigation was to establish how the school physical environment influence students' academic performance. The hypothesis that there is no statistically significant influence of school physical environment on students' academic performance was rejected. The research demonstrated that school physical environment impacts positively students' academic performance in SHS. In addition, the findings showed that school furniture and school safety were aspects of the school physical environment that significantly influenced students' academic performance.

School infrastructure provides a favourable atmosphere for learning and enables students to focus on learning activities. This finding supports related results in the field. Alimi et al. (2012), for instance, found that the quality of school facilities positively influenced students' academic performance. The study concluded that a conducive school physical environment fosters students' academic performance. Likewise, Suleman et al. (2014)

established that students who studied in well-equipped classrooms achieved higher scores. The study concluded that a favourable and well-equipped classroom environment impacts positively on students' academic performance. Asiyai (2011) affirmed that a safe learning environment improves students' academic performance.

The findings demonstrate that infrastructure and safety are important dimensions of the school learning environment. This study provides data to stakeholders to emphasise the school physical environment's role in improving academic performance. The results established that when students learn in a safe school environment, they are motivated to attend school and regularly participate in learning activities. School safety promotes a sense of belonging and effective learning. A well-organised school physical environment facilitates effective teaching and learning and enhances students' academic performance. Therefore, this study concludes that resources should be mobilised to improve the school physical environment.

5.2.4 School teaching environment and students' academic performance

The study investigated how school teaching environment influences students' academic performance. The research rejected the hypothesis that there is no statistically significant influence of school teaching environment on students' academic performance. The study found that, among indicators of school learning environment, school teaching environment had the most significant influence on students' academic performance in SHS. School teaching environment consisted of school technical and instructional environment. This research has established that integrating information and communication technology in teaching and learning is vital in achieving quality learning outcomes. Results showed that e-learning facilities enhanced students' academic performance.

Additionally, this study found that instructional approaches impact significantly on students' academic performance. Through various teaching methods, teachers engage and sustain students' interest in learning. The approaches motivate students to aspire for higher academic performance. This study supports initiatives that promote continuous professional development for teachers. For instance, in 2014, the education sector ministry in Ghana initiated the *Transforming teacher education and learning* programme in Colleges of Education (Coffie, 2019). The goal was to improve the quality of teacher training to enhance teacher practices and learning outcomes.

The findings of this investigation corroborate results from related studies. For example, Brock et al. (2008) found that the teaching environment was significant in achieving students' learning needs. Similarly, Kember and Leung (2005) established that a school teaching environment characterised by effective teaching, active students' participation, and coherent curriculum leads to improved students' academic performance. Furthermore, Arinze et al. (2012) observed that integrating ICT in teaching can improve learning quality. Integration of ICT in teaching approaches provides a bridge between subject content and pedagogical skills. However, Agyei (2013) reported that ICT had not been noticeably integrated into teaching and learning in senior high schools in Ghana. Therefore, policy on incorporating ICT in schools should be implemented to address students' poor academic performance in senior high schools.

5.2.5 Indicators of school learning environment and students' academic performance

The research explored the extent to which school learning environment predicts students' academic performance. The study found that indicators of school learning environment significantly influence students' academic performance. This finding was established by the adjusted R^2 value of linear regression analysis of this study. The analysis showed that school learning environment factors cumulatively contributed 71.1% of variations in students' academic performance. The study implied that students' academic performance in senior high schools in Ghana could be improved by enhancing the school learning environment. Poor academic performance in senior high schools in the Greater Accra Region can be attributed to indicators like student-teacher relationships, academic support, school physical environment, and school teaching environment.

The results provide insight into the overarching challenges of decline in students' academic performance in SHS. The government of Ghana should increase funding to senior high school education and upgrade school infrastructure to provide a favourable learning environment. Similarly, reports by MoE (2017) and World Bank (2017b) indicated that school resources, funding, infrastructural development, and teacher quality are critical for quality education outcomes. Ministry of Education should improve teacher education and professional development to optimise students' academic performance. Likewise, parental involvement in school management should be enhanced to establish effective collaboration to improve learning outcomes in senior high schools.

5.3 Limitations

This study did not include parents due to financial constraints. The students involved in this study were admitted to the various senior high schools through the Computerised School Selection and Placement System (CSSPS). CSSPS selects students on merit across all geographical regions of the country. Therefore, it required enormous financial resources to collect data from parents.

Greater Accra Region comprises two metropolitan areas, Greater Accra Metropolitan Area (GAMA) and Tema Metropolitan Area (TMA). The study was conducted in GAMA. TMA was not included in this investigation due to time limitation. Time challenges comprised of university academic schedule and vastness of study setting. The two metropolitan areas that constitute the Greater Accra Region cover a vast landmark that requires time.

School administrative bureaucracy impeded the inclusion of senior high school teachers in this study. The bureaucracy was as a result of complex organisational protocols. The challenge was further compounded by teachers' apprehension about the study findings and implication for their job security. This made it challenging to recruit teachers to participate in the study. Also, in some cases, school authorities were suspicious of the research purpose and became uncooperative.

5.4 Implications and policy suggestions

This study demonstrated the importance of school learning environment on students' academic performance by establishing contributions of school learning environment indicators. The findings fill the existing gaps on the influence of school learning environment indicators on students' academic performance in senior high school in the Greater Accra Region in Ghana. The predictive model of school learning environment and student academic performance showed that with other factors constant, every unit change in the school teaching environment causes the highest increase in student academic performance by 34.8%. The school teaching environment has the most significant influence on students' learning.

The model further illustrated that a unit change in the school physical environment can cause an increase of 18.5% in students' academic performance. Likewise, a unit increase in academic support and student-teacher relationships raises students' academic performance by 17.4% and 15.9%, respectively. The study highlighted the interplay of the school learning environment indicators, which collectively influence 71.1% of students' academic

performance. This study implies that current trends of students' poor academic performance in the West African Senior School Certificate Examination can be attributed to the school learning environment's low quality.

The findings of this research are significant to stakeholders in education and the research community. This study provides evidence-based solutions in tackling the decline in Ghanaian students' academic performance in senior high school. In view of the empirical evidence shown by this study, some proposals to inform policy and education practices are suggested. These include:

1. Ministry of Education should consider appointing academic advisors in senior high schools. The academic advisors are to support students' learning needs and collaborate with teachers and parents to improve the school learning environment. This study demonstrated the central role of the school learning environment in improving students' academic performance. Therefore, academic advisors can be teachers assigned to individual students or group of students to promote positive student-teacher relationships. The position of an academic advisor should be anchored in the management structure of senior high school. Ghana Education Service may have a supervisory role over the activities of academic advisors. The policy should also incorporate systems and procedures that facilitate mutual interactions between parents and school academic advisors to encourage effective parental involvement in PTA activities.
2. This study recommends the establishment of a national education infrastructure policy for senior high schools in Ghana. The aim of the policy is to address current inequalities in school infrastructures. The government of Ghana should allocate more resources to finance senior high schools' infrastructural development. For effective implementation, the policy should clearly state the government's commitment to providing appropriate school physical infrastructure such as classrooms, furniture, sanitation, and ICT facilities to improve teaching and learning processes. An independent body should manage the policy to ensure equity, fairness, accountability, and probity.
3. A policy that mandates Ghana Education Service to undertake a structured professional development programme for senior high school teachers should be instituted. This programme will ensure continuous professional training for teachers to update their pedagogical skills on various subject areas and issues affecting students' academic performance. The training should include effective teaching approaches that can enhance the school teaching environment and students' academic performance. The

continuous professional teacher training programme can be placed under the University of Cape Coast and University of Education, Winneba. These two universities are primarily institutions of teacher education and can use evidence-based research findings to guide teachers' professional development in Ghana.

The various policy recommendations are drawn from the findings of this investigation. Implementing these policies can significantly improve the school learning environment and teaching and learning in senior high school, including academic performance.

5.4.2. Suggestions for future research

This study explored the influence of indicators of the school learning environment on students' academic performance to provide solutions to the current trend of low academic performance in Ghana. The model showed the contributions of the various indicators to academic performance and formed the basis for the following suggestions on future research direction.

- I. The highest variation in students' academic performance in senior high school is accounted for by the school teaching environment, as shown by the linear regression model coefficients in this study. Teachers play a crucial role in a school teaching environment. Chetty et al. (2014) found that teachers contribute substantially to students' academic performance in secondary school. Teacher training processes are important for quality learning outcomes. Therefore, future research can investigate the effect of senior high school teacher training practices on students' academic performance.
- II. Academic support contributes significantly to students' academic performance in senior high school. This study highlighted parental participation in learning activities as a significant component of academic support. The 2002 education review in Ghana established a legal framework for *parent-teacher-association* to enable effective parental involvement in students' learning activities, including school management (MoE, 2003). Chowa et al. (2013) reported that parental involvement in students' academic activities in Ghana is low. There is a need to investigate factors that impede parental participation and develop a model for effective parental participation in senior high school.

III. Information communication technology (ICT) is vital in the school teaching environment, as demonstrated by this study. The factor analysis of the school teaching environment illustrated the role of ICT in the school teaching environment. For instance, ICT related items had a cumulative variance of 42.4% in this construct. Pradeep et al. (2016) posited that ICT integration in teaching approaches enhances learning outcomes. However, Agyei (2013) postulated inadequate integration of ICT in secondary school teaching and learning. Difficulties associated with ICT implementation in education in Ghana may evolve from complex factors that require empirical evidence. Thus, future studies can consider the complexities of effective inclusion of ICT in the secondary education system in Ghana.

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References

- Abd-Elmotaleb, M., & Saha, S. K. (2013). The role of academic self-efficacy as a mediator variable between perceived academic climate and academic performance. *Journal of Education and Learning*, 2(3), 117–129. <https://doi.org/10.5539/jel.v2n3p117>
- Abdul-Rahaman, N., Abdul, B. A. R., Ming, W., Ahmed, A.-R., & Salma, A.-R. S. (2018). The free senior high policy: An appropriate replacement to the progressive free senior high policy. *International Journal of Education and Literacy Studies*, 6(2), 26. <https://doi.org/10.7575/aiac.ijels.v.6n.2p.26>
- Abidogun, J. M., & Falola, T. (2020). The palgrave handbook of African education and indigenous knowledge. In J. M. Abidogun & T. Falola (Eds.), *Palgrave Macmillan*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-38277-3>
- Abreh, M. K., Owusu, K. A., & Amedahe, F. K. (2018). Trends in performance of WASSCE candidates in the science and mathematics in Ghana: Perceived contributing factors and the way forward. *Journal of Education*, 198(1), 113–123. <https://doi.org/10.1177/0022057418800950>
- Acharya, A. S., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and how of it? *Indian Journal of Medical Specialities*, 4(2), 330–333. <https://doi.org/10.7713/ijms.2013.0032>
- Addae, B., & Oppelt, N. (2019). Land-use/land-cover change analysis and urban growth modelling in the Greater Accra Metropolitan Area (GAMA), Ghana. *Urban Science*, 3(1), 26. <https://doi.org/10.3390/urbansci3010026>
- Ado, T. (2015). Influence of learning environment on students' academic achievement in mathematics: A case study of Some selected secondary schools in Yobe State – Nigeria. *Journal of Education and Practice*, 6(34), 40–44.
- Adu-Gyamfi, S., Donkoh, J., & Addo, A. A. (2016). Educational reforms in Ghana: Past and present. *Journal of Education and Human Development*, 5(3), 158–172. <https://doi.org/10.15640/jehd.v5n3a17>
- Agyei, D. D. (2013). Analysis of technology integration in teacher education in Ghana. *Journal of Global Initiatives: Policy, Pedagogy, Perspective*, 8(1), 69–86. <http://digitalcommons.kennesaw.edu/jgi%5Cnhttp://digitalcommons.kennesaw.edu/jgi/v>

- Ainsworth, H. L., & Eaton, S. E. (2010). Formal, non-formal and informal learning in the sciences. In J. Clydesdale (Ed.), *Eaton International Consulting (EIC) Inc.* Onate Press.
- Akinbobola, A. O., & Ikitde, G. A. (2008). Strategies for achieving quality assurance in science education in Akwa Ibom State of Nigeria. *African Research Review*, 2(3), 146–159. <https://doi.org/10.4314/afrrrev.v2i3.41037>
- Akiri, A. A. (2013a). Effects of teachers' effectiveness on students' academic performance in public secondary schools; Delta state - Nigeria. *Journal of Educational and Social Research*, 3(3), 105–112. <https://doi.org/10.5901/jesr.2013.v3n3p105>
- Akiri, A. A. (2013b). Effects of teachers' effectiveness on students' academic performance in public secondary schools; Delta State - Nigeria. *Journal of Educational and Social Research*, 3(2), 107–113. <https://doi.org/10.5901/jesr.2013.v3n3p105>
- Akyeampong, K. (2008). Educational expansion and access in Ghana: A review of 50 years of challenge and progress. In *Centre for International Education University of Sussex* (pp. 1–16). <http://www.cecomm.org.uk/attachments/paper>.
- Alade, O. M., Kuku, O. O., & Osoba, A. (2017a). Factors influencing candidates' performance in English language and mathematics at West African senior school certificate examination. *International Journal of Evaluation and Research in Education*, 6(3), 243–251. <https://doi.org/10.11591/ijere.v6i3.9066>
- Alade, O. M., Kuku, O. O., & Osoba, A. (2017b). Factors influencing candidates' performance in English language and mathematics at West African senior school certificate examination. *International Journal of Evaluation and Research in Education*, 6(3), 243–251. <https://doi.org/10.11591/ijere.v6i3.9066>
- Ali, Z., Masroor, F., & Khan, T. (2020). Creating positive classroom environment for learners' motivation towards communicative competence in the English language. *Journal of the Research Society of Pakistan*, 1(57), 317–328. <https://www.uel.ac.uk/wwwmedia/microsites/riste/Article-3-Evgenia-Theodotou.pdf>
- Alimi, O. S., Ehinola, G. B., & Alabi, F. O. (2012). School types, facilities and academic performance of students in senior secondary schools in Ondo State, Nigeria. *International Education Studies*, 5(3), 44–48. <https://doi.org/10.5539/ies.v5n3p44>

- Ambelu, T. G. K. (2011). The effects of student-centered approach in improving students' graphical interpretation skills and conceptual understanding of kinematical motion. *Latin-American Journal of Physics Education*, 5(2), 374–381.
- Amirul, N. J., Ahmad, C. N. C., Yahya, A., Abdullah, M. F. L., Adnan, M., & Noh, N. M. (2013). The physical classroom learning environment. *2nd International Higher Education Teaching and Learning Conference*, 1–9.
- Ampofo, J. A., Abrefi, A. A., & Nyatusah, Y. F. (2020). Incorporating ICT into teaching and learning in junior high schools in Ajumako: Challenges. *International Journal of Management & Entrepreneurship Research*, 2(5), 365–379.
- Anlimachie, M. A. (2019). Understanding the causes of students' weak performance in geography at the WASSCE and the implications for school practices; A case of two senior high schools in a rural district of Ghana. *International Journal of Research and Innovation in Social Science*, III(III), 295–311.
- Ansong, D., Ansong, E. K., Ampomah, A. O., & Adjabeng, B. K. (2015). Factors contributing to spatial inequality in academic achievement in Ghana: Analysis of district-level factors using geographically weighted regression. *Applied Geography*, 62, 136–146. <https://doi.org/10.1016/j.apgeog.2015.04.017>
- Arinze, F. O., Okonkwo, E. N., & Iwunor, A. N. (2012). Information and communication technology (ICT) application in secondary schools and students' academic performance in social studies. *African Research Review*, 6(4), 266–278. <https://doi.org/10.4314/afrrrev.v6i4.18>
- Armbruster, P., Patel, M., Johnson, E., & Weiss, M. (2009). Active learning and student-centered pedagogy improve student attitudes and performance in introductory biology. *CBE—Life Sciences Education*, 8(3), 203–213. <https://doi.org/10.1187/cbe.09-03-0025>
- ARORA, N., & SINGH, N. (2017). Factors Affecting the Academic Performance of College Students. *Journal of Educational Technology*, 14(1), 47–53. <https://doi.org/10.26634/jet.14.1.13586>
- Asamoah, D., Sundeme, B., Quainoo, E. A., Adom-Fynn, D., Yalley, C. E., & Afrane, R. (2020). School-environment, teacher-related and student-related factors: Critical causes of low academic performance of senior high school students in core mathematics in the

- Kumasi Metropolis of Ghana. *Journal of Educational and Psychological Research*, 2(1), 3–15. <https://doi.org/10.33140/jep.02.01.02>
- Asiyai, R. (2011). Effective classroom management techniques for secondary schools. *African Research Review*, 5(1), 282–291. <https://doi.org/10.4314/afrrrev.v5i1.64526>
- Aslam, H. D., Ali, A., Iqbal, F., Rahim, K., Saeed, S., & Abbasi, Z. A. (2012). Analysing factors affecting learning environment of universities in Pakistan: A case of public sector university of Pakistan. *Journal of American Science*, 8(9), 56–65. <http://www.jofamericanscience.org>
- Atuahene, F., & Owusu-Ansah, A. (2013). A Descriptive hssessment of higher education access, participation, equity, and disparity in Ghana. *SAGE Open*, 3(3), 1–16. <https://doi.org/10.1177/2158244013497725>
- Aziabah, M. A. (2018). Critical studies of education. In S. R. Steinberg (Ed.), *The politics of educational reform in Ghana: Understanding structural persistence in the secondary school system* (pp. 1–182). Springer International Publishing. <https://doi.org/10.1007/978-3-319-93761-8>
- Azigwe, J. B., Kyriakides, L., Panayiotou, A., & Creemers, B. P. M. (2016). The impact of effective teaching characteristics in promoting student achievement in Ghana. *International Journal of Educational Development*, 51, 51–61. <https://doi.org/10.1016/j.ijedudev.2016.07.004>
- Babah, P. A., Frimpong, A., Mensah, R. O., & Acquah, A. (2020). Computerized school selection and placement system in Ghana: Challenges and the way forward. *The European Journal of Educational Sciences*, 7(2), 70–80. <https://doi.org/10.19044/ejes.v7no2a5>
- Babah, P. A., Frimpong, A., Mensah, R. O., & Sakyi-Darko, M. (2020). Computerized school selection and placement system in the Greater Accra Region of Ghana: Perception of takeholders. *Journal of Educational Psychology Research*, 2(2), 96–110.
- Bada, S. O. (2015). The psychogenesis of knowledge and its epistemological significance. *Journal of Research and Method in Education*, 5(6), 66–70. <https://doi.org/10.9790/7388-05616670>
- Baidoo-Anu, D. (2018). Perceived school environmental, home conditions and academic

- performance of junior high school students in Asikuma-Odoben-Brakwa District, Ghana. *Journal of Education, Society and Behavioural Science*, 24(2), 1–7.
<https://doi.org/10.9734/JESBS/2018/39617>
- Bakadorova, O., & Raufelder, D. (2018). The essential role of the teacher-student relationship in students' need satisfaction during adolescence. *Journal of Applied Developmental Psychology*, 58, 57–65. <https://doi.org/10.1016/j.appdev.2018.08.004>
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Reviews of Psychology*, 52(1), 1–26.
<http://search.ebscohost.com/login.aspx?direct=true&db=aph&%2338;AN=4369846&%2338;site=ehost-live>
- Banks, T., Sapp, M., & Obiakor, F. E. (2014). Understanding B.F. Skinner: Building emotional competence in students with diverse learning needs. *Multicultural Learning and Teaching*, 9(1), 53–66. <https://doi.org/10.1515/mlt-2013-0021>
- Baranovskaya, T., & Shaforostova, V. (2017). Assessment and evaluation techniques. *Journal of Language and Education*, 3(2), 30–38. <https://doi.org/10.17323/2411-7390-2017-3-2-30-38>
- Barrett, P., Davies, F., Zhang, Y., & Barrett, L. (2015). The impact of classroom design on pupils' learning: Final results of a holistic, multi-level analysis. *Building and Environment*, 89, 118–133. <https://doi.org/10.1016/j.buildenv.2015.02.013>
- Beusaert, S. A. J., Segers, M. S. ., & Wiltink, D. P. A. (2013). The influence of teachers' teaching approaches on students' learning approaches: The student perspective. *Educational Research*, 55(1), 1–15. <https://doi.org/10.1080/00131881.2013.767022>
- Bempechat, J. (2004). The motivational benefits of homework: A social-cognitive perspective. *Theory into Practice*, 43(3), 189–196. <https://doi.org/10.1353/tip.2004.0029>
- Bhattacharjee, J. (2015). Constructivist Approach to Learning– An Effective Approach of Teaching Learning. *International Research Journal of Interdisciplinary & Multidisciplinary Studies*, 1(6), 65–74. <http://www.irjims.com>
- Bhavana, V., & Achchi, K. (2018). Influence of school environment on academic performance of high school students. *International Journal of Interdisciplinary Research in Arts and Humanities*, 3(1), 262–265.

- Biney, I. K., Addo, I. A., & Abu, M. (2014). The effect of the 1987 education reforms on youth unemployment in Ghana: An exploratory study. In C. Roscoe (Ed.), *Ghana: Social, economic and political issues* (pp. 295–311). Nova Science Publishers, Inc.
- Black, P., & Wiliam, D. (2018). Classroom assessment and pedagogy. *Assessment in Education: Principles, Policy & Practice*, 25(6), 551–575.
<https://doi.org/10.1080/0969594X.2018.1441807>
- Bonney, E. A., Amoah, D. F., Micah, S. A., Ahiamenyo, C., & Lemaire, M. B. (2015). The relationship between the quality of teachers and pupils academic performance in the STMA junior high schools of the Western Region of Ghana. *Journal of Education and Practice*, 6(24), 139–150.
- Bossaert, G., Doumen, S., Buyse, E., & Verschueren, K. (2011). Predicting children’s academic achievement after the transition to first grade: A two-year longitudinal study. *Journal of Applied Developmental Psychology*, 32(2), 47–57.
<https://doi.org/10.1016/j.appdev.2010.12.002>
- Bosson-Amedenu, S. (2018). Effect of use of WAEC syllabus on the mathematical achievement of WASSCE candidates in Ghana. *Asian Research Journal of Arts & Social Sciences*, 6(4), 1–8. <https://doi.org/10.9734/ARJASS/2018/34695>
- Bouchard, K. L., & Smith, J. D. (2017). Teacher–student relationship quality and children’s bullying experiences with peers: Reflecting on the mesosystem. *Educational Forum*, 81(1), 108–125. <https://doi.org/10.1080/00131725.2016.1243182>
- Brock, L. L., Nishida, T. K., Chiong, C., Grimm, K. J., & Rimm-Kaufman, S. E. (2008). Children’s perceptions of the classroom environment and social and academic performance: A longitudinal analysis of the contribution of the responsive classroom approach. *Journal of School Psychology*, 46(2), 129–149.
<https://doi.org/10.1016/j.jsp.2007.02.004>
- Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development* (pp. 993–1028). John Wiley & Sons Inc.
- Brown, S. D., Lent, R. W., & Larkin, K. C. (1989). Self-efficacy as a moderator of scholastic aptitude-academic- Academic performance relationships. *Journal of Vocational*

Behavior, 35(1), 64–75. [https://doi.org/10.1016/0001-8791\(89\)90048-1](https://doi.org/10.1016/0001-8791(89)90048-1)

Bruinsma, M., & Jansen, E. P. W. A. (2007). Educational productivity in higher education: An examination of part of the Walberg educational productivity model. *International Journal of Research, Policy and Practice*, 18(1), 45–65.

<https://doi.org/10.1080/09243450600797711>

Caffrey, E. D. (2009). Assessment in elementary and secondary education: A primer. In *CRS Report for Congress*. www.crs.gov

Cameron, R., & Harrison, J. L. (2012). The interrelatedness of formal, non-formal and informal learning: Evidence from labour market program participants. *Australian Journal of Adult Learning*, 52(2), 277–309.

Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning: Testing the linkages. *Research in Higher Education*, 47(1), 1–32.

<https://doi.org/10.1007/s11162-005-8150-9>

Chang, D.-F., & Lin, N.-J. (2018). Applying CIPO indicators to examine internationalization in higher education institutions in Taiwan. *International Journal of Educational Development*, 63, 20–28. <https://doi.org/10.1016/j.ijedudev.2017.12.007>

Chang, M.-L. (2009). An Appraisal perspective of teacher burnout: Examining the emotional work of teachers. *Educational Psychology Review*, 21(3), 193–218.

<https://doi.org/10.1007/s10648-009-9106-y>

Chanimbe, T., & Prah, P. K. W. (2020). Distribution mechanisms of Ghana's free senior high school policy: The equity dimensions and ameliorating measures. *Interchange*, 51(4), 441–467. <https://doi.org/10.1007/s10780-020-09403-3>

Che, R. M. S., Tasmin, R., Takala, J., & Norazlin, H. (2013). Factor retention decisions in exploratory factor analysis results: A study type of knowledge management process at Malaysian university libraries. *Asian Social Science*, 9(15), 227–240.

<https://doi.org/10.5539/ass.v9n15p227>

Chen, J. J.-L. (2005). Relation of academic support from parents, teachers, and peers to Hong Kong adolescents' academic achievement: The mediating role of academic engagement. *Genetic, Social, and General Psychology Monographs*, 131(2), 77–127.

<https://doi.org/10.3200/MONO.131.2.77-127>

- Chen, J. J. L. (2005). Relation of academic support from parents, teachers, and peers to Hong Kong adolescents' academic achievement: The mediating role of academic engagement. *Genetic, Social, and General Psychology Monographs*, *131*(2), 77–127.
<https://doi.org/10.3200/MONO.131.2.77-127>
- Chenoweth, K. (2016). ESSA offers changes that can continue learning gains. *Phi Delta Kappan*, *97*(8), 38–42. <https://doi.org/10.1177/0031721716647017>
- Chetty, R., Friedman, J. N., & Rockoff, J. E. (2014). Measuring the impacts of teachers II: Teacher value-added and student outcomes in adulthood. *American Economic Review*, *104*(9), 2633–2679. <https://doi.org/10.1257/aer.104.9.2633>
- Chiekem, E. (2015). Grading practice as valid measures of academic achievement of secondary schools students for national development. *Journal of Education and Practice*, *6*(26), 24–28. <https://files.eric.ed.gov/fulltext/EJ1077389.pdf>
- Chowa, G. A. N., Masa, R. D., & Tucker, J. (2013a). The effects of parental involvement on academic performance of Ghanaian youth: Testing measurement and relationships using structural equation modeling. *Children and Youth Services Review*, *35*(12), 2020–2030. <https://doi.org/10.1016/j.chilyouth.2013.09.009>
- Chowa, G. A. N., Masa, R. D., & Tucker, J. (2013b). The effects of parental involvement on academic performance of Ghanaian youth: Testing measurement and relationships using structural equation modeling. *Children and Youth Services Review*, *35*(12), 2020–2030. <https://doi.org/10.1016/j.chilyouth.2013.09.009>
- Chowdhry, S., Sieler, K., & Alwis, L. (2014). A study of the impact of technology-enhanced learning on student academic performance. *Journal of Perspectives in Applied Academic Practice*, *2*(3), 3–15. <https://doi.org/10.14297/jpaap.v2i3.111>
- Choy, L. T. (2014). The strengths and weaknesses of research methodology: Comparison and complimentary between qualitative and quantitative approaches. *Journal of Humanities and Social Science*, *19*(4), 99–104.
- Clark, I. (2012). Formative assessment: assessment is for self-regulated learning. *Educational Psychology Review*, *24*(2), 205–249. <https://doi.org/10.1007/s10648-011-9191-6>
- Coffie, I. S. (2019). Transforming Teacher Education and learning in Ghana: The impact of a continuous professional development on physics teaching at the colleges of education.

International Journal of Research and Scientific Innovation, 6(6), 201–206.

- Coleman, J. S. (1969). Equality of educational opportunity. *Socio-Economic Planning Sciences*, 2(4), 347–354. [https://doi.org/10.1016/0038-0121\(69\)90029-9](https://doi.org/10.1016/0038-0121(69)90029-9)
- Conley, D. T., & Darling-Hammond, L. (2013). *Creating systems of assessment for deeper learning*. Stanford Center for Opportunity Policy in Education. <http://edpolicy.stanford.edu>
- Cornelius-White, J. (2007). Learner-centered teacher-student relationships are effective: A meta-analysis. *Review of Educational Research*, 77(1), 113–143. <https://doi.org/10.3102/003465430298563>
- Craney, T. A., & Surlles, J. G. (2002). Model-dependent variance inflation factor cutoff values. *Quality Engineering*, 14(3), 391–403. <https://doi.org/10.1081/QEN-120001878>
- Crosnoe, R., Johnson, M. K., & Elder, G. H. J. (2004). School size and the interpersonal side of education: An examination of race/ ethnicity and organizational context. *Social Science Quarterly*, 85(5), 1259–1274. <https://doi.org/10.1111/j.0038-4941.2004.00275.x>
- Dagar, V., & Yadav, A. (2016). Constructivism: A Paradigm for Teaching and Learning. *Arts and Social Sciences Journal*, 7(4), 1–4. <https://doi.org/10.4172/2151-6200.1000200>
- Danso, A. K., Owusu-Ansah, F. E., & Alorwu, D. (2012). Designed to deter: Barriers to facilities at secondary schools in Ghana. *African Journal of Disability*, 1(1), 1–9. <https://doi.org/10.4102/ajod.v1i1.2>
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97–140. <https://doi.org/10.1080/10888691.2018.1537791>
- De Clercq, M., Galand, B., Dupont, S., & Frenay, M. (2013). Achievement among first-year university students: an integrated and contextualised approach. *European Journal of Psychology of Education*, 28(3), 641–662. <https://doi.org/10.1007/s10212-012-0133-6>
- Debele, A. F. (2016). The study of accessibility of the physical environment of primary schools to implement inclusive education: The case study of Addis Ababa, Ethiopia. *Imperial Journal of Interdisciplinary Research*, 2(1), 26–36. <http://link.springer.com/10.1007/s10212-012-0133-6>

- Dincer, M. A., & Uysal, G. (2010). The determinants of student achievement in Turkey. *International Journal of Educational Development*, 30(6), 592–598.
<https://doi.org/10.1016/j.ijedudev.2010.05.005>
- Dixson, D. D., & Worrell, F. C. (2016). Formative and summative assessment in the classroom. *Theory Into Practice*, 55(2), 153–159.
<https://doi.org/10.1080/00405841.2016.1148989>
- Dong, Y., Wu, S. X., Wang, W., & Peng, S. (2019). Is the student-centered learning style more effective than the teacher-student double-centered learning style in improving reading performance? *Frontiers in Psychology*, 10(2630), 1–40.
<https://doi.org/10.3389/fpsyg.2019.02630>
- Dorman, J., & Adams, J. (2004). Associations between students' perceptions of classroom environment and academic efficacy in Australian and British secondary schools. *Westminster Studies in Education*, 27(1), 69–85.
<https://doi.org/10.1080/0140672040270106>
- Dorman, J. P. (2001). Associations between classroom environment and academic efficacy. *Learning Environments Research*, 4(3), 243–257.
<https://doi.org/10.1023/A:1014490922622>
- Drezner, Z., Turel, O., & Zerom, D. (2010). A modified Kolmogorov–Smirnov test for normality. *Communications in Statistics - Simulation and Computation*, 39(4), 693–704.
<https://doi.org/10.1080/03610911003615816>
- Duflo, E., Dupas, P., & Kremer, M. (2019). The impact of free secondary education: Experimental evidence from Ghana. In *Working Paper* (No. 1254167).
- Eaton, S. (2019). Overview of higher education. In *Bloomsbury Education and Childhood Studies* (pp. 1–18). Bloomsbury Publishing Plc.
<https://doi.org/10.5040/9781474209434.0004>
- Education Advisory Committee. (1972). *Report of the education advisory committee on the proposed new structure and content of education for Ghana*.
- Emaliana, I. (2017). Teacher-centered or student-centered learning approach to promote learning? *Jurnal Sosial Humaniora*, 10(2), 59–70.
- Ercan, I., Yazici, B., Sigirli, D., Ediz, B., & Kan, I. (2007). Examining cronbach alpha, theta,

- omega reliability coefficients according to sample size. *Journal of Modern Applied Statistical Methods*, 6(1), 291–303. <https://doi.org/10.22237/jmasm/1177993560>
- Ertmer, P. A., & Newby, T. J. (2008). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, 6(4), 50–72. <https://doi.org/10.1111/j.1937-8327.1993.tb00605.x>
- Ertmer, P. A., & Newby, T. J. (2013). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, 26(2), 43–71. <https://doi.org/10.1002/piq.21143>
- Eyisi, D. (2016). The usefulness of qualitative and quantitative approaches and methods in researching problem-solving ability in science education curriculum. *Journal of Education and Practice*, 7(15), 91–100. <https://doi.org/2222-288X>
- Fan, W., & Williams, C. M. (2010). The effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation. *Educational Psychology*, 30(1), 53–74. <https://doi.org/10.1080/01443410903353302>
- Farrell, G., & Isaacs, S. (2007). *Survey of ICT and education in Africa: A summary report, based on 53 country surveys* (ICT and Education, Issue The Commonwealth of Learning). https://www.infodev.org/infodev-files/resource/InfodevDocuments_353.pdf
- Fisk, W. J., Paulson, J. A., Kolbe, L. J., & Barnett, C. L. (2016). Significance of the school physical environment - A commentary. *Journal of School Health*, 86(7), 483–487. <https://doi.org/10.1111/josh.12400>
- Fomunyan, K. G. (2019). ICT possibilities for primary and secondary education in Africa. *International Journal of Mechanical Engineering and Technology*, 10(12), 29–36. <http://www.iaeme.com/ijmet/issues.asp?JType=IJMET&VType=10&IType=12>
- Forghani-Arani, N., Cerna, L., & Bannon, M. (2019). *The lives of teachers in diverse classrooms* (EDU/WKP(2019)6; OECD Education Working Paper No. 198). [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP\(2019\)6&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP(2019)6&docLanguage=En)
- Francis, G. (2014). Stakeholders' assessment of Ghana's post independence educational policies. *Science Journal of Education*, 2(6), 170–179. <https://doi.org/10.11648/j.sjedu.20140206.11>

- Fraser, B. J., & Fisher, D. L. (1982). Effects of classroom psychosocial environment on student learning. *British Journal of Educational Psychology*, 52(3), 374–377.
<https://doi.org/10.1111/j.2044-8279.1982.tb02525.x>
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of evidence. *Review of Educational Research*, 74(1), 59–109.
- Fryling, M. J., Johnston, C., & Hayes, L. J. (2011). Understanding observational learning: An interbehavioral approach. *The Analysis of Verbal Behavior*, 27, 191–203.
<https://doi.org/10.1007/BF03393102>
- Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children’s academic engagement and performance. *Journal of Educational Psychology*, 95(1), 148–162.
<https://doi.org/10.1037/0022-0663.95.1.148>
- Ganyaupfu, E. M. (2013). Teaching methods and students’ academic performance. *International Journal of Humanities and Social Science Invention*, 2(9), 29–35.
- Garrett, T. (2008). Student-centered and teacher-centered classroom management: A case study of three elementary teachers. *Journal of Classroom Interaction*, 43(1), 34–47.
- Gauthier, L. M. (2014). How learning works: 7 research-based principles for smart teaching. *Journal of the Scholarship of Teaching and Learning*, 14(1), 126–129.
<https://doi.org/10.14434/josotl.v14i1.4219>
- Ghani, M. F. A., Siraj, S., Radzi, N. M., & Elham, F. (2011). School effectiveness and improvement practices in excellent schools in Malaysia and Brunei. *Procedia - Social and Behavioral Sciences*, 15, 1705–1712. <https://doi.org/10.1016/j.sbspro.2011.03.355>
- Ghavifekr, S., Kunjappan, T., Ramasamy, L., & Anthony, A. (2016). Teaching and learning with ICT tools issues and challenges from teachers’ perceptions. *Malaysian Online Journal of Educational Technology*, 4(2), 38–57.
- Gill, A. K., & Kusum. (2017). Teaching Approaches, Methods and Strategy. *Scholarly Research Journal for Interdisciplinary Studies*, 4(36), 6692–6697.
<https://doi.org/10.21922/srjis.v4i36.10014>
- Government of Ghana. (2017). *Midline survey: Transforming teacher education and learning (T-TEL)* (pp. 1–44). JMK Consulting, LLC.

- Guey, C., Cheng, Y., & Shibata, S. (2010). A triarchal instruction model: integration of principles from behaviorism, cognitivism, and humanism. *Procedia - Social and Behavioral Sciences*, 9, 105–118. <https://doi.org/10.1016/j.sbspro.2010.12.122>
- Guney, A., & Al, S. (2012). Effective learning environments in relation to different learning theories. *Procedia - Social and Behavioral Sciences*, 46, 2334–2338. <https://doi.org/10.1016/j.sbspro.2012.05.480>
- Gyamfi, K., & Pobbi, M. A. (2016). Parental monitoring and child performance in Ghana. *Journal of Education and Practice*, 7(21), 33–41. <http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1109409&site=ehost-live>
- Gyampo, R. (2018). Creating new regions in Ghana: Populist or rational pathway to development? *Journal of Political Sciences and Public Affairs*, 6(2), 1–6. <https://doi.org/10.4172/2332-0761.1000324>
- Hancock, D. R., Bray, M., & Nason, S. A. (2002). Influencing university students' achievement and motivation in a technology course. *The Journal of Educational Research*, 95(6), 365–372. <https://doi.org/10.1080/00220670209596611>
- Hanushek, E A, & Wößmann, L. (2010). Education and Economic Growth. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International Encyclopedia of Education* (Vol. 2, pp. 245–252). Elsevier. <https://doi.org/10.1016/B978-0-08-097086-8.92058-0>
- Hanushek, Eric A., & Rivkin, S. G. (2006). Teacher quality. In Eric A. Hanushek & F. Welch (Eds.), *Handbook of the Economics of Education* (Vol. 2, pp. 1051–1078). Elsevier B.V. [https://doi.org/10.1016/S1574-0692\(06\)02018-6](https://doi.org/10.1016/S1574-0692(06)02018-6)
- Harlen, W., & Crick, R. D. (2002). A systematic review of the impact of summative assessment and tests on students' motivation for learning (EPPI-Centre review, version 1.1*). In *Research Evidence in Education Library* (Issue 1). EPPI-Centre, Social Science Research Unit, Institute of Education. <https://doi.org/10.1080/0969594032000121270>
- Harlen, W., & Deakin Crick, R. (2002). A systematic review of the impact of summative assessment and tests on students' motivation for learning (EPPI-Centre review, version 1.1*). In *Research Evidence in Education Library* (Issue 1). EPPI-Centre, Social

Science Research Unit, Institute of Education.
<https://doi.org/10.1080/0969594032000121270>

- Hart, K. E., & Kritsonis, W. A. (2006). Critical analysis of an original writing on social learning theory imitation of film-mediated aggressive models. *National Forum of Applied Educational Research Journal*, 19(3), 1–7.
- Hofman, R. H., Dijkstra, N. J., & Adriaan Hofman, W. H. (2009). School self-evaluation and student achievement. *School Effectiveness and School Improvement*, 20(1), 47–68.
<https://doi.org/10.1080/09243450802664115>
- Hofstein, A., Cohen, I., & Lazarowitz, R. (1996). The learning environment of high school students in chemistry and biology laboratories. *Research in Science & Technological Education*, 14(1), 103–116. <https://doi.org/10.1080/0263514960140108>
- Hollis, L. P. (2019). Lessons from Bandura’s Bobo doll experiments: Leadership’s deliberate indifference exacerbates workplace bullying in higher education. *Journal for the Study of Postsecondary and Tertiary Education*, 4, 85–102. <https://doi.org/10.28945/4426>
- Hughes, J. N., & Chen, Q. (2011). Reciprocal effects of student–teacher and student–peer relatedness: Effects on academic self efficacy. *Journal of Applied Developmental Psychology*, 32(5), 278–287. <https://doi.org/10.1016/j.appdev.2010.03.005>
- Hughes, J. N., & Kwok, O. (2006). Classroom engagement mediates the effect of teacher–student support on elementary students’ peer acceptance: A prospective analysis. *Journal of School Psychology*, 43(6), 465–480. <https://doi.org/10.1016/j.jsp.2005.10.001>
- Huisman, E. R. C. M., Morales, E., van Hoof, J., & Kort, H. S. M. (2012). Healing environment: A review of the impact of physical environmental factors on users. *Building and Environment*, 58, 70–80. <https://doi.org/10.1016/j.buildenv.2012.06.016>
- Huitema, B., & Laraway, S. (2016). Autocorrelation. In *Encyclopedia of measurement and Statistics* (Issue 2006, pp. 1–4). SAGE Publications, Inc. http://www.sage-erence.com/statistics/Article_n37.html
- Huitt, W., Huitt, M., Monetti, D., & Hummel, J. (2009). A systems-based synthesis of research related to improving students’ academic performance. *3rd International City Break Conference*, 1–15. <http://www.edpsycinteractive.org/papers/improving-school-achievement.pdf>

- Hulpia, H., & Valcke, M. (2004). The use of performance indicators in a school improvement policy: The theoretical and empirical context. *Evaluation & Research in Education*, 18(1–2), 102–119. <https://doi.org/10.1080/09500790408668311>
- Iruka, I. U., DeKraai, M., Walther, J., Sheridan, S. M., & Abdel-Monem, T. (2020). Examining how rural ecological contexts influence children’s early learning opportunities. *Early Childhood Research Quarterly*, 52, 15–29. <https://doi.org/10.1016/j.ecresq.2019.09.005>
- Ismail, A. abdussalaam I., Abdul-Majid, A.-H., & Musibau, H. O. (2017). Employee learning theories and their organizational applications. *Academic Journal of Economic Studies*, 3(4), 96–104. <https://doi.org/10.1109/IEMCON.2018.8614772>
- Iweka, F. (2017). Learning environment as correlate of students’ academic achievement in junior secondary school integrated science. *International Journal of Education, Learning and Development*, 5(4), 48–54.
- Kadingdi, S. (2004). Policy initiatives for change and innovation in basic education programmes in Ghana. *Critical Review*, 4(2), 3–18.
- Kassem, H. M. (2019). The impact of student-centered instruction on EFL learners’ affect and achievement. *English Language Teaching*, 12(1), 134–153. <https://doi.org/10.5539/elt.v12n1p134>
- Kassim, H., & Ali, Z. (2007). The use of ICT in the implementation of student-centered learning (SCL). *Internet Journal of E-Language Learning & Teaching*, 4(1), 15–31.
- Kazu, I. Y., Kazu, H., & Ozdemir, O. (2005). The effects of mastery learning model on the success of the students who attended “usage of basic information technologies” course. *Educational Technology & Society*, 8(4), 233–243.
- Keith, T. Z. (2019). *Multiple Regression and Beyond* (3rd ed.). Routledge. <https://doi.org/10.4324/9781315162348>
- Keller, H. (2013). Attachment and culture. *Journal of Cross-Cultural Psychology*, 44(2), 175–194. <https://doi.org/10.1177/0022022112472253>
- Kember, D., & Leung, D. Y. P. (2005). The influence of the teaching and learning environment on the development of generic capabilities needed for a knowledge-based society. *Learning Environments Research*, 8(3), 245–266.

<https://doi.org/10.1007/s10984-005-1566-5>

- Khalil, M. K., & Elkhider, I. A. (2016). Applying learning theories and instructional design models for effective instruction. *Advances in Physiology Education*, 40(2), 147–156. <https://doi.org/10.1152/advan.00138.2015>
- Kibriya, S., & Jones, G. (2020). The impact of a safe learning environment in schools on students' learning outcomes: Evidence from Tanzania. *Quality Assurance in Education*, 29(1), 15–28. <https://doi.org/10.1108/QAE-11-2019-0124>
- King, R. B., & Ganotice, F. A. J. (2014). The social underpinnings of motivation and achievement: Investigating the role of parents, teachers, and peers on academic outcomes. *The Asia-Pacific Education Researcher*, 23(3), 745–756. <https://doi.org/10.1007/s40299-013-0148-z>
- Koca, F. (2016). Motivation to learn and teacher-student relationship. *Journal of International Education and Leadership*, 6(2), 1–20.
- Koh, E., & Lim, J. (2008). The emergence of educational technology. *IFIP Advances in Information and Communication Technology*, 269, 99–112. https://doi.org/10.1007/978-0-387-09657-5_6
- Kolb, A. Y., & Kolb, D. A. (2009). Experiential learning theory: A dynamic, holistic Approach to management learning, education and development. In *The SAGE handbook of management learning, education and development* (pp. 42–68). SAGE Publications Ltd. <https://doi.org/10.4135/9780857021038.n3>
- Konadu, D. A. (1994). Improving the deployment of teachers: The Ghanaian experience. In *International Institute for Educational Planning*. <https://unesdoc.unesco.org/ark:/48223/pf0000099189>
- Korir, D. K., & Kipkemboi, F. (2014). The impact of school environment and peer influences on students' academic performance in Vihiga County, Kenya. *International Journal of Education and Practice*, 5(11), 1–12. <https://journals.sagepub.com/doi/abs/10.1177/1932202X1102200206>
- Kumar, N., Rose, R. C., & D'Silva, J. L. (2008). Teachers' readiness to use technology in the classroom: An empirical study. *European Journal of Scientific Research*, 21(4), 603–616.

- Kumari, K., & Yadav, S. (2018). Linear regression analysis study. *Journal of the Practice of Cardiovascular Sciences*, 4(1), 33–36. https://doi.org/10.4103/jpcs.jpcs_8_18
- Kuyini, A. B. (2013). Ghana's education reform 2007: A realistic proposition or a crisis of vision? *International Review of Education*, 59(2), 157–176. <https://doi.org/10.1007/s11159-013-9343-7>
- Kwofie, F. A. A., Mensah, D. K., & Kwofie, R. I. (2018). The duration in school and academic performance: A comparative study of the three and four year senior high school education in Ghana. *International Journal of Innovative Research & Development*, 7(7), 190–196. <https://doi.org/10.24940/ijird/2018/v7/i7/JUL18029>
- Lamas, H. A. (2015). School performance. *Propósitos y Representaciones*, 3(1), 313–386. <https://doi.org/10.20511/pyr2015.v3n1.74>
- Lansford, J. E. (2016). Bobo doll experiment. In *Encyclopedia of Personality and Individual Differences* (pp. 1–3). Springer International Publishing. https://doi.org/10.1007/978-3-319-28099-8_1214-1
- Lau, J., & Ng, K.-M. (2014). Conceptualizing the counseling training environment using Bronfenbrenner's ecological theory. *International Journal for the Advancement of Counselling*, 36(4), 423–439. <https://doi.org/10.1007/s10447-014-9220-5>
- Lawrence, J. E., & Tar, U. A. (2018). Factors that influence teachers' adoption and integration of ICT in teaching/learning process. *Educational Media International*, 55(1), 79–105. <https://doi.org/10.1080/09523987.2018.1439712>
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice and performance. *Journal of Vocational Behavior*, 45, 79–122.
- Light, D. (2009). The role of ICT in enhancing education in developing countries: Findings from an evaluation of the Intel teach essentials course in India, Turkey, and Chile. *Journal of Education for International Development*, 4(2), 52–66.
- Lim, K. H., Buendía, G., Kim, O.-K., Cordero, F., & Kasmer, L. (2010). The role of prediction in the teaching and learning of mathematics. *International Journal of Mathematical Education in Science and Technology*, 41(5), 595–608. <https://doi.org/10.1080/00207391003605239>

- Liu, F., & Cavanaugh, C. (2012). Factors influencing student academic performance in online high school algebra. *Open Learning: The Journal of Open, Distance and e-Learning*, 27(2), 149–167. <https://doi.org/10.1080/02680513.2012.678613>
- Lodhi, M. A., Sahar, A. H., Qayyum, N., Iqbal, S., & Shareef, H. (2019). Relationship of school environment and English language learning at government schools. *Public Administration Research*, 8(1), 1–13. <https://doi.org/10.5539/par.v8n1p1>
- Lorsbach, A., & Jinks, J. (1999). Self-efficacy theory and learning environment research. *Learning Environments Research*, 2, 157–167. <https://doi.org/10.1023/A:1009902810926>
- Loyd, G. E., & Koenig, H. M. (2008). Assessment for learning. *International Anesthesiology Clinics*, 46(4), 85–96. <https://doi.org/10.1097/AIA.0b013e31818623df>
- Madan, C. R., & Kensinger, E. A. (2017). Test–retest reliability of brain morphology estimates. *Brain Informatics*, 4(2), 1–15. <https://doi.org/10.1007/s40708-016-0060-4>
- Makori, D. M., & Jagongo, A. (2013). Working capital management and firm profitability: Empirical evidence from manufacturing and construction firms listed on Nairobi securities exchange, Kenya. *International Journal of Accounting and Taxation*, 1(1), 1–14.
- Malecki, C. K., & Demaray, M. K. (2003). What type of support do they need? Investigating student adjustment as related to emotional, informational, appraisal, and Instrumental Support. *School Psychology Quarterly*, 18(3), 231–252. <https://doi.org/10.1521/scpq.18.3.231.22576>
- Malik, R. H., & Rizvi, A. A. (2018). Effect of classroom learning environment on students' academic achievement in mathematics at secondary level. *Bulletin of Education and Research*, 40(2), 207–218.
- Mantiri, O. (2013). The influence of culture on learning styles. *SSRN Electronic Journal*, 1–17. <https://doi.org/10.2139/ssrn.2566117>
- Martínez-Abad, F. (2019). Identification of factors associated with school effectiveness with data mining techniques: Testing a new approach. *Frontiers in Psychology*, 10, 1–13. <https://doi.org/10.3389/fpsyg.2019.02583>
- Maskey, R., Fei, J., & Nguyen, H. O. (2018). Use of exploratory factor analysis in maritime

- research. *The Asian Journal of Shipping and Logistics*, 34(2), 91–111.
<https://doi.org/10.1016/j.ajsl.2018.06.006>
- Matthews, W. J. (2003). Constructivism in the classroom: Epistemology, history, and epirical evidence. *Teacher Education Quarterly*, 51–64.
<https://files.eric.ed.gov/fulltext/EJ852364.pdf>
- Maxwell, L. K., & David, C. H. (1995). The application of the Durbin-Watson test to the dynamic regression model under normal and non-normal errors. *Econometric Reviews*, 14(4), 487–510. <https://doi.org/10.1080/07474939508800333>
- McCoy, D. C., Wolf, S., & Godfrey, E. B. (2014). Student motivation for learning in Ghana: Relationships with caregivers' values toward education, attendance, and academic achievement. *School Psychology International*, 35(3), 294–308.
<https://doi.org/10.1177/0143034313508055>
- McGrath, K. F., & Bergen, V. P. (2015). Who, when, why and to what end? Students at risk of negative student–teacher relationships and their outcomes. *Educational Research Review*, 14, 1–17. <https://doi.org/10.1016/j.edurev.2014.12.001>
- Mensah, B., & Eric Koomson. (2020). Linking teacher-student relationship to academic achievement of senior high school students. *Social Education Research*, 102–108.
<https://doi.org/10.37256/ser.122020140>
- Mensah, D. K. D. (2019). Teachers' perspective on implementation of the double track senior high school system in Ghana. *International Journal of Emerging Trends in Social Sciences*, 5(2), 47–56. <https://doi.org/10.20448/2001.52.47.56>
- Mine, Y., Hiraishi, H., & Mizoguchi, F. (2001). Collaboration of networked home electronics using multi-agent technology. *Annual Conference of the North American Fuzzy Information Processing Society - NAFIPS*, 5(9), 2648–2652.
<https://doi.org/10.1109/NAFIPS.2001.943641>
- Ministry of Education. (2017). *Midium Term Expenditure Framework (MTEF) for 2017-2019*. <https://www.mofep.gov.gh/sites/default/files/pbb-estimates/2017/2017-PBB-MOE.pdf>
- Ministry of Education. (2018). *National pre-tertiary education curriculum framework*. <https://nacca.gov.gh/wp-content/uploads/2019/04/National-Pre-tertiary-Education->

Curriculum-Framework-final.pdf

Ministry of Education [MoE]. (2003). *Education strategic plan (ESP) 2003 to 2015: Policies, targets and strategies* (Vol. 1).

Ministry of Education [MoE]. (2015a). Education sector performance report. *Government of Ghana*, 1–77.

Ministry of Education [MoE]. (2015b). Inclusive education policy. *Policy Document*, 1–46.
<https://doi.org/10.1136/adc.32.161.66>

Ministry of Education [MoE]. (2018). *Education strategic plan 2018 - 2030*.
<http://usid.org/doc/social-protection.pdf>

Ministry of Education [MoE]. (2019a). *Education sector medium-term*.
<http://moe.gov.gh/edge/content/uploads/2019/05/Education-Sector-Medium-Term-Development-Plan-2018-2021.pdf>

Ministry of Education [MoE]. (2019b). GES SHS selection register 2020: Policy document. In *Ghana Education Service* (pp. 1–81).

Mohajan, H. K. (2017). Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University Economic Series*, 17(4), 59–82.
<https://doi.org/10.26458/1746>

Mukaka, M. M. (2012a). Statistics corner: A guide to appropriate use of correlation coefficient in medical research. *Malawi Medical Journal*, 24(3), 69–71.
<https://pubmed.ncbi.nlm.nih.gov/23638278/>

Mukaka, M. M. (2012b). Statistics corner: A guide to appropriate use of correlation coefficient in medical research. *Malawi Medical Journal*, 24(3), 69–71.
<https://pubmed.ncbi.nlm.nih.gov/23638278/>

Murray, C., & Murray, K. M. (2004). Child level correlates of teacher-student relationships: An examination of demographic characteristics, academic orientations, and behavioral orientations. *Psychology in the Schools*, 41(7), 751–762.
<https://doi.org/10.1002/pits.20015>

Muttaqin, T. (2018). Determinants of Unequal Access to and Quality of Education in Indonesia. *The Indonesian Journal of Development Planning*, 2(1), 1–24.

<https://doi.org/10.36574/jpp.v2i1.27>

- Muzenda, A. (2013). Lecturers' competences and students' academic performance. *International Journal of Humanities and Social Science Invention*, 3(1), 6–13.
- Nudzor, H. P. (2014). An analytical review of education policy-making and implementation processes within the context of “decentralized system of administration” in Ghana. *SAGE Open*, 4(2), 1–11. <https://doi.org/10.1177/2158244014530885>
- Nurmi, J.-E. (2012). Students' characteristics and teacher–child relationships in instruction: A meta-analysis. *Educational Research Review*, 7(3), 177–197. <https://doi.org/10.1016/j.edurev.2012.03.001>
- Nusche, D. (2013). Teacher appraisal: Enhancing teacher professionalism. In *Synergies for Better Learning: An International Perspective on Evaluation and Assessment* (pp. 271–382). OECD. <https://doi.org/10.1787/9789264190658-9-en>
- Obong, L. B., Okey, S.-M., & Okaba, L. A. (2010). Strategies for school environmental management in Nigerian secondary schools: A case of Calabar, Nigeria. *International Education Studies*, 3(1), 196–205. <https://doi.org/10.5539/ies.v3n1p196>
- Odeh, R. C., Oguche, O. A., & Ivagher, E. D. (2015). Influence of school environment on academic achievement of students in secondary schools in Zone “A” Senatorial District of Benue State, Nigeria. *International Journal of Recent Scientific Research*, 6(7), 4914–4922. <http://www.recentscientific.com>
- OECD. (2009). *Creating effective teaching and learning environments: First results from TALIS*. <https://www.oecd.org/berlin/43024880.pdf>
- OECD. (2018a). *Preparing our youth for an inclusive and sustainable world: The OECD PISA global competence framework*. PISA. <https://www.oecd.org/education/Global-competency-for-an-inclusive-world.pdf>
- OECD. (2018b). The future of education and skills education 2030. *OECD Publications*, 1–23. [http://www.oecd.org/education/2030/E2030 Position Paper \(05.04.2018\).pdf](http://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf)
- Ohene-Adjei, K., Kenu, E., Bandoh, D. A., Addo, P. N. O., Noora, C. L., Nortey, P., & Afari, E. A. (2017). Epidemiological link of a major cholera outbreak in Greater Accra Region of Ghana, 2014. *BMC Public Health*, 17(1), 1–10. <https://doi.org/10.1186/s12889-017-4803-9>

- Okafor, C. A., Maina, J. J., Stephen, H., & Ohambele, C. C. (2016). Impact of school environments on academic performance: Feedback from secondary school students. *Joint International Conference (JIC) on 21st Century Human Habitat: Issues, Sustainability and Development*, 1175–1182.
- Okendu, J. N. (2012). The influence of instructional process and supervision on academic performance of secondary school students of River State, Nigeria. *Academic Research International*, 3(1), 332–339.
- Omodan, B. I., & Tsoetsi, C. T. (2018). Student-teacher relationships as a panacea for students' academic performance in Nigeria secondary schools: An attachment perspective. *Journal of Social Studies Education Research*, 9(4), 82–101. <https://doi.org/10.17499/jsser.19219>
- Opoku-Asare, N. A. A., & Siaw, A. O. (2015). Rural–Urban Disparity in Students' Academic Performance in Visual Arts Education: Evidence From Six Senior High Schools in Kumasi, Ghana. *SAGE Open*, 1–14. <https://doi.org/10.1177/2158244015612523>
- Opoku-Asare, N. A., Tachie-Menson, A., & Essel, H. B. (2015). Perceptions, attitudes and institutional factors that influence academic performance of visual arts students in Ghana's senior high school core curriculum subjects. *Education and Practice*, 6(21), 38–50.
- Opper, I. (2019). Teachers matter: Understanding teachers' impact on student achievement. In *RAND Education* (Vol. 1). RAND Corporation. <https://doi.org/10.7249/RR4312>
- Osher, D., Spier, E., Kelly, D., Tolani-Brown, N., Shors, L., Chen, C.-S., Jessee, C., Padilla, O., & Davis, J. (2009a). Child friendly schools programming: Global evaluation report. In *United Nations Children's Fund*. <https://doi.org/10.15580/GJER.2013.6.011813393>
- Osher, D., Spier, E., Kelly, D., Tolani-Brown, N., Shors, L., Chen, C.-S., Jessee, C., Padilla, O., & Davis, J. (2009b). Child friendly schools programming: Global evaluation report. In *United Nations Children's Fund*. <https://doi.org/10.15580/gjer.2013.6.011813393>
- Owusu, A. M., Milledzi, Y. E., Twum, A. E., & Gyambrah, M. (2018). Relationship between Parental Involvement and Academic Performance of Senior High School Students: The Case of Ashanti Mampong Municipality of Ghana. *American Journal of Educational Research*, 6(1), 1–8. <https://doi.org/10.12691/education-6-1-1>

- Parliament of the Republic of Ghana. (2008). Education act, 2008 (Act 778). In *Natlex* (pp. 1–21). Government of Ghana.
<http://www.ilo.org/dyn/natlex/docs/MONOGRAPH/83622/92463/F2061259086/GHA83622.pdf>
- Parliament of the Republic of Ghana. (2013). Ghana's constitution of 1992 with amendments through 1996. *Government of Ghana*, 1–150.
- Paulo, S., Shewbridge, C., Nusche, D., & Herzog, H.-D. (2009). Evaluation and assessment frameworks for improving school outcomes: Common policy challenges. *Education and Training Policy*, 21, 1–10. <https://www.oecd.org/education/school/46927511.pdf>
- Peel, D. (2005). The significance of behavioural learning theory to the development of effective coaching practice. *International Journal of Evidence Based Coaching and Mentoring*, 3(1), 18–28.
<http://www.business.brookes.ac.uk/research/areas/coaching&mentoring/>
- Pelgrum, W. . (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers & Education*, 37(2), 163–178.
[https://doi.org/10.1016/S0360-1315\(01\)00045-8](https://doi.org/10.1016/S0360-1315(01)00045-8)
- Peng, P., & Kievit, R. A. (2020). The development of academic achievement and cognitive abilities: A bidirectional perspective. *Child Development Perspectives*, 14(1), 15–20.
<https://doi.org/10.1111/cdep.12352>
- Petersen, G. J., & Young, M. D. (2004). The no child left behind act and its influence on current and future district leaders. *Journal of Law & Education*, 33(3), 343–363.
<http://search.ebscohost.com/login.aspx?direct=true&db=ejh&AN=13921275&site=ehost-live>
- Pianta, R. C., & Hamre, B. K. (2009). Conceptualization, Measurement, and Conceptualization, measurement, and improvement of classroom processes: Standardized observation can leverage capacity. *Educational Researcher*, 38(2), 109–119. <https://doi.org/10.3102/0013189X09332374>
- Pietarinen, J., Soini, T., & Pyhältö, K. (2014). Students' emotional and cognitive engagement as the determinants of well-being and achievement in school. *International Journal of Educational Research*, 67, 40–51. <https://doi.org/10.1016/j.ijer.2014.05.001>

- Pobbi, M. A., Kor, J., & Opare, J. K. (2018). The impact of school climate on academic performance: A case of Ghanaian schools. *Journal of Education and Practice*, 9(22), 83–93.
- Poku, J., Aawaar, G. M., & Worae, T. A. (2013). Educational sector reforms in Ghana: A review. *Global Research Journal of Education*, 3(2), 20–31.
<http://www.globalresearchjournals.org/journal/grje>
- Powell, W. W., & Snellman, K. (2004). The knowledge economy. *Annual Review of Sociology*, 30(1), 199–220. <https://doi.org/10.1146/annurev.soc.29.010202.100037>
- Pradeep, S. G., Vetrivel, S., & Raju, B. R. V. R. (2016). Approach for integrating ICT in teaching-learning process. *International Journal of Trend in Research and Development*, 3(5), 153–155.
- President’s Committee on Review of Education Reforms. (2002). *Meeting the challenges of education in the twenty first century: Report of the President’s committee on review of education reforms in Ghana*. Adwinsa Publications (Gh) Ltd.
- Prince, M. J., & Felder, R. M. (2006). Inductive teaching and learning methods: Definitions, comparisons, and research bases. *Journal of Engineering Education*, 95(2), 123–138.
<https://doi.org/10.1002/j.2168-9830.2006.tb00884.x>
- Rahimi, A., & Ebrahimi, N. A. (2011). Constructivist vs. objectivist learning environments. *Contemporary Online Language Education Journal*, 89–103.
- Realyvásquez-Vargas, A., Maldonado-Macías, A. A., Arredondo-Soto, K. C., Baez-Lopez, Y., Carrillo-Gutiérrez, T., & Hernández-Escobedo, G. (2020). The Impact of Environmental Factors on Academic Performance of University Students Taking Online Classes during the COVID-19 Pandemic in Mexico. *Sustainability*, 12(21), 1–22.
<https://doi.org/10.3390/su12219194>
- Republic of Ghana. (2008). *Education act 778 (Act 778)* (pp. 1–21). Parliament of the Republic of Ghana. <https://sapghana.com/data/documents/Education-Act-778.pdf>
- Revathi, G., Elavarasi, S., & Saravanan, K. (2019). Innovative methods of teaching and learning. *Journal of Emerging Technologies and Innovative Research*, 6(5), 159–163.
- Richards, J. C., & Rodgers, T. S. (2001). Approaches and methods in language teaching. In Cj. C. Richards & T. S. Rodgers (Eds.), *System* (2nd ed., Vol. 15, Issue 3). Cambridge

- University Press. [https://doi.org/10.1016/0346-251X\(87\)90017-0](https://doi.org/10.1016/0346-251X(87)90017-0)
- Richardson, C., & Mishra, P. (2018). Learning environments that support student creativity: Developing the SCALE. *Thinking Skills and Creativity*, 27, 45–54. <https://doi.org/10.1016/j.tsc.2017.11.004>
- Right to Education Project. (2012). *Right to education country factsheet GhanaProject*. https://www.right-to-education.org/sites/right-to-education.org/files/resource-attachments/RTE_Country_Factsheet_Ghana_2012.pdf
- Rijn, S. van, Urbanus, E., & Swaab, H. (2019). Eyetracking measures of social attention in young children: How gaze patterns translate to real-life social behaviors. *Social Development*, 28(3), 564–580. <https://doi.org/10.1111/sode.12350>
- Roach, E. (2019). Education in Ghana. *World Education News Reviews*, 1–22. <https://wenr.wes.org/2019/04/education-in-ghana>
- Roopa, S., & Rani, M. (2012). Questionnaire designing for a survey. *The Journal of Indian Orthodontic Society*, 46(December), 273–277. <https://doi.org/10.5005/jp-journals-10021-1104>
- Roorda, D. L., Koomen, H. M. Y., Spilt, J. L., & Oort, F. J. (2011). The influence of affective teacher–student relationships on students’ school engagement and achievement. *Review of Educational Research*, 81(4), 493–529. <https://doi.org/10.3102/0034654311421793>
- Rubie-Davies, C. M. (2015). Learning environment: The influence of school and classroom space on education. *The Routledge International Handbook of Social Psychology of the Classroom*, 252–262. <https://doi.org/10.4324/9781315716923>
- Rudasill, K. M., Snyder, K. E., Levinson, H., & Adelson, J. L. (2018). Systems view of school climate: A theoretical framework for research. *Educational Psychology Review*, 30(1), 35–60. <https://doi.org/10.1007/s10648-017-9401-y>
- Ruzek, E. A., Hafen, C. A., Allen, J. P., Gregory, A., Mikami, A. Y., & Pianta, R. C. (2016). How teacher emotional support motivates students: The mediating roles of perceived peer relatedness, autonomy support, and competence. *Learning and Instruction*, 42, 95–103. <https://doi.org/10.1016/j.learninstruc.2016.01.004>
- Ryan, A. M., & Patrick, H. (2001). The classroom social environment and changes in adolescents’ motivation and engagement during middle school. *American Educational*

- Research Journal*, 38(2), 437–460. <https://doi.org/10.3102/00028312038002437>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Sabol, T. J., & Pianta, R. C. (2012). Recent trends in research on teacher–child relationships. *Attachment & Human Development*, 14(3), 213–231. <https://doi.org/10.1080/14616734.2012.672262>
- Saleem, M., Adeeb, M., Hafeez, S., Siddique, A. R., & Qasim, A. (2018). Academic support and academic achievement of university students: Mediating role of academic stress. *Journal of Research and Reviews in Social Sciences Pakistan*, 1(1), 72–81.
- Santos, M. A., Godás, A., Ferraces, M. J., & Lorenzo, M. (2016). Academic performance of native and immigrant students: A study focused on the perception of family support and control, School Satisfaction, and learning environment. *Frontiers in Psychology*, 7, 1–12. <https://doi.org/10.3389/fpsyg.2016.01560>
- Schreurs, J., & Dumbraveanu, R. (2014). A shift from teacher centered to learner centered approach. *International Journal of Engineering Pedagogy*, 4(3), 1–7. <https://doi.org/10.3991/ijep.v4i3.3395>
- Schunk, D. H. (2012). *Learning theories: An educational perspective* (P. Smith & M. Buchholz (eds.); 6th ed.). Pearson Education, Inc.
- Seginer, R. (2006). Parents' educational involvement: A developmental ecology perspective. *Parenting: Science and Practice*, 6(1), 1–48. https://doi.org/10.1207/s15327922par0601_1
- Serin, H. (2018). A comparison of teacher-centered and student-centered approaches in educational settings. *International Journal of Social Sciences & Educational Studies*, 5(1), 164–167. <https://doi.org/10.23918/ijsses.v5i1p164>
- Shacham, M., & Od-Cohen, Y. (2009). Rethinking PhD learning incorporating communities of practice. *Innovations in Education and Teaching International*, 46(3), 279–292. <https://doi.org/10.1080/14703290903069019>
- Shahzadi, E., & Ahmad, Z. (2011). A study on academic performance of university students. *8th International Conference on Recent Advances in Statistics*, 255–268.

<https://doi.org/10.13140/2.1.3949.3126>

- Shen, J. (1999). Connecting educational theory, research, and practice: A comprehensive review of John I. Goodlad's publication. *Journal of Thought*, 34(4), 24–96.
- Shrestha, U., Williams, T. P., Al- Samer, S., Alies, G. Van, & Zaidi, A. (2019). *What is the relationship between politics, education reforms, and learning? Evidence from a new database and nine case studies*. <https://doi.org/10.13140/RG.2.2.25279.05286>
- Shute, V. J., Sun, C., & Asbell-Clarke, J. (2017). Demystifying computational thinking. In *Educational Research Review* (Vol. 22, pp. 142–158). <https://doi.org/10.1016/j.edurev.2017.09.003>
- Sim, J., & Wright, C. C. (2005). The kappa statistic in reliability studies: Use, interpretation, and sample size requirements. *Physical Therapy*, 85(3), 257–268. <https://doi.org/10.1093/ptj/85.3.257>
- Simpson, R. L., Lacava, P. G., & Graner, P. S. (2004). The no child left behind act: Challenges and implications for educators. *Intervention in School and Clinic*, 40(2), 67–75. <https://doi.org/10.1177/10534512040400020101>
- Sjøberg, S. (2010). Constructivism and learning. In *International Encyclopedia of Education* (Vol. 5, pp. 485–490). Elsevier. <https://doi.org/10.1016/B978-0-08-044894-7.00467-X>
- Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology*, 100(4), 765–781. <https://doi.org/10.1037/a0012840>
- Smit, K., de Brabander, C. J., & Martens, R. L. (2014). Student-centred and teacher-centred learning environment in pre-vocational secondary education: Psychological needs, and motivation. *Scandinavian Journal of Educational Research*, 58(6), 695–712. <https://doi.org/10.1080/00313831.2013.821090>
- Sookoo-Singh, N., & Boisselle, L. N. (2018). How does the “flipped classroom model” impact on student motivation and academic achievement in a chemistry classroom? *Science Education International*, 29(4), 201–212. <https://files.eric.ed.gov/fulltext/EJ1205443.pdf>
- Spilt, J. L., Koomen, H. M. Y., & Thijs, J. T. (2011). Teacher wellbeing: The importance of teacher-student relationships. *Educational Psychology Review*, 23(4), 457–477.

<https://doi.org/10.1007/s10648-011-9170-y>

Spröte, W. (2019). Special edition: Progress towards the sustainable development goals. In *A Concise Encyclopedia of the United Nations: Vol. E/2019/68*. Brill | Nijhoff.

<https://doi.org/10.1163/ej.9789004180048.i-962.115>

Statistical Service (GSS), Ghana Health Service (GHS), and I. I. (2015). *Ghana Demographic and Health Survey 2014* (p. 355). GSS, GHS, and ICF International.

Stemler, S. E., Bebell, D., & Sonnabend, L. A. (2011). Using school mission statements for reflection and research. *Educational Administration Quarterly*, *47*(2), 383–420.

<https://doi.org/10.1177/0013161X10387590>

Suhendi, A., & Purwarno. (2018). Constructivist learning theory: The contribution to foreign language learning and teaching. *KnE Social Sciences*, *3*(4), 87–95.

<https://doi.org/10.18502/kss.v3i4.1921>

Suleman, Q., & Hussain, I. (2014). Effects of classroom physical environment on the academic achievement scores of secondary school students in Kohat Division, Pakistan. *International Journal of Learning and Development*, *4*(1), 71–82.

<https://doi.org/10.5296/ijld.v4i1.5174>

Sun, P., & Feng, Z. (2006). Compact planar monopole antenna with ground branch for GSM/DCS/PCS/IMT2000 operation. *Microwave and Optical Technology Letters*, *48*(4), 719–721.

<https://doi.org/10.1002/mop.21454>

Syomwene, A., Kitainge, K., & Mwaka, M. (2013). Psychological influences in the curriculum decision making process. *Journal of Education and Practice*, *4*(8), 173–181.

Taber, K. S. (2006). Beyond constructivism: The progressive research programme into learning science. *Studies in Science Education*, *42*(1), 125–184.

<https://doi.org/10.1080/03057260608560222>

Takyi, S. A., Amponsah, O., Asibey, M. O., & Ayambire, R. A. (2019). An overview of Ghana's educational system and its implication for educational equity. *International Journal of Leadership in Education*, *24*(2), 157–182.

<https://doi.org/10.1080/13603124.2019.1613565>

Tamanja, E., & Pajibo, E. (2019a). Ghana's free senior high school policy: Evidence and insight from data. *EduLearn19 Conference Proceedings*, *1*, 7837–7846.

<https://doi.org/10.21125/edulearn.2019.1906>

Tamanja, E., & Pajibo, E. (2019b). Ghana's free senior high school policy: Evidence and insight from data. *EDULEARN19 Conference Proceedings, 1*, 7837–7846.

<https://doi.org/10.21125/edulearn.2019.1906>

Tang, T. L. P., & Austin, M. J. (2009). Students' perceptions of teaching technologies, application of technologies, and academic performance. *Computers and Education, 53*(4), 1241–1255. <https://doi.org/10.1016/j.compedu.2009.06.007>

Taras, M. (2007). Assessment for learning: Understanding theory to improve practice.

Journal of Further and Higher Education, 31(4), 363–371.

<https://doi.org/10.1080/03098770701625746>

Tasheva, Z., & Bogdanov, R. (2018). A relationship between cognitive information processing in learning theory and machine learning techniques in cognitive radios. *Society, Integration, Education: Proceedings of the International Scientific Conference, 5*, 465–474. <https://doi.org/10.17770/sie2018vol1.3191>

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2*, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>

Taylor, R. D., & Gebre, A. (2016). Teacher-student relationships and personalized learning: Implications of person and contextual variables. In M. Murphy, S. Redding, & J. Twyman (Eds.), *Handbook on personalized learning for states, districts, and schools*. Temple University, Center on Innovations in Learning.

www.centeril.org
www.centeril.org

The World Bank. (2017a). Enhancing urban resilience in the Greater Accra metropolitan area. *Global Practice on Social, Urban, Rural and Resilience, 1–118*.

www.worldbank.org/urban

The World Bank. (2017b). *International development association project paper on a proposed additional financing credit to the Republic of Ghana for the secondary education improvement project* (pp. 1–78). Education Global Practice, Africa Region.

<http://documents1.worldbank.org/curated/en/997201498874510564/pdf/Ghana-Education-PAD-06092017.pdf>

Theodotou, E. (2014). Early years education: Are young students intrinsically or extrinsically

- motivated towards school activities? A discussion about the effects of rewards on young children's learning. *Research in Teacher Education*, 4(1), 17–21.
<https://www.uel.ac.uk/wwwmedia/microsites/riste/Article-3-Evgenia-Theodotou.pdf>
- Thiede, K. W., Brendefur, J. L., Osguthorpe, R. D., Carney, M. B., Bremner, A., Strother, S., Oswald, S., Snow, J. L., Sutton, J., & Jesse, D. (2015). Can teachers accurately predict student performance? *Teaching and Teacher Education*, 49, 36–44.
<https://doi.org/10.1016/j.tate.2015.01.012>
- Thompson, N. M., & Casely-Hayford, L. (2008). *The financing and outcomes of education in Ghana* (WP08/16; Recoup Working Paper 16, Issue 16).
<http://ceid.educ.cam.ac.uk/publications/WP16.pdf>
- Tierney, R. D. (2013). Fairness in classroom assessment. In J. H. McMillan (Ed.), *SAGE Handbook of Research on Classroom Assessment* (pp. 124–144). SAGE Publications, Inc. <https://doi.org/10.4135/9781452218649.n8>
- Tomaschek, F., Hendrix, P., & Baayen, R. H. (2018). Strategies for addressing collinearity in multivariate linguistic data. *Journal of Phonetics*, 71, 249–267.
<https://doi.org/10.1016/j.wocn.2018.09.004>
- Tondeur, J., Cooper, M., & Newhouse, C. P. (2010). From ICT coordination to ICT integration: A longitudinal case study. *Journal of Computer Assisted Learning*, 26(4), 296–306. <https://doi.org/10.1111/j.1365-2729.2010.00351.x>
- Türkkahraman, M. (2012). The role of education in the societal development. *Journal of Educational and Instructional Studies in the World*, 2(4), 38–41.
<http://www.wjeis.org/FileUpload/ds217232/File/04.turkkahraman.pdf>
- Turner, K. (2019). One-to-one learning and self-determination theory. *International Journal of Instruction*, 12(2), 1–16. <https://doi.org/10.29333/iji.2019.1221a>
- Uline, C., & Tschannen-Moran, M. (2008). The walls speak: The interplay of quality facilities, school climate, and student achievement. *Journal of Educational Administration*, 46(1), 55–73. <https://doi.org/10.1108/09578230810849817>
- Umar, I. N., & Jalil, N. A. (2012). ICT skills, practices and barriers of its use among secondary school students. *Procedia - Social and Behavioral Sciences*, 46, 5672–5676.
<https://doi.org/10.1016/j.sbspro.2012.06.494>

- UNESCO. (2012a). *A place to learn: Lessons from research on learning environments* (Technical Paper 9). UNESCO Institute for Statistics.
<http://uis.unesco.org/sites/default/files/documents/a-place-to-learn-lessons-from-research-on-learning-environments-2012-en.pdf>
- UNESCO. (2012b). World trends in education issues and trends in education for sustainable development. In A. Leicht, J. Heiss, & W. J. Byun (Eds.), *Education on the Move*. UNESCO Publishing. <https://doi.org/10.3726/978-3-653-04538-3>
- UNESCO. (2013). Why every child deserves a quality education. *The Global Learning Crisis*, 1–20. <https://unesdoc.unesco.org/ark:/48223/pf0000223826>
- UNESCO. (2018). ICT Transforming Education in Africa. *UNESCO-KFIT Project Update*, 1–10. <https://unesdoc.unesco.org/ark:/48223/pf0000265441>
- United Nations. (2016). *The sustainable development goals report 2017* (L. Jensen (ed.)). United Nations Publication.
https://doi.org/10.29171/azu_acku_pamphlet_k3240_s878_2016
- Urdan, T., Solek, M., & Schoenfelder, E. (2007). Students' perceptions of family influences on their academic motivation: A qualitative analysis. *European Journal of Psychology of Education*, 22(1), 7–21. <https://doi.org/10.1007/BF03173686>
- Viloria, A., & Parody, A. (2016). Methodology for Obtaining a Predictive Model Academic Methodology for obtaining a predictive model academic performance of students from first partial note and percentage of absence. *Indian Journal of Science and Technology*, 9(46), 1–5. <https://doi.org/10.17485/ijst/2016/v9i46/107369>
- Vincent, E. O., & Udeme, T. A. (2014). Instructional strategies and students academic performance in electrical installation in technical colleges in Akwa Ibom State: Instructional skills for structuring appropriate learning experiences for students. *International Journal of Educational Administration and Policy Studies*, 6(5), 80–86. <https://doi.org/10.5897/ijeaps2014.0347>
- Viray, J. S. (2016). Parental involvement as predictor of student academic performance. *Imperial Journal of Interdisciplinary Research*, 2(6), 1379–1382.
<http://academicjournals.org/journal/IJEAPS/article-abstract/7C24C0745729>
- Vlaev, I., & Dolan, P. (2015). Action change theory: A reinforcement learning perspective on

- behavior change. *Review of General Psychology*, 19(1), 69–95.
<https://doi.org/10.1037/gpr0000029>
- Walberg, H. J., Fraser, B. J., & Welch, W. W. (1986). A test of a model of educational productivity among senior high school students. *The Journal of Educational Research*, 79(3), 133–139. <https://doi.org/10.1080/00220671.1986.10885664>
- Walberg, H. J., Haertel, G. D., Pascarella, E., Junker, L. K., & Boulanger, F. D. (1981). Probing a model of educational productivity in science with national assessment samples of early adolescents. *American Educational Research Journal*, 18(2), 233–249.
<https://doi.org/10.3102/00028312018002233>
- Wampold, B. E., & Freund, R. D. (1987). Use of multiple regression in counseling psychology research: A flexible data-analytic strategy. *Journal of Counseling Psychology*, 34(4), 372–382. <https://doi.org/10.1037/0022-0167.34.4.372>
- Wang, S. K., & Reeves, T. C. (2006). The effects of a web-based learning environment on student motivation in a high school earth science course. *Educational Technology Research and Development*, 54(6), 597–621. <https://doi.org/10.1007/s11423-006-0638-2>
- Weinstein, C. S. (1979). The physical environment of the school: A review of the research. *Review of Educational Research*, 49(4), 577–610.
<https://doi.org/10.3102/00346543049004577>
- Wenglinsky, H. (2002). How schools matter: The link between teacher classroom practices and students academic performance. *Education Policy Analysis Archives*, 10(12), 1–30.
- Werquin, P. (2010). Recognising non-formal and informal learning: Outcomes, policies and practices. In *OECD Publications*. <https://doi.org/10.1787/9789264063853-en>
- Wilson, S. M., & Peterson, P. L. (2006). Theories of learning and teaching: What do they mean for educators? In *Best Practices: NEA Research*.
<https://files.eric.ed.gov/fulltext/ED495823.pdf>
- Woollard, J. (2011). Psychology for the classroom: Behaviourism. In A. Pritchard & J. Woollard (Eds.), *Psychology for the Classroom Series* (1st ed.). Routledge.
<https://doi.org/10.4324/9780203819166>
- World Health Organization. (2004). *The physical school environment: An essential element of a health-promoting school* (pp. 1–57). WHO Information Series on School Health.

https://www.who.int/school_youth_health/media/en/physical_sch_environment.pdf?ua=1

- Xiong, R. (2019). Research on the Effects of Learning environment on Students' Academic Performance. *Proceedings of the 2019 4th International Conference on Information and Education Innovations - ICIEI 2019*, 91–94. <https://doi.org/10.1145/3345094.3345104>
- Xu, Z. Z., & Qi, C. (2019). The relationship between teacher-student relationship and academic achievement: The mediating role of self-efficacy. *Eurasia Journal of Mathematics, Science and Technology Education*, 15(10), 1–7. <https://doi.org/10.29333/ejmste/105610>
- Yahaya, A., Ee, N. S., Bachok, D. J., Yahaya, N., Boon, Y., Hashim, S., & Lee, G. M. (2012). The impact of emotional intelligence element on academic achievement. *Archives Des Sciences*, 65(4), 2–16.
- Yang, S. J. H., Lu, O. H. T., Huang, A. Y. Q., Huang, J. C. H., Ogata, H., & Lin, A. J. Q. (2018). Predicting students' academic performance using multiple linear regression and principal component analysis. *Journal of Information Processing*, 26, 170–176. <https://doi.org/10.2197/ipsjjip.26.170>
- Yilmaz, K. (2011). The cognitive perspective on learning: Its theoretical underpinnings and implications for classroom practices. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 84(5), 204–212. <https://doi.org/10.1080/00098655.2011.568989>
- Yong, A. G., & Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in Quantitative Methods for Psychology*, 9(2), 79–94. <https://doi.org/10.20982/tqmp.09.2.p079>
- Zhou, M., & Brown, D. (2017a). Educational learning theories. In M. Y. Zhou & D. Brown (Eds.), *Education Open Textbooks. 1* (2nd ed.). Educational Psychology Commons. <https://oer.galileo.usg.edu/education-textbooks/1>
- Zhou, M., & Brown, D. (2017b). Educational learning theories. In M. Y. Zhou & D. Brown (Eds.), *Education Open Textbooks. 1* (2nd ed.). Educational Psychology Commons. <https://oer.galileo.usg.edu/education-textbooks/1>
- Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning.

Journal of Educational Psychology, 81(3), 329–339. <https://doi.org/10.1037/0022-0663.81.3.329>

Zinskie, C. D., & Rea, D. (2016). The every student succeeds act (ESSA): What it means for educators of students at risk. *National Youth-At-Risk Journal*, 2(1), 1–9.
<https://doi.org/10.20429/nyarj.2016.020101>

Zullig, K. J., Collins, R., Ghani, N., Patton, J. M., Huebner, S. E., & Ajamie, J. (2014). Psychometric support of the school climate measure in a large, diverse sample of adolescents: A replication and extension. *Journal of School Health*, 84(2), 82–90.
<https://doi.org/10.1111/josh.12124>

Zullig, K. J., Huebner, E. S., & Patton, J. M. (2011). Relationships among school climate domains and school satisfaction. *Psychology in the Schools*, 48(2), 133–145.
<https://doi.org/10.1002/pits.20532>

Appendices

Appendix 1

Multiple comparisons of mean performance

(I) School	(J) School	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
School A SHS	School B Girls SHS	0.11928	0.20631	0.563	-0.2864	0.5250
	School C SHS	-0.37492*	0.18761	0.046	-0.7439	-0.0060
	School D SHS	0.01351	0.19622	0.945	-0.3724	0.3994
School B Girls SHS	School A SHS	-0.11928	0.20631	0.563	-0.5250	0.2864
	School C SHS	-0.49420*	0.18460	0.008	-0.8572	-0.1312
	School D SHS	-0.10577	0.19335	0.585	-0.4860	0.2744
School C SHS	School A SHS	0.37492*	0.18761	0.046	0.0060	0.7439
	School B Girls SHS	0.49420*	0.18460	0.008	0.1312	0.8572
	School D SHS	0.38843*	0.17326	0.026	0.0477	0.7291
School D SHS	School A SHS	-0.01351	0.19622	0.945	-0.3994	0.3724
	School B Girls SHS	0.10577	0.19335	0.585	-0.2744	0.4860
	School C SHS	-0.38843*	0.17326	0.026	-0.7291	-0.0477

Appendix 2

School learning environment and student academic performance questionnaire

- A. This section examines how you experience the learning environment in your school. Against each statement, kindly choose the best option about a statement which you think best describes how you feel by simply giving marks from 1 to 5:

1=Strongly Disagree (SD); 2=Disagree (D); 3= Somehow (S); 4=Agree(A); 5=Strongly Agree (SA)

	Student-Teacher Relationships.	SD	D	S	A	SA
1	All teachers in my school are approachable	1	2	3	4	5
2	My teachers seem to take a real interest in my future	1	2	3	4	5
3	Most teachers in my school care about the students	1	2	3	4	5
4	My teachers know my parents	1	2	3	4	5
5	It is easy for students to interact with teachers in my school.	1	2	3	4	5
6	My teachers know me by my name	1	2	3	4	5
7	Most teachers in the school make students love to be in school	1	2	3	4	5
8	In this school, all teachers pay attention to students' problems	1	2	3	4	5
9	My teachers make me feel good about myself	1	2	3	4	5
	Academic Support	SD	D	S	A	SA
10	Teachers in my school give homework after class	1	2	3	4	5
11	In my school, all teachers correct homework promptly	1	2	3	4	5
12	Teachers in my school expect students to learn hard	1	2	3	4	5
13	I feel that I can do well in this school	1	2	3	4	5
14	In my school, teachers check class attendance every day	1	2	3	4	5
15	My school organizes extra classes for students during every vacation	1	2	3	4	5
16	Classroom rules are applied equally to every student	1	2	3	4	5
17	School rules are clearly stated in students' admission letter.	1	2	3	4	5
18	Students get in trouble if they do not follow school rules.	1	2	3	4	5
19	In my school, any student who falls in trouble is given a chance to explain himself or herself	1	2	3	4	5
20	My school counselling unit is helpful to me	1	2	3	4	5

21	Most teachers in my school do not compromise when students misbehave in class	1	2	3	4	5
22	Discipline is strict in my school.	1	2	3	4	5
	School Physical Environment	SD	D	S	A	SA
23	All classrooms in my school have got furniture.	1	2	3	4	5
24	In my school the security men are strict	1	2	3	4	5
25	My school changes over to a generator plant always whenever the national electricity grid goes off	1	2	3	4	5
26	In my school students can get access to the school library at any time.	1	2	3	4	5
27	Different kinds of foods are sold in my school's canteen	1	2	3	4	5
28	My school has an entertainment hall.	1	2	3	4	5
29	My school has a sick bay	1	2	3	4	5
30	My school needs more boarding facilities.	1	2	3	4	5
	School Technical Environment	SD	D	S	A	SA
31	In my school, every classroom has whiteboard.	1	2	3	4	5
32	My school has an Information Communication Technology (ICT) laboratory.	1	2	3	4	5
33	My school has internet connectivity.	1	2	3	4	5
34	There are enough computers in the ICT laboratory for all students.	1	2	3	4	5
35	In my school most security men are strict.	1	2	3	4	5
36	In my school, students' academic results can be accessed online.	1	2	3	4	5
37	My school has a website.	1	2	3	4	5
38	Most information about my school can be found on the internet.	1	2	3	4	5
39	I read online books in my school library.	1	2	3	4	5
40	In my school, students are allowed to use their own laptop.	1	2	3	4	5

B. This section examines the instructional strategies that teachers use in teaching their lessons.

Please do select only one number in a box.

1=Strongly Disagree (SD); 2=Disagree (D); 3= Somehow (S); 4=Agree(A); 5=Strongly Agree (SA)

	Statements	SA	A	N	D	SD
1	All teachers expect students to be attentive in class	1	2	3	4	5
2	All teachers in my school encourage students to ask questions in class	1	2	3	4	5
3	All teachers demonstrate in class how we are expected to solve questions	1	2	3	4	5
4	Classes run mostly as teachers wish.	1	2	3	4	5
5	Most teachers give difficult tests to students to solve.	1	2	3	4	5
6	Most teachers give class test regularly.	1	2	3	4	5
7	Some teachers use object to explain what they are teaching.	1	2	3	4	5
8	In my school, some teachers use projectors.	1	2	3	4	5
9	Most teachers encourage us to read story books.	1	2	3	4	5
10	Teachers in my school generally like students to be curious.	1	2	3	4	5
11	Most teachers help us to select right materials for reading.	1	2	3	4	5
12	My teachers encourage me to participate in school competitions.	1	2	3	4	5
13	Our teachers only check students' learning through exams.	1	2	3	4	5
14	Most of my teachers give examples when teaching.	1	2	3	4	5
15	All teachers in my school come to class on time.	1	2	3	4	5
16	Most teachers in my school do not come to class regularly.	1	2	3	4	5
17	My teachers help us develop interest in their subject	1	2	3	4	5
18	Most teachers in our school encourage students to do homework on their own.	1	2	3	4	5
19	Most teachers in the school make the class lively.	1	2	3	4	5
20	My school has computer for students' use.	1	2	3	4	5
21	Most teachers live in the school bungalow.	1	2	3	4	5

22	Teachers in my school give good remarks when students excel in their tests.	1	2	3	4	5
23	Teachers in my school make time to help students who do not do well in class tests.	1	2	3	4	5
24	Teachers consider our actual knowledge level about a topic.	1	2	3	4	5
25	My school encourages students who have learning difficulties to approach their teachers for help.	1	2	3	4	5
26	Most teachers in my school create relax discussion atmosphere for students to state their views freely.	1	2	3	4	5
27	Most teachers in my school repeat lessons that students find difficult to understand.	1	2	3	4	5
28	Teachers in my school expect students not to skip class.	1	2	3	4	5
29	In my school, students respect each other's views in class.	1	2	3	4	5
30	Teachers in my school teach students how to apply what they learn during examination.	1	2	3	4	5
31	Teachers prevent actions that distract the flow of lesson.	1	2	3	4	5
32	Some of our teachers check attendance during evening prep.	1	2	3	4	5

C. This section examines how you feel your parents/guardians have been involved in your life and school. Please indicate how often your parents/guardians perform the following activities using the following response format:

AR = Almost Never, R = Rarely, S = Sometimes, O = Often, RO = Rather Often

	Parental Home Involvement	AR	R	S	O	RO
1	My parents help me do my homework.	1	2	3	4	5
2	My parents check my report card regularly.	1	2	3	4	5
3	My parents know most of my teachers.	1	2	3	4	5
4	My parents restrict my leisure activities anytime I make a poor grade.	1	2	3	4	5
5	My parents are concerned about my future.	1	2	3	4	5
6	My parents discuss my school progress with me.	1	2	3	4	5

7	My parents provide for my needs.	1	2	3	4	5
8	My parents buy me books which teachers recommend to me.	1	2	3	4	5
9	Whenever I perform poorly, my parents become unhappy	1	2	3	4	5
	My parents give me gifts when I make a good grade	1	2	3	4	5
10	My parents understand my learning challenges	1	2	3	4	5
11	My parents always encourage me to learn harder.	1	2	3	4	5
	Parental School Involvement	AR	R	S	O	RO
12	My parents attend my school's PTA meetings	1	2	3	4	5
13	My parents provide me with a quiet space to study when I am home.	1	2	3	4	5
14	My parents plan my study time when I am on holidays	1	2	3	4	5
15	My parents are happy with the level of discipline in my school	1	2	3	4	5
16	My parents discuss my school progress with my teachers	1	2	3	4	5
17	My parents are nice to me when I am home.	1	2	3	4	5

D. This section examines how you think your performance has been using the West African Examination Council's (WAEC) grading system.

Grade	Interpretation	Equivalent in numeric value
A1	80% - 100%	1
B2	70% - 79%	2
B3	65% - 69%	3
C4	60% - 64%	4
C5	55% - 59%	5
C6	50% - 54%	6
D7	45% - 49%	7
E8	40% - 44%	8
F9	0% - 39%	9

Appendix 3

Request to School Heads for Inclusion in the Study

Eötvös Loránd University
Faculty of Education and Psychology
1075 Budapest
Kazinczi u. 23-27
Hungary
September 1, 2018.

The Headmaster
School's address

Dear Sir/Madam,

REQUEST FOR INCLUSION IN A STUDY

I am a PhD student in Educational Sciences at the above university and researching on the impact of the school learning environment on students' academic performance in Ghana under the supervision of Professor Csizér Kata, PhD, habil.

The study aims to find out how school learning environment indicators interplay to influence the academic performance of students in Senior High Schools (SHS). The project requires that your students fill questionnaire that may take approximately 20 minutes. Participation is voluntary and would be glad if your school can take part in the study. You can withdraw from the study at any time without any legal obligation. The data gathered will strictly be confidential.

The study received ethical clearance by Ethical Committee of the Eötvös Loránd University, faculty of Education and Psychology. If you have questions for the Committee, please contact them on keb@ppk.elte.hu For any other questions, kindly contact Richard Akrofi Kwabena Baafi, richard.baafi@ppk.elte.hu

We would grateful if our request is granted.

Thank you.

Yours faithfully,

.....

Richard Akrofi Kwabena Baafi.
(PhD Candidate)

Appendix 4

Participant consent declaration

The study on the impact of the school learning environment students' academic performance aims to find out how school learning environment indicators interplay to influence academic performance in senior high schools. Your participation in the study is free and voluntary. You can withdraw at any time without any saction. The study involves survey that you fill. The filling may take approximately 20 minutes. The data gathered will strictly be confidential.

For you to participate you would need to sign this consent form indicating that you have read and agreed to participate in this study freely. Should you choose to participate, you will be required to fill this questionnaire. Specific guidelines and instructions are provided to guide you. Please do well not to skip any of the questions. There is no right or wrong answer.

Please sign here if you consent to participate in the study

Signature

Date

Appendix 5

Ethical approval certificate

EÖTVÖS LORÁND TUDOMÁNYEGYETEM
PEDAGÓGIAI ÉS
PSZICHOLÓGIAI KAR
KUTATÁSETIKAI BIZOTTSÁG



EÖTVÖS LORÁND UNIVERSITY
FACULTY OF EDUCATION
AND PSYCHOLOGY
RESEARCH ETHICS COMMITTEE

Reference number: 2018/267

Research Ethics Application Approval

Name of the Principal Investigator:	CSIZÉR KATA
His/her academic degree:	PhD. habil.
His/her workplace:	ELTE- Faculty of Humanities (BTK)
His/ her job title:	Associate Professor
His/her e-mail address:	Wein.katalin@btk.elte.hu
Title of the research:	The impact of school learning environment on the academic performance of students in Ghana.
Further researchers (e.g. student):	Richard Akrofi Kwabena Baafi
Expected dates of the beginning and the end of the research:	September 2018 to December, 2018.

The Research Ethics Committee of the Faculty of Pedagogy and Psychology (ELTE) grants permission to carry out the above study. This decision is based on the evaluation of the referenced Application submitted to the Research Ethics Committee. The permission granted by the Research Ethics Committee of the Faculty of Pedagogy and Psychology of ELTE will become effective on the condition that the appropriate authorities outside Hungary will also approve it.

Budapest, 24. 09. 2018.

Research Ethics Committee
Chair or Acting Member

Eötvös Loránd University
Faculty of Education and Psychology
Research Ethics Committee
H-1064 Budapest, Izabella u. 46.

H-1064 Budapest, Izabella u. 46. • telephone: (36-1) 209-0619
e-mail: keb@ppk.elte.hu • www.ppk-keb.elte.hu