UNIVERSITY OF EDUCATION, WINNEBA

DIFFERENCES IN JUNIOR HIGH SCHOOL STUDENTS' PERCEPTION OF SCHOOL, TEACHER AND STUDENT FACTORS INHIBITING THEIR PERFORMANCE IN MATHEMATICS

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A thesis in the Department of Mathematics Education, Faculty of Science Education, submitted to the School of Graduate Studies in partial fulfilment of the requirements for the award of the degree of

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DECLARATION

Student's Declaration

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

SIGNATURE: ……..

DATE: ……

Supervisor's Declaration

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

SUPERVISOR'S NAME: DR. GLORIA ARMAH

SIGNATURE: ……

DATE: ……

DEDICATION

To my daughter Peace Apreku

ACKNOWLEDGEMENTS

I am grateful to my supervisor Dr. Gloria Armah for guiding me to complete this research successfully. I acknowledge the help I had from the CEO and staff of Abba Father Communication. To all who in diverse ways contributed to the success of my education I say may the good Lord richly bless you all.

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ABSTRACT

The study was conducted to investigate junior high school students‟ perception of school factors, student factors, and teacher factors inhibiting students‟ academic performance in Mathematics. The study was a descriptive survey with sample of one hundred and twenty-six respondents selected randomly from the three hundred and twenty-six students of Asokore SDA College Demonstration Junior High School, Koforidua. The researcher administered a closed-ended questionnaire personally to gather data for the study. The study found that students‟ perception of school factors inhibiting their academic performance in Mathematics included good seating arrangement, the type of school either public or private, and class size. Also, the students‟ perception of student factors inhibiting their academic performance in Mathematics included gender of students, attitude of students towards studying mathematics, and parental education of students. In addition, the junior high school students‟ perception of teacher factors inhibiting their academic performance in Mathematics included teacher absenteeism, teacher lateness, and shortage of qualified mathematics teachers. The study concluded that any attempt at improving upon the academic performance of students in Mathematics at the junior high school should consider school related factors, student related factors and teacher related factors. Based on the findings of the study, it is recommended that teachers of Asokore SDA College Demonstration Junior High School, Koforidua through the school‟s Parent Teacher Association (PTA) need to educate and motivate students to adopt positive attitude towards the studying of Mathematics. Also, the head teacher of Asokore SDA College Demonstration Junior High School, Koforidua need to put in place mechanisms to supervise teacher attendance and punctuality to school.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter discusses areas of the first chapter of the study such as the background, statement of the problem, purpose of the study, objectives and research questions. The rest are the significance of the study, delimitation of the study, limitations of the study and organization of the rest of the study.

1.1 Background to the Study

Globally, education is fundamental in the development of human capital and has been viewed principally in the light of a fundamental human right (Kyalo et al., 2006) as well as being the cradle of mankind. Education continues to play a significant role in imparting knowledge to many people. This indicates a good future life for many people. Many high performing schools often attribute their "excellent students" performances" to students" hard work and discipline in the schools (Wasike et al., 2013).

Academic performance could be defined as the display of knowledge attained or skill developed in school subjects designated by test and examination scores or marks assigned by the subject teachers (Wasike et al., 2013). Academic performance could also be said to be any expression used to represent students" scholastic standing. Researchers, psychologists, and educators alike, have identified some of the variables that have effects on students" academic performances. An individual"s inherent potentials in terms of intelligence combined with other sociological factors refers to academic performance. Ojerinde (2009) identified personality factors such as anxiety, achievement, motivation, and level of interest as factors that affect academic

performance. The consistence of these claims was asserted by Ford (2010) by claiming that student with high self-efficacy received higher grades than those with low self-efficacy. In addition, students with negative self-concept have poor academic performance. Moreover, academic performance is a facet of many interrelated variables key among them is the inherent student‟s effort, teacher‟s inputs, school environment, and student‟s perception. Despite various efforts to improve academic performance, some schools continue to perform dismally in national examinations and therefore most students from such schools fails to secure admissions to higher learning institutions (Saha, 2007).

Perception refers to the way people judge others with whom they are in contact. A person‟s attitude towards an idea or object determines what the person thinks and feels. How a person would like to behave towards an idea or object is determined by the person‟s perception. Therefore, students‟ perception of their teachers‟ qualification could influence their attitudes towards learning Mathematics or any other school subject. Etuk et al. (2013) noted that students more often than not judge their teachers in such areas as the teachers‟ knowledge of the subject matter, communication ability, and choice of appropriate teaching method. A teacher who is rated high on these indices in the perception of his or her students is likely to enjoy the confidence, respect, and admiration of his/her students and vice versa. The way students perceive a subject determines their success or failure in that subject. Some students perceive Mathematics as a no go area because of the negative impression passed down to them by the past generations who had had experience with unqualified Mathematics teachers. Such students may perceive that Mathematics is the most difficult subject studied in school, it is not meant for everybody, not everybody passes it, and it is meant for students with special talent (Dauda et al.,

2016). On hearing all these negative expressions before getting admission into school, the child psychologically develops fear for the subject. Ale (1989) coined the term "Math phobia" for the condition that these negative notions (fear followed by low productivity and consequently leads to low achievement in Mathematics) lead to.

Perception can be defined from physical, psychological, and physiological perspectives. Wasike et al., (2013) pointed out that perception is the way we judge or evaluate others. That is, the way individuals evaluate people with whom they are familiar with in everyday life. Eggen and Kauchak (2002) gave a cognitive dimension of perception. According to Eggen and Kauchak, perception is the process by which people attach meaning to experiences. Eggen and Kauchak, further explained that after people attend to certain stimuli in their sensory memories, processing continues with perception. Perception is critical because it influences the information that enters the working memory. Background knowledge in the form of schemas affects perception. Research findings have corroborated this claim that background knowledge resulting from experience strongly influence perception (Wasike et al., 2013). Thus, perception is the reaction elicited when an impression is perceived after making connection with other materials in the conscious mind (memory).

From the foregone viewpoints, two implications could be deduced. First, perception cannot be done in vacuum thus, it depends on some background information that will trigger a reaction. Students‟ perception of teachers‟ knowledge of subject matter, attitudes to work and teaching skills is dependent on the fact that they have been taught by the teachers under evaluation and are familiar with them. Hence, they have their minds already pre-occupied with memories and reactions that inventory for data collection will measure. Second, perception may be energized by

both the present and past experiences, individual attitude at a particular moment, the physical state of the sense organ, the interest of the person, the level of attention, and the interpretation given to the perception. From evidences available, it‟s been established why teachers‟ knowledge of subject matter is highly essential for effective teaching. It‟s confirmed that teachers‟ teaching is influenced by the level of his/her pedagogical knowledge as different from his/her subject matter knowledge. It is to be noted that pedagogical knowledge is not exactly the same thing as knowledge of subject matter, they nevertheless are, intimately linked with it because teachers‟ mastery and use of them in the classroom will indicate the depth of their knowledge of subject matter (Wasike et al., 2013).

According to Weaver-Hightower (2003), several researchers worldwide have discussed Mathematics as a gateway subject that separates students despite their social background and gender. Some of the research on students‟ performance in Mathematics have highlighted a traditional gender gap in favour of boys (Marsh et al., 2008) while other researchers including Lindberg et al. (2010) have concluded that the gender gap in Mathematics are insignificant. Despite the inconsistencies in research findings on students‟ performance in Mathematics, Robinson and Lubienski (2011) showed that girls have obtained slightly better grades in Mathematics over the last four decades than boys.

According to Samuelsson and Samuelsson (2016), explanations for the gender gap between boys‟ and girls‟ performances in Mathematics have focused on different factors. Traditionally, girls‟ lower performance in Mathematics was explained as relating to both internal and external contextual factors including lower perceived support for learning Mathematics (Eccles, 2011). Other studies attributed girls‟ drop

in performance to their Mathematics feelings that their classrooms were unattractive, uncomfortable and hostile. Riegle-Crumb et al. (2006) reported that the factors of importance for girls‟ performance in Mathematics were teacher and peer support. Such results concerning Mathematics are supported by general findings indicating that teacher and peer support positively connected to academic attitudes, achievement, emotions, learning, motivation and self-efficacy (Danielsen et al., 2010).

Gherasim et al. (2013) found gender differences in such variables as achievement goals, classroom environments, and achievement in Mathematics among young adolescents showing that girls obtained higher grades in Mathematics than boys. Shim et al. (2008) found that girls reported higher classroom support, lower performance-avoidance goals, and more mastery of learning materials. Jones and Young (1995) studied students‟ attitudes and found that boys had more favourable attitudes towards Mathematics and Science than girls. As a follow up study, Frenzel et al. (2007) researched into students‟ emotions towards Mathematics and found that girls experienced less enjoyment and pride than boys. On the other hand, boys experienced less anxiety and less hopelessness towards Mathematics than girls.

In any culture of the different countries around the world, there is a widespread stereotype that the study of Mathematics is linked to males with the perception that Mathematics is for males (Peteros et al., 2020). In addition, Cvencek et al. (2015) argued that this perception has resulted in the underrepresentation of women in the field of Science, Engineering, and Mathematics. This stereotype has been influential in the educational interests and career choices of children (Cheryan et al., 2015). Moreover, the perception of the society about gender on the Mathematics skills among boys and girls leads to the difference in the identification of their skills

and interests at their very young ages (Cvencek et al., 2011). This could influence students‟ interests and perceptions towards their abilities in performing tasks related to the subject.

Farrington et al., (2012) were of the opinion that students‟ self-perceptions about their academic abilities are vital in their effort to adjust with their school tasks and responsibilities. This is because these perceptions could influence the efforts students exert in their school work. Students who perceive that they are skilful in a particular subject are likely to perform well in that field than those who perceive that they have low skills (Hannover & Kessels, 2004). The academic performance of students who have lesser interest in doing a particular task would be negatively affected. On the other hand, students who have high self-concept on a particular subject are likely to perform well in whatever related tasks they are given and brings positive effects on their performance in the subject. Hence, Khalaila (2015) asserted that a student with high academic self-concept is more likely to have better academic achievements.

According to Kamoru and Ramon (2017), researchers had reported that boys have more positive self-concept than girls in Mathematics. Also, Kamoru and Ramon, observed that boys outperform girls in standardized tests in Mathematics but girls perform better when specific tests are given to measure their knowledge and understanding on the topics discussed (Ganley et al., 2013). Globally, several established results exist to prove that boys perform better than girls in Mathematics (Peteros et al., 2020) however, further research is needed locally to affirm or contradict previous findings documented in literature. There is therefore the need to conduct this study to contribute literature to the discussion on gender differences in

junior high school students‟ perception of school, teacher, and student factors inhibiting their performance in Mathematics in the New Juaben Municipality.

1.2 Statement of the Problem

According to Ajai and Imoko (2015), various studies have been undertaken to examine factors that influence gendered achievement in Mathematics. Many of such studies (Zhu, 2007; Abiam & Odok, 2006) focused on factors related to differences in the performance of boys and girls in Mathematics. Feminist researchers (Jungwirth, 1991) have tried to make meaning of the experiences of boys and girls in Mathematics classrooms and to interpret male-female power relations. Ajai and Imoko (2015) noted that feminist researchers have revealed that girls are often marginalized and given subordinate status in Mathematics class. This suggests that perceptions of teachers are that girls‟ performances in Mathematics are dependent on rote learning, hard work and perseverance rather than natural talent, flexibility and risk taking which are the learning styles associated with boys.

Wambui (2018) noted that most studies show that girls‟ self-esteem, confidence in their abilities, expectations for life, interest in challenging courses and rewarding careers, and pursuit in Mathematics decline as they grow older. Wambui, was of the opinion that teachers and parents may contribute to girls‟ challenges by giving them less attention or a lower quality of attention. The mind set of girls often impacts greatly on their academic performance in Mathematics. The Gender Policy Research in Education reported that scarcity of resources and insensitivity to the needs of girls in many schools create a gender insensitive infrastructure which adversely affect their academic performance more than boys. The previous knowledge and experiences of learners, expectations, interests and beliefs have also been known

to have some impact on the way learning takes place (Ndirangu, 2000). It appears studies focusing on determinants of students‟ performance in Mathematics are not well conceptualized in terms of gender. While most studies generally looked at factors that impede academic performance of students in Mathematics, this study sought to investigate the perception of boys and girls concerning school factors, teacher factors, and student factors inhibiting students‟ academic performance in Mathematics at the junior high school level.

1.3 Purpose of the Study

The purpose of the study was to investigate the differences in junior high school students‟ perceptions of school factors, student factors, and teacher factors inhibiting students‟ academic performance in Mathematics at Asokore SDA College Demonstration Junior High School, Koforidua.

1.4 Objectives of the Study

The objectives of the study are to;

1. investigate the differences in students‟ perception of school factors inhibiting their academic performance in Mathematics.
2. examine the differences in students‟ perception of student factors inhibiting their academic performance in Mathematics.
3. determine the differences in students‟ perception of teacher factors inhibiting their academic performance in Mathematics.

1.5 Research Questions

The study was guided by the following research questions.

1. What are the differences in students‟ perception of school factors inhibiting their academic performance in Mathematics?
2. What are the differences in students‟ perception of student factors inhibiting their academic performance in Mathematics?
3. What are the differences in students‟ perception of teacher factors inhibiting their academic performance in Mathematics?

1.6 Significance of the Study

The findings of the study will be significant to all stakeholders of education including government, parents, teachers, and students for a number of reasons. First, the study would report on the differences in junior high school students‟ perception of school, teacher, and student factors inhibiting their academic performance in Mathematics. This will help the government, parents, and teachers to plan effectively to improve the academic performance of students in Mathematics. Also, the findings of the study would add to existing literature on differences and academic performance of students at the junior high school level. This inform government, parents, teachers and students about the factors that affect the academic performance of students. Again, the findings of the study would motivate further research to confirm or contradict research findings on the academic performance of boys and girls in Mathematics. This will help the government, parents, and teachers to plan effectively to improve the teaching and learning of students in Mathematics at the basic school level.

1.7 Delimitations of the Study

The study was delimited to the teaching and learning of Mathematics among teachers and students of Asokore SDA College Demonstration Junior High School, Koforidua. The actions of both teachers and students during Mathematics lessons are likely to influence the perception students have toward the subject. Hence, delimiting the study to teachers and students in the school was justified.

1.8 Limitation of the Study

The main limitation of this study was that its findings cannot be easily generalized to include all basic schools in the New Juaben Municipality. In addition, some of the teachers were sceptical about the study and were therefore reluctant to contribute data. However, after assuring them of the confidentiality of the data they would provide, they completed and returned the questionnaire given to them. Truancy on the part of the students sampled for the study delayed the schedule for the data collection exercise. This was because the researcher had to re-administer the questionnaire to ensure that the views of all students sampled for the study were gathered.

1.9 Organization of the Study

The study was made up of five chapters. The first chapter which was the introduction presented the background to the study, statement of the problem, purpose of the study, objectives, research questions, significance of the study, delimitations, limitations, and organization of the study. Chapter two focused on the review of related literature, where relevant materials like journals, magazines, articles and books on the topic under study were reviewed. Chapter three looked at the methodology for conducting the study. The research design, population, sample and sampling

procedure, research instruments, data collection procedure and data analysis plan were considered. Chapter four reported on the results and discussion of the data collected. Chapter five, which was the final chapter, considered the summary, conclusion and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter presents the literature reviewed by the researcher. The chapter presents the conceptual framework, the socialization theories and students‟ performance in mathematics, gender gap in students‟ mathematics performance, five strands of desirable mathematical action for students, discussion of the desirable actions, identification of mathematics difficulties in children, mathematics: a universal problem, students‟ attitude and performance in mathematics, causes of students‟ poor performance in mathematics, parental support, instructional materials, learning facilities and students‟ academic performance, and six key principles for effective teaching of Mathematics.

2.1 Conceptual Framework

The conceptual framework shows the hypothesized relationships between dependent, independent and the intervening variables. The perception which boys and girls develop towards Mathematics in turn affect their academic performance in the subject.

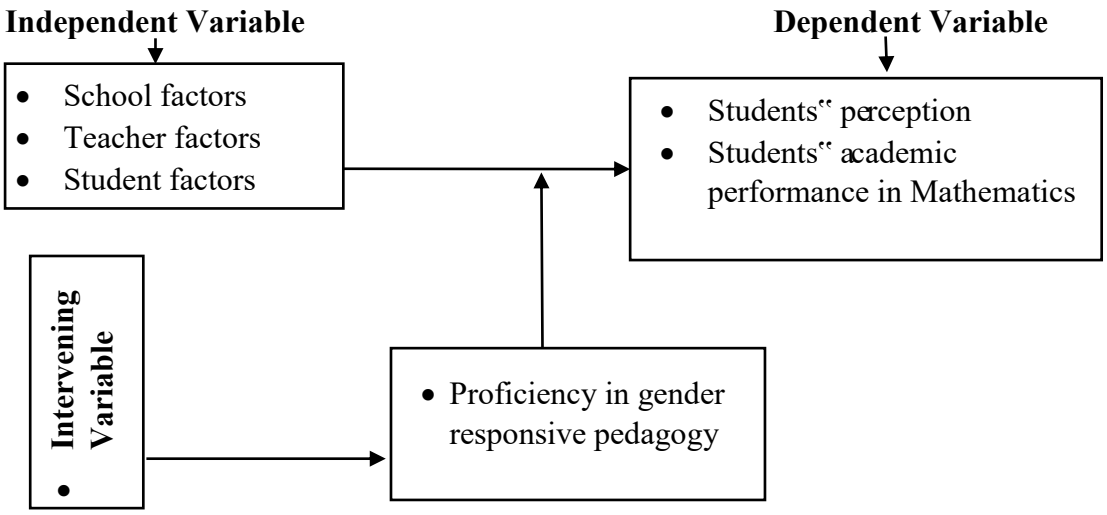

Figure 1.1: Relationships between independent variable and dependent variable

Source: Adapted from Orodho (2012).

Performance of boys and girls in Mathematics at the junior high school level is greatly influenced by their perceptions toward the subject. This remains the focus of the study and the dependent variable. The perception of boys and girls are shaped by the school factors, teacher factors, and student factors which are independent variables of the study. The intervening variable of the study explains the link between the dependent and independent variables. It thus explains that teaching methods, teaching and learning resources, and the Mathematics curriculum influence the perceptions of students and eventually their academic performance in the subject. Therefore, adopting the framework for the study is justified since it shows the linkage between school factors, student factors, teacher factors, method of teaching and students‟ performance in mathematics.

2.2 Socialization Theories and Students' Performance in Mathematics

A number of theoretical approaches within psychology provide insight into socialization processes that might account for the effects proposed by the gender stratification hypothesis. Eccles (1994) proposed and tested an expectancy-value

theoretical model to explain the gender gap in Mathematics achievement, attitudes, and its‟ effect on the underrepresentation of women in careers in science and engineering. According to the Eccles model, people do not undertake a challenge unless they value it and have some expectation of success. Perceptions of the value of the task (for example, taking a challenging Mathematics course) are shaped by the cultural milieu (gender segregation of occupations, cultural stereotypes about the subject matter, etc.) and the person‟s short-term and long-term goals (for example becoming an elementary school teacher and thinking one does not need advanced Mathematics or becoming a civil engineer and knowing that one does). Expectations of success are shaped by the person‟s attitude, relevant past events such as grades in the subject and scores on standardized tests, the person‟s interpretations of and attributions for these events, and the person‟s self-concept of ability (Wambui, 2018). Socio-cultural forces such as parents‟ and teachers‟ attitudes and expectations, including stereotypes, also shape self-concept and attitudes toward the subject. Empirical research on the awareness of negative stereotypes supports this link (Aronson & McGlone, 2008). This study is guided by expectancy-value model and psychological theory as discussed in the following sub-sections.

2.3.1 Expectancy-Value Model on Mathematics and Career

According to the Expectancy-Value Model, if a student believes that the career opportunities available do not require Mathematics skills, he/she is less likely to invest in developing his/her Mathematics skills by working hard in his/her required Mathematics courses or by taking elective Mathematics courses. He/she may see Mathematics as less useful or valuable. The theory has been backed by documented empirical support (Frome & Eccles, 1998) and provides a clear model for why cultural inequities in educational or career opportunities have an adverse impact on

girls and women considering STEM careers. Eccles‟s (1994) Expectancy-Value Theoretical Model is consistent with the gender stratification hypothesis by maintaining that individuals do not engage in tasks they perceive to have little value and that individuals make cost–benefit judgments regarding their academic choices (Wambui, 2018).

2.3.2 Psychological Theory on Academic Choices

Another psychological theory that is consistent with the gender stratification hypothesis is Cognitive Social Learning Theory (Bussey & Bandura, 1999). The theory maintains that a number of social processes including reinforcements, modelling, and cognitive processes such as self-efficacy contribute to the development of gender-typed behaviour. Role models and socializing agents as well as perceptions of gender-appropriate behaviour have an important influence on an individual‟s academic choices. As with Eccles‟s (1994) model, this theory also emphasizes the role of self-efficacy in gender-typed behaviours such as choosing to pursue science subjects. This theory maintains that students are attentive to the behaviours that people in their culture engage in and thus feel efficacious in and model those behaviours. That is, if students observe that people in their culture do not become engineers or scientists, they may believe that such careers are outside the realm of possibilities for them. Such students may feel anxious and may avoid these subjects. In emphasizing the roles of observational learning and the internalization of cultural norms, Cognitive Social Learning Theory provides an individual-level explanation of why some students make gendered educational and vocational choices that reiterate societal-level gender stratification. This study therefore examined the gender differences in junior high school students‟ perception of school, teacher, and student factors inhibiting their performance in Mathematics.

2.4 Empirical Review

2.4.1Gender Gap in Students' Mathematics Performance

Wambui (2018) noted that there have been substantial improvements in the college preparation of female students and the college gender gap has narrowed dramatically over the past few decades. Research findings from Goldin, Katz, and Kuziemko (2006) reported that female high school students outperform male high school students in most subjects particularly on verbal test scores. The ratio of male to female college graduates has not only decreased but reversed itself as the majority of college graduates are now female. Also, Wambui, pointed out that the number of Mathematics and Science courses taken by female high school students has increased. The mean and standard deviation in performance on Mathematics test scores are only slightly larger for males than for females. Despite minor differences in students Mathematics mean scores, Hedges and Nowell (1995) reported that many more boys than girls perform at the positive tail end of the normal distribution curve. This gender gap has been documented for a series of Mathematics tests including the calculus test, the Mathematics SAT, and the quantitative portion of the Graduate Record Exam (GRE). The ratio of males to females who score in the top five percent in high school Mathematics has remained constant at two to one (Xie & Shauman, 2003). Examining students who scored 800 on the Mathematics SAT in 2007, Ellison and Swanson (as cited in Wambui, 2018) also found a two to one male–female ratio.

Researchers such as Miheso (2002) and Eccles (1994) have sought to provide answers to why more boys than girls excel in Mathematics. One argument is that boys have and develop superior spatial skills which gives them an advantage in Mathematics. This difference could have an evolutionary foundation as male tasks such as hunting may have required greater spatial orientation than typical female tasks

(Gaulin & Hoffman, 1988). In addition, it could be because boys tend to engage in play that is more movement-oriented and therefore grow up in more spatially complex environments. There is evidence of a significant and substantial gender difference in the extent to which skills are reflected in a competitive performance (Gneezy et al., 2003). The effects in mixed-sex settings range from women failing to perform well in competitions to women shying away from environments in which they have to compete (Niederle & Vesterlund, 2007). Response to competition differs for men and women, and in the examined environment, gender difference in competitive performance does not reflect the difference in non-competitive performance.

According to Halpern et al. (2007), dozens of explanations including hormones and prenatal brain differentiation, stereotype threat, and other factors have been proposed to explain the gender gap in students‟ Mathematics performances. Halpern et al. noted that of primary interest is a sociological hypothesis proposed by Baker and Jones (1993) that girls‟ poorer Mathematics achievement and more negative Mathematics attitudes are the result of societal gender stratification. The gender stratification hypothesis proposes that in patriarchal cultures, male students link their achievement to future opportunities and outcomes. As a result of the decreased opportunities afforded to females, girls do not perceive such a link and thus do not achieve as boys do in domains that they perceive to be less useful. Baker and Jones (1993) pointed out that female students who are faced with less opportunity may see Mathematics as less important for their future and are told so in a number of ways by teachers, parents, and friends. Thus, opportunity structures can shape numerous socialization processes that shape performance of students. According to Wambui (2018), the gender stratification hypothesis proposes that where there is more societal stratification based on gender thus, more inequality of opportunity. In this

case, girls will report less positive attitudes, more negative effect and will perform less well on Mathematics achievement tests than will their male peers. Where there is greater gender equity, gender similarities in Mathematics achievement will be evident.

Literature about gender and academic performance in Mathematics exist with different views and findings. Studies (Fennema, 2000) conducted in countries of the North have shown that boys performed better than girls in Mathematics. According to Asante (2010), boys generally achieved higher than girls on standardized Mathematics tests however, international literature suggests that female students perform better than male students. A large scale study in the U.S.A. by Hydea and Mertzb (2009) revealed that girls have reached parity with boys in Mathematics performance including at high school where a gap existed in earlier decades. Hydea and Mertzb (2009) affirmed that girls are doing better than boys even for tasks that require complex problem solving.

The Second Southern and Eastern Africa Consortium for Monitoring Education Quality (SACMEQ) Survey (2000-2002) by International Institute for Educational Planning (HEP)-UNESCO (2004) reported no significant gender differences among students in South Africa. The same study showed that girls scored significantly higher scores than boys only in Seychelles. On the other hand, in Tanzania, Kenya, Mozambique, Zanzibar and Malawi, boys scored significantly higher than girls did. In the other school systems, including the ones in South Africa, the differences were not significant (Ajai & Imoko, 2015).

Research findings (Frost et al., 1994) have shown that the gender differences in mathematical performance are diminishing. Perie et al., (2005) found that the gap has been narrowing in the United States of America. Research in Australia (Forgasz et

al., 2000) indicated that gender differences in Mathematics achievement are reducing and shifting. Vale (2009) found that many studies conducted between 2000 and 2004 in Australia showed no significant differences in achievement in Mathematics between male and female students though male students were more likely to obtain higher mean scores.

Fennema and Leder (1990) noted that gender differences in Mathematics teaching, learning and achievement have also been explained on the basis of gender differences in cognition and brain lateralization. Paechter (1998) was of the opinion that male and female students do experience the world in different ways. They are differently positioned in society, they have different learning styles and they perceive and process reality differently. Ajai and Imoko (2015) emphasized that most Mathematics classroom discourse is organized to accommodate male learning patterns hence, their high achievement in Mathematics. Mutemeri and Mygweni (2005) argued that the idea that Mathematics is for boys may result in low motivation in girls and could widen the gender gap in Mathematics achievement in favour of boys.

Boaler (1997) was of the view that different learning goals of girls and boys leave girls at a disadvantage in competitive environments. Boys and girls preferred a Mathematics curriculum that enabled them to work at their own pace as their reasoning is different. According to Ajai and Imoko (2015), girls value experiences that allow them to think and develop their own ideas as their aim is to gain understanding. Boys on the other hand, emphasize speed and accuracy and see these as indicators of success. Boys are able to function well in a competitive environment of textbook based Mathematics learning.

Kaino and Salani (2004) reported other important factors that emerge in research on gender and Mathematics to include family influences, socio-economic status of parents, as well as cultural and traditional influences. Asante (2010) argued that schools establish symbolic oppositions between male and female students through gendering of knowledge and defining of certain subjects as masculine. In contrast, female students are conditioned by the society to believe that Mathematics is a male subject and it is acceptable for them to drop it (Ajai & Imoko, 2015).

Literature suggests that factors including issues such as classroom interactions, students‟ attitudes, students‟ interest and self-esteem, teachers‟ gendered attitudes, curricular materials, beliefs, social and cultural norms may be associated with the gender gap. These differences put together have implications for the kind of instructional procedures that are to be adopted for setting up an appropriate teaching and learning environment for Mathematics instruction that is suitable for both boys and girls (Ajai & Imoko, 2015). Mathematics is a Science subject and gender-based science researchers (Howes, 2002; Sinnes, 2005) have reported that females in principle will produce exactly the same scientific knowledge as males if sufficient objectivity is considered in scientific inquiry. Though the issue of gender inequality in Science, Technology, and Mathematics Education (STME) is global, it is believed that bridging gender gap is one major way of achieving egalitarianism and enhancing human development. There is therefore, the need to give boys and girls exactly the same opportunities and challenges. This study gathered data on the gender differences in junior high school students‟ perceptions of school, teacher, and student factors inhibiting their Mathematics achievement.

2.5 Five Strands of Desirable Mathematical Actions for Students

In discussing the connections between the practical and specialized perspectives with classroom practice, this review posits that both perspectives need to incorporate a sense of „doing" that the focus should be on the mathematical actions being undertaken during the learning. To further delineate the scope and nature of the mathematical actions that students need to experience in their mathematical learning and which apply equally to both the practical and specialized perspectives the following are some ways of describing those actions. Kilpatrick et al. (2001), established and described five strands of mathematical actions as follows.

2.5.1 Conceptual Understanding

Kilpatrick et al. (2001), named their first strand „conceptual understanding" and Watson and Sullivan (2008), in describing actions and tasks relevant for teacher learning, explained that conceptual understanding includes the comprehension of mathematical concepts, operations and relations. Skemp (as cited in Watson & Sullivan, 2008), argued that it is not enough for students to understand how to perform various mathematical tasks (instrumental understanding). For full conceptual understanding, Skemp argued that the students must also appreciate why each of the ideas and relationships work the way that they do (relational understanding). Skemp elaborated an important related idea based on the work of Piaget related to schema or mental structures. Watson and Sullivan (2008), argued that well-constructed knowledge is interconnected, so that when one part of a network of ideas is recalled for use at some future time, the other parts are also recalled. For example, when students can recognize and appreciate the meaning of the symbol, words and relationships associated with one particular concept, they can connect different

representations of that concept to each other and use any of the forms of representation subsequently in building new ideas.

2.5.2 Procedural Fluency

Kilpatrick et al. (2001), named their second strand as „procedural fluency", while Wastson and Sullivan (2008), preferred the term „mathematical fluency". Kilpatrick et al. defined this as including skills in carrying out procedures flexibly, accurately, efficiently and appropriately, and having factual knowledge and concepts that come to mind readily. Pegg (2010), presented a clear and cogent argument for the importance of developing fluency for all students. Pegg (2010) explained that initial processing of information happens in working memory which is of limited capacity. Pegg (2010) focused on the need for teachers to develop fluency of calculation in their students, as a way of reducing the load on working memory so allowing more capacity for other mathematical actions. An example of the way this works is in mathematical language and definitions. If students do not know what is meant by terms such as „parallel", „right angle", „index", „remainder", „average", then instruction using those terms will be confusing and ineffective since so much of students" working memory will be utilized trying to seek clues for the memory of the relevant terminology. On the other hand, if students can readily recall key definitions and facts, these facts can facilitate problem solving and other actions.

2.5.3 Strategic Competence

The third strand from Kilpatrick et al. (2001), is „strategic competence". Watson and Sullivan (2008), described strategic competence as the ability to formulate, represent and solve mathematical problems. Turner (2010), termed this „devising strategies" which he argued involves a set of critical control processes that

guide an individual to effectively recognize, formulate and solve problems. This skill is characterized as selecting or devising a plan or strategy to use Mathematics to solve problems arising from a task or context as well as guiding its implementation. Problem solving has been a focus of research, curriculum and teaching for some time. Teacher are generally familiar with its meaning and resources that can be used to support students‟ learning to solve problems.

2.5.4 Adaptive Reasoning

The fourth strand from Kilpatrick et al (2001), is „adaptive reasoning‟. Watson and Sullivan (2008), described adaptive reasoning as the capacity for logical thought, reflection, explanation and justification. Stacey (2010), argued in her conference paper that such mathematical actions have been underemphasized in recent Australian jurisdictional curricula and that there is a need for resources and teacher learning to support the teaching of mathematical reasoning. In an analysis of Australian Mathematics texts, Stacey reported that some Mathematics texts did pay some attention to proofs and reasoning but in a way which seemed to derive a rule in preparation for using it in the exercise rather than to give explanation that might be used as a thinking tool in subsequent problems.

2.5.5 Productive Disposition

The fifth strand from Kilpatrick et al. (2001), is „productive disposition‟. Watson and Sullivan (2008), describe productive disposition as a habitual inclination to see Mathematics as sensible, useful and worthwhile, coupled with a belief in diligence and one‟s own efficacy. As the name of this strand suggests, this is less a student action than the other strands, but it remains one of the key issues for teaching

Mathematics. This is because positive disposition can be fostered by teachers and possessing them does make a difference to learning.

2.6 Discussion of the Desirable Actions

The first four of these actions are described as proficiencies (Australian Curriculum Assessment and Reporting Authority, 2010). The simplified terms of „understanding", „fluency", „problem solving", and „reasoning" are used for ease of communication, but they encompass the range of mathematical actions as described above. Previously, the curricula of most Australian jurisdictions used the term „working mathematically" to describe mathematical actions. ACARA (2010), argued that the notion of „working mathematically" creates the impression to teachers that the actions are separate from the content descriptions, whereas the intention is that the full range of mathematical actions apply to each aspect of the content.

All five of these sets of mathematical actions have implications for Mathematics teaching of both the practical and specialized perspectives. As is argued in various places in this review, all five mathematical actions are important and contribute to a balanced curriculum. One of the challenges facing Mathematics educators is to incorporate each of the mathematical actions described in this subsection into centrally determined and school-based assessment, to ensure that they are appropriately emphasized by teachers. This is made more difficult by the way in which fluency is disproportionately the focus of most externally set assessments and therefore is emphasized by teachers often to the detriment of the other mathematical actions.

2.6.1 Defining Numeracy

The term numeracy is used in various contexts and with different meanings and not limited to the following:

- as a descriptive label for systematic mathematical assessments.
- in subsequent reporting to schools and parents
- as the name of a remedial subject
- to describe certain emphases in the Mathematics curriculum and in other disciplines.

There is a diversity of opinions expressed on the nature of numeracy ranging from those of some mathematicians who claim that numeracy does not exist to some educators who claim it is synonymous with Mathematics and others who argue that the term numeracy refers just to the use of Mathematics in practical contexts.

Sullivan (2011), argued that while there are some situations that require only practical Mathematics for solution and some aspects of Mathematics that have limited or no practical use although they are still valuable and important to the field and to learners, most real-life situations have some elements of both practical and specialized Mathematics. This contention is exemplified in the many commentaries on the contribution of practical realistic examples to the learning of specialized Mathematics (Peled, 2008). Most of these commentaries contain suggestions ranging from teachers using such examples to illustrate the relevance of Mathematics to students‟ lives to recommendations that teachers use realistic contexts that illustrate the power of Mathematics.

2.6.2 Work Readiness and Implications for a Numeracy Curriculum

In addition to the purpose of schooling, teachers at least need to consider preparing young people for the demands of employment and the requirements of audit life. Consideration of the numeracy demands of work-readiness can inform not only the content of school curricula but also pedagogical approaches used (Perso, 2006). Over the past two decades there have been many studies of out-of-school numeracy practices of adults. Some have sought evidence of the use of recognized school Mathematics topics in the workplace and society (FitzSimons, 2002). Others have examined the thinking processes used in particular contexts known as situated cognition. Lave (as cited by Sullivan, 2011) observed various groups of people at work and presented that the mathematical knowledge and skills utilized, for example, by shoppers and weight watchers, bore little resemblance to the mathematical routines, procedures and even formulate taught in school. Sullivan indicated that the relevance, location and teaching of many topics in school Mathematics curricula need to be reconsidered especially in the context of the argument for prioritizing practical Mathematics.

In recent years, several large-scale studies of numeracy in the workplace in the United Kingdom (Bakker et al., 2006) and in Australia (FitzSimons & Wedege, 2007), have confirmed Lave‟s findings. Additionally, Zevenbergen and Zevenbergen (2009), have drawn attention to ways that young people use numeracy in their school work. Zevenbergen and Zevenbergen (2009) found that young workers did not use formal school Mathematics even when solving problems involving measuring or proportion and ratios instead, they relied on the use of intuitive methods some of which were workplace specific. While Zevenbergen and Zevenbergen (2009) were critical of emphasis in curricula on Mathematics content that is irrelevant in

workplaces they also argued that such consideration of work demands has implications for the ways that Mathematics is taught. The researchers proposed that a greater emphasis on estimation, problem solving and reasoning, and a lesser emphasis on the development of procedural skills would assist in an increase in the relevance of Mathematics learning to the workplace.

The findings of Zevenbergen and Zevenbergen (2009), have important implications for the numeracy needs of future Australian citizens and contribute to an understanding of what needs to be emphasized in Mathematics curricula and learnt by students for their work-readiness. The research indicated that since informed judgments about money, safety and accuracy are required in workplaces, workers need knowledge that is flexible and adaptable. The research also indicated that the context in which the Mathematics is used is critical and that students need to be able to apply different disciplines simultaneously. In addition, students should learn to use non-standard methods as well as standard mathematical processes. Interestingly, approaches that incorporate Mathematics within practical contexts may well have the effect of engaging more students in learning numeracy and Mathematics. Sullivan and Jorgensen (2009), reported various case studies in which students saw tasks that were presented as part of a contextualized approach as relevant and accessible and were willing to invest the effort involved in learning the relevant numeracy. It is noted that many of these findings emphasize the need for the breadth of the mathematical actions recommended by Kilpatrick et al. (2001).

2.6.3. A Social Perspective on Numeracy

This subsection suggests that there are aspects of social decision making that can extend the ways that numeracy perspectives can enrich the school curriculum.

Teachers who pose to their students‟ tasks which are placed within a clear social realistic context enable students to exercise some real-life experiences as they consider and solve the tasks. Such an approach has the dual advantages of, on one hand, preparing students for life challenges and on the other hand, illustrating that numeracy and Mathematics can be useful for them in their lives.

It is relevant for teachers to allow students to explore examples from both mathematical and social perspectives. At least part of the function of the consideration of such tasks is in developing in students the orientation and capacity for explaining their reasoning. There are many situations in life in which disputes arise involving measurements (mainly money) and finding resolutions to such disputes is a key like skill, a key aspect of which is justifying one‟s reasoning. Jablonka (2003), in an overview of the relationship between mathematical literacy and Mathematics, argued for Mathematics teachers to include a social dimension in their teaching. Jablonka suggested that numeracy perspectives can be useful in exploring cultural identity issues and the way that particular peoples have used numeracy historically. Also, critical perspectives that are important not only for evaluating information presented in the media (an example of this is the arguments presented on each side of the global warming debates), but for arguing particular social perspectives (the extent to which Ghana could manage refugees seeking resettlement). Numeracy perspectives could shed light on a broad range of public issues ranging from personal weight management, to health care, to investments in stock and shares, to comparing phones plans, and so on. Such contexts can be chosen to maximize relevance to students‟ lives, therefore making their learning of Mathematics more meaningful for them and hopefully increasing their engagement with mathematical ideas. Such problems can even illustrate connections to other domains of knowledge.

2.6.4 Numeracy in Other Curriculum Areas

Another way that numeracy perspectives can enrich learning is in their incorporation into other aspects of the curriculum. This subsection provides examples of how this might be achieved. In the case of primary school teachers who teach all subjects to their class, this is mainly a matter of them being aware of potential links and finding ways of building connections across different domains of knowledge. However, for secondary teachers, who are subject specialists, incorporating numeracy perspectives into subjects other than Mathematics is something of a challenge for two reasons. First, teachers of other curriculum areas are sometimes not convinced that quantitative perspectives illuminate the issues on which they focus. Second, many teachers who are specialists in non-mathematical subjects are neither confident nor skilled in approaches to working with students to model or explain the relevant numeracy. For the former, this is a matter of raising awareness. For the latter, some processes for especially supporting such teachers will be necessary (Sullivan, 2011).

The following examples indicate how teachers of other curriculum areas might benefit from incorporating numeracy perspectives. The examples, which draw heavily on ACARA (2010), predominantly apply to secondary schools by virtue of the topics but the pedagogical approaches implied are also relevant for primary school teachers. One topic with serious social consequences that is routinely discussed in the media is that of population planning which includes the related issues of immigration. In Geography, where for example this topic may be addressed, a capacity to appreciate the relevant numeracy is critical to being able to interpret population flows and the impact of immigrants including refugees, on population changes. To consider these issues, students will need to have data on the size of the population, and compared with data on net immigration inflow. The fraction of the net inflow is the result of

applicants for asylum. All of these require collection and consideration of the relevant data and a capacity to manipulate the figures appropriately (Sullivan, 2011). While the basic skills required for making such calculations or estimates will be an outcome of effective Mathematics teaching, consideration of the issues is clearly within the curricular remit of the Geography teacher. The Geography and Mathematics teachers can both benefit from collaboration on such issues. The Geography teacher can learn how to better present the data which illustrates the relevant ratio comparisons and the Mathematics teacher can benefit through listening to their colleagues‟ thinking and description of their ways of dealing with data from within the discipline of Geography.

In English literature study, the meaning and exegetical analysis of texts can be enriched by being more precise about the numeracy dimensions mentioned in the writing. For example, to truly understand the scale of fortune that Jane Austen says that a man should amass before proposing to a woman, some comparative wealth figures from different levels of society 200 years ago, and comparative income rates from then to the present converted to current country‟s currency values would enhance students‟ appreciation of Austen‟s assertion (Sullivan 2011). There are course approaches to the teaching of literacy that could profitably be incorporated into numeracy teaching. Such approaches include the teacher and students reading the text together, highlighting words that are important for mathematical meaning, writing key words on the board and saying them together, suggesting synonyms for difficult words and so on. Again, there are many instances of such possibilities of collegial cooperation from which both literacy and Mathematics teachers would benefit.

Sullivan (2011), noted that in the subject History, students consider elapsed time not only over large time periods such as, for example, the comparative length of indigenous and immigrant settlement, but also over shorter periods, such as the chronological sequence of 20th century events. Mathematical tools and models are useful for explicating these periods of time. Both History and Mathematics teachers can benefit from collaboration. History teachers are best placed to comment on the significance of such comparisons and Mathematics teachers are able to inform the calculations and even suggest appropriate models that can be used. Other topics for which a numeracy perspective would enhance the learning of History is in appreciation of large numbers such as in population comparisons, trends in population over times, and experience of visualization of space and places.

In Science, students in the middle and senior secondary years perform calculations related to concentrations, titrations, and unit conversions. Practical work and problem solving across all the sciences require the use of a range of measurements, capacity to organize and represent data in a range of forms, to plot, interpret and extrapolate through graphs. This also requires students to estimate, solve ratio problems, use formulae flexibly in a range of situations, perform unit conversions, use and interpret rates, scientific notation and significant figures (Watson & Sullivan, 2008). These concepts are better taught by the Science teacher in the context of the Science being learned. However, without the appropriate pedagogies the numeracy opportunities might be restrained to the learning of simply techniques. As with the other curriculum areas, there is clearly both a need for and opportunities in collaboration between Mathematics teachers and those in other subjects to enrich the study of the context and the numeracy that can enrich study of other disciplines. Such cross-curricular approaches model to students‟ ways that numeracy skills will be

useful to them in many aspects of their future work and private lives. Of course learning in many subjects is enhanced through the effective use of statistics. These should of course build on the concepts developed in Mathematics classes. Nevertheless, the use of statistics in other context also needs to be considered by for example, the Physical Education or Information Communication and Technology teachers. This requires collaboration and goodwill between the Mathematics teachers and the teachers of those other subjects (Sullivan, 2011).

2.7 Identification of Mathematics Difficulties in Children

Croark et al. (2007), have clearly documented that the early identification of children who experience difficulties to learning is of critical importance in enabling such youngsters not only to make greater progress but to become participating members of society. It is important to identify children who experience difficulties to learning as early as possible so that services can minimize or eliminate learning difficulties. On the other hand, it is important to avoid placing harmful labels on children that lead to lower expectations for achievement. If children who experience difficulties to learning can be identified early during childhood development, they stand a better chance of success since the problem can be addressed.

Steele (2004), further supports the notion that early identification of learning Mathematics difficulties provides a foundation for later learning and academic success experiences for children. Steele also claimed that if children who experienced difficulties to learning are identified in the early childhood years, it is much more likely that they will have the opportunity to develop to their true potential. Early identification also prevents secondary difficulties from occurring and children who are identified early will have a greater chance of not developing secondary difficulties

such as frustration and anxiety (Machaba, 2013). Early intervention implies some socio-economic benefits in that prevention or early treatment of developmental problems in young children may reduce more serious, burdensome difficulties with which society may need to cope later.

If children who experience difficulties to learning are not identified early, the learning difficulties continue which could lead to children dropping out of school, exhibiting behavioural problems and developing greater academic deficiencies (Machaba, 2013). In addition, early identification of learning difficulties will improve educational opportunities and outcomes for all children with complex needs or particular types or patterns of difficulty in learning. Even though every day teachers are faced with children who fail or drop out of school, this does not mean that these children are not capable of doing anything. Possibly these children might not be able to see well, or may have hearing problems, or handwriting difficulties. For example, children with handwriting difficulties may experience difficulty in keeping up with copying, especially when viewing the material from a distance (such as when they are copying from the chalkboard). They may also experience difficulty in spatial organization when writing or copying. The child‟s writing of words or numbers on a page may go upward or downward, or may be cramped too close together or spread too far apart. The child‟s letters or numbers may appear distorted or rotated (Guerin, 2006).

2.8 Mathematics: A Universal Problem

The problem of poor Mathematics performance is universal (Reddy, 2003). In an attempt to address this problem in Australia, Brown et al. (1998), identified certain factors that contribute to poor Mathematics performance. The factors include;

teaching method (whole class teaching); failure to use knowledge associated with Mathematics; language; lack of flexibility; beliefs; and quality of teacher-pupil interaction. Brophy and Good (1986), noted that poor performance in Mathematics has always been associated with whole class teaching. That is when teaching the whole class at the same time children do not learn in the same way. Children who learn fast may benefit whereas children who do not catch on quickly will be disadvantaged. Brophy and Good (1986), argue that in individual cases particularly, poor performance in Mathematics has also been associated with whole class teaching. For example, when the teacher uses the whole class teaching method he/she may not be able to interact with all the children at the same time. In such cases, problems experienced by some children are not promptly detected and remedied.

2.8.1. Various Misconceptions about Mathematics Teaching

Schunk (2004) asserted that the content area of Mathematics is a fertile area of cognitive and constructive research. Schunk (2004) added that topics that have been explored include how children construct mathematical knowledge, how experts and novices differ and which methods are most effective. Schunk (2004) also agreed that children and adults often construct procedures to solve numerical/mathematical problems however, the errors are not random but rather systematic mistakes. Systematic mistakes reflect the constructivist assumptions that children form procedures based on their interpretation of experiences. For example, a common mistake in subtraction is to subtract the smaller number from the bigger number in each column, regardless of direction, as follows 65 – 29 = 44; 571 – 298 =327. Systematic mistake develops when the children encounter new problems and incorrectly generalize productions, especially when they do not know what to do. They modify the rules to fit the new problem (Schunk, 2004).

2.8.2. Language Issues in the Teaching of Mathematics

According to Naude et al. (2002), many Grade 1 children enter South Africa schools having various academic and learning difficulties that might occur as a result of limited language proficiency. A child with limited language proficiency may continue to learn and understand at a slower rate. This explains why Grade 3 children who receive tuition through a language other than their own find it difficult to understand numerical concepts. They also struggle to master the medium of instruction itself because language and thought are interwoven. Limited language proficiency leads to learning difficulties. A child has to be competent in expressive and receptive languages in order to understand and carry out academic tasks including Mathematics (Naude et al., 2002). Children should also be able to commit what they learn to memory and be able to reproduce it when needed. It goes without saying that lack of language proficiency would be an impediment for children at the basic school level. Thus, teachers need to be patient in teaching concepts such as addition, subtraction, division, and multiplication.

Mercer (2006), argued that the tendency of Mathematics educators and policy makers to emphasize the distinction between the subject language of Mathematics and more informal talk can hinder the process of inducting children into Mathematics practices. Mercer pointed out that group activities offer valuable opportunities for children to construct solutions for themselves through talk which would not be found in whole class teaching. This method encourages children to participate actively in finding solutions to problems while at the same time using language to communicate. In so doing, children are able to understand better and view Mathematics exercise as everyday problems rather than something only related to the school environment and Mathematics jargon. Vygotsky (as cited in Mercer, 2006), stressed the significance of

language as a psychological and cultural tool. Vygotsky further argued that the social involvement in problem-solving activities constituted an important factor for individual development. Vygotsky charged that inter-mental (social) activity, mediated through language, can promote intra-mental (individual) intellectual development. By using language and examples with which the child can associate and those that stem from his/her immediate environment, will engender better understanding and enable the child to relate the process in his/her own words.

There are two ways of interaction through which the spoken language can be related to the learning of Mathematics in schools. The first is teacher-led interaction with children the teacher guides the children in their development and understanding, which can be important in the children‟s induction into discourses, associated with the particular knowledge domains. Mercer (2006), noted that it concerns subtler aspects of interaction such as the extent to which teachers elicit children‟s own ideas about the work they are engaged in, make clear to them to discuss errors and misunderstandings and engage them in extended sequences of dialogue about such matters. Alexander (2004), suggested that dialogue teaching is a method that employs the power of talk to encourage and expand the children‟s thoughts and advance their learning and understanding. It involves both the teacher and the children and relates to teaching across the curriculum. It is an approach that is grounded in the principles of collectively, reciprocity, cognition and observation. Dialogical teaching therefore, requires children to be actively engaged in doing as well as talking (discussing/explaining) what the lesson is about. This approach as such is good in the teaching of Mathematics where children have to handle concrete objects and explain what they see and learn the concepts. Dialogue teaching is characterized by certain features of classroom interaction such as:

- Questions are structured so as to provoke thoughtful answers.
- Answers provoke further questions and are seen as the building blocks of dialogue rather than its terminal point.
- Individual teacher-child and child-child exchanges are chained into coherent lines of enquiry rather than left stranded and disconnected. In this manner, the children experience the learning process as cooperative activity.

The second context of interaction in which spoken language can be related to the learning of Mathematics in schools is that of peer group interaction. By working in pairs or groups, children become involved in interactions that are more "symmetrical" than those of teacher-pupil discourse. This gives children different kinds of opportunities for developing reasoned arguments and describing events (Mercer, 2006). The child does not only learn Mathematics but also social interaction. Teachers can help children to gain relevant knowledge of numerical procedures, terms, concepts and operations. Teachers can also help children to learn how to use language to work effectively and to jointly enquire, reason, consider information, share and negotiate ideas and to make joint decisions. This kind of guidance is not usually offered (Mercer, 2006).

According to Vaidya (2008), some children suffer from dyscalculia. This is characterized by a poor understanding of the number concept and the number system characteristic of their age group. Such children experience difficulties counting, learning abstract concepts of time, direction learning, and recalling facts, sequence of past and future events. They also fail to use rules and procedures to build on known facts. For instance, they may know that 3+5=8, but would fail to deduce that 5+3=8. Such children are generally said to have difficulties learning Mathematics. Without

identification and remediation these children would not be able to be numerically functional.

Mathematics is a "second language" and should be taught as such. It constitutes formal learning of concepts that have hitherto not been frequently used and known to many of the children in class. Thus, they would also seem to be learning a different language to the one they use at home. The conceptual aspects of Mathematics learning are connected to the language. It is exclusively bound to the symbolic representation of ideas. Most of the difficulties seen in Mathematics result from underdevelopment of the language of Mathematics (Sharma, 1989). Teaching of the linguistic elements of Mathematics language is sorely neglected. The syntax, terminology and the translation from English to Mathematics language and from Mathematics language to English must be directly and deliberately taught. Consequently, Mathematics language can pose challenges for children. For a teacher to get through to her children he/she should have an understanding of the "Mathematic language". An added problem is that certain Mathematics terms such as "hypotenuse" are not found in everyday conversations (Machaba, 2013).

2.9 Student's Attitude and Performance in Mathematics

The topic of attitudes and problem solving in mathematics has received a lot of attention in the literature (Effandi & Normah, 2009). One of the key factors that affects pupils' success in school is attitude. According to Mohd et al. (2011), a student's attitude has an impact on how they connect with their friends, families, teachers, and other students. Thus, a student's attitude toward a course will influence how successful they are. Students' attitudes toward mathematics are closely tied to their attitudes about problem-solving in general (Effandi & Normah, 2009). Thus, it is

crucial that students develop their problem-solving abilities because these abilities are necessary for navigating daily life with competence. O'Connell (2000) backed up Effandi and Normah's (2009) assertion by pointing out that for students to succeed, they must have a positive attitude toward problem-solving. O'Connell (2000) suggested that in order to solve difficulties, one must have patience, tenacity, perseverance, and the willingness to take chances. This is consistent with Papanastasiou's (2000) assertion that students who have a favourable attitude toward mathematics will typically perform well in the subject.

2.9.1 Patience towards Problem Solving and Mathematics Achievement

According to a study by Faridah (2004), learners with high levels of perseverance will keep working on an issue until they are able to solve it. They will not give up until they find the solution. According to Faridah (2004), the majority of learners start trying to solve the puzzle without first making any plans on how they will achieve it. Only a modest fraction of students is able to resolve the mathematical problems as a result. Faridah (2004) claimed that these students lacked the perseverance necessary to attentively read and comprehend the demands of the offered questions. As a consequence, Faridah's research revealed that patience in problem solving is crucial to getting good grades in mathematics.

2.9.2 Confidence towards Problem Solving and Mathematics Achievement

According to Education Matters (2008), students' commitment to mathematics includes their drive to master the subject, their belief in their capacity for success, and their emotional reactions to it. The dedication of students to mathematics is crucial for the development of their mathematical abilities and knowledge. As a result, it is thought that confidence in problem-solving skills is one of the elements that

influences students' achievement in mathematics and that it has a major impact on mathematics achievement. Bandura (as cited in Mohd et al., 2011) claims that a person's self-efficacy expectation of his or her ability to successfully complete a given task is a reliable predictor of whether or not they will attempt a task, the amount of effort they will put forth, and their level of perseverance in the face of unforeseen difficulties were further highlighted by Andrew et al. (2009). Self-efficacy has been employed in the evaluation of performance in a range of academic fields, although a primary focus has been tied to mathematical skills (Kranzler & Pajares, 1997). According to Tooke and Lindstrom (1998), success depends on having confidence in one's ability to master mathematics and solve problems. As a result, Mohd et al. (2011) noted that confidence is crucial to success in mathematics.

2.9.3 Learning Environment

For children with disabilities, there may be a variety of learning contexts (such as the resource room and inclusion inside the regular education classroom). Each environment is distinct, and the most flexible location for learning depends on the students' cognitive abilities. The inclusion of students in the normal education mathematics classroom should be at their highest level. It is said that inclusion is a philosophy. This philosophy is supported by two justifications. The first defence involves keeping students apart in different classes or programs. Thus, depriving them of excellent educational opportunities. Secondly, Collins (2012) asserts that segregating students with learning difficulties has not produced appropriate educational outcomes. The facilitator in this scenario is the highly qualified mathematics teacher (NCTM, 2000). According to Graham et al. (2007), a teacher is considered to be highly qualified if they have at least a bachelor's degree, are fully

licensed in the state where they teach, and can demonstrate their subject-matter expertise.

Two hundred and twenty-eight middle school mathematics teachers in nineteen states were sampled by DeSimone and Parmar in 2006. According to DeSimone and Parmar (2006), the majority of respondents agreed with the concept of inclusion but opposed using teaching methods and techniques for children who struggle with mathematics in their classrooms. The strong emphasis middle school administrators place on instructors, subject-area curricula, instructional changes, and adaptations required for children with special needs puts pressure on mathematics teachers. These are frequently neglected and sacrificed. Some mathematics teachers feel they don't have the resources, training, time, or training in working with children with disabilities that is required to make inclusion successful for the students and teachers.

In a study, Campbell et al. (2003) discovered that after participating in a semester-long field experience and formal teaching, the teachers had positive attitudes regarding working with children with impairments. Although they had received expert training to teach subject content, they lacked the interpersonal skills required to effectively interact with pupils. The same teachers advocated inclusive settings and held that the general education classroom was not the proper environment. DeSimone and Parmar (2006) discovered that middle school mathematics teachers, who were subject experts, felt responsibility for fostering student mastery but not for adapting instruction to accommodate varied learning styles. It can be challenging to develop conceptual understanding with students. But it can be especially challenging when dealing with students that struggle with mathematics. According to Campbell et al.

(2003), taking a full semester course that combined formal education with structured field work experience led to a rise in positive views toward students with impairments. The mathematics instructor is expertly qualified to instruct the subject matter. However, he or she might not have the essential abilities to work with children who have individual education plans.

A resource room is a classroom where a special education teacher works with a single student or a small group of children while implementing accommodations, adapted curricula, and other instructional techniques that are more effective with students who struggle with mathematics (Collins, 2012). Students who need a lot of assistance in mathematics or another topic are put in the appropriate resource room. The particular demands of a child who is gifted and needs specialized resources and teaching methods are met by special education teachers through carefully tailored instruction (Algozzine et al., 1988). The special education instructor in this setting is in charge of imparting lessons in mathematics, reading, language arts, and other subjects. Up to 79% of the school day may be spent in standard education classrooms, beyond which time students may proceed to the resource room to receive the in-depth training in one or more subject areas that they require. The special education instructor must adhere to the same scope and sequencing, NCTM standards, and assessment procedures while instructing students with mathematics learning disabilities in the resource room (Hawkins, 2007).

According to Brownell et al. (2010), special education teachers need to be highly skilled in the fundamental subject areas they teach because they must understand how disability-related difficulties might thwart learning and how research-based solutions can be used to intervene. Additionally, the combination of a highly

educated special education teacher and a mathematics instructor is knowledgeable in both the principles and methods of mathematics. When working with the special needs population, special education teachers employ research-based approaches (Brownell et al., 2010). More specifically, mathematics content needs to be solved in a more straightforward manner for children with learning impairments. According to Vlachou et al. (2006), 53.7% of students preferred the resource room, whereas 38.9% chose the conventional classroom. Due to the smaller student population and more teacher involvement, these students believed that they learned more efficiently in the resource room. Also, the students in the resource room felt more relaxed to ask questions and solicit help when needed.

2.10 Causes of Poor Performance in Mathematics in Schools

It appears that the performance of junior high school students in Mathematics has not been the best over the past few years. The causes of students‟ poor performance in Mathematics can be attributed to school factors, student factors, teacher factors, as well as government factors. It is worth noting that over the past years, efforts have been made to bring a lasting solution to the problem. For instance, Umameh (2011) stated that events like the Comparative Education Study and Adaptation Centre (1976) that took care of the secondary level Mathematics syllabus, the Benin Conference (1977), and The National Critique Workshop at Onitsha as well as The National Mathematics Centre, all did a lot with the aim of ending students‟ poor performance in Mathematics. According to Bakare (as cited in Asikhia, 2010), the factors militating against good academic performance can be categorized into four principal areas as follows.

- Causations resident in the child such as basic cognition skills, physical and health factors, psych emotional factors, and lack of interest in school programme.
- Causations resident in the family such as cognition stimulation/basic intuition during the first two years, type of discipline at home, lack of role model, and finance.
- Causations resident in the school such as school location and physical buildings, and interpersonal relationships among the school personnel.
- Causations resident in the society such as instability of educational policy, under funding of the educational sector, leadership, and job losses.

The causes of students‟ poor performance in Mathematics is well documented. Vudla (as cited in Tshabalala & Ncube, 2013) was of the view that shortage of well trained teachers, inadequate teaching facilities, lack of funds to purchase necessary equipment, poor quality of textbooks, overcrowded classes, poorly motivated teachers, lack of laboratories and libraries, poorly coordinated supervisory activities, interference of the school system by the civil service, incessant transfers of teachers and principals, automatic promotions of pupils, the negative role of public examinations on the teaching and learning process, and inequality in education opportunities all hamper the smooth acquisition of Mathematics knowledge.

In addition, Ojimba (2012) was of the view that the causes of students‟ poor performance in Mathematics include factors such as; acute shortage of qualified professional Mathematics teachers, exhibition of poor knowledge of Mathematics content by Mathematics teachers, overcrowded Mathematics classrooms, students‟ negative attitude toward Mathematics, undue emphasis on the coverage of

Mathematics syllabus at the expense of meaningful learning of mathematical concepts, inadequate Mathematics facilities and laboratories.

Also, the National Institute for Educational Development [NIED] (2010) found out in Britain that the reasons for students‟ poor performance in Mathematics from the point of views of principals included lack of learning support, principal teachers‟ dissatisfaction with the career training of teachers in Mathematics, perceived shortage of instructional resources for teaching Mathematics, learners taught by teachers who have not participated in career professional development, Mathematics contents were not fully covered, and emphasis is placed on few areas that involve numbers.

The National Institute for Educational Development [NIED] (2010) attributed the causes of students‟ poor performance in Mathematics to students‟ misconceptions of the subject as a difficult one, fear, and anxiety. Thus, students often develop mathematical anxiety in schools, often as a result of learning from teachers who are themselves anxious about their mathematical abilities in certain areas. Attwood (2014) attributed students‟ poor performance in Mathematics to parental attitude, interrupted teaching, poor teaching and dyscalculia. Karue and Amukowa (2013) pointed out that lack of well-resourced library and laboratory, inadequate qualified teachers, home environmental factors and family backgrounds as well as little participation of parents in the education of their children were the main causes of students‟ poor performance in Mathematics in Kenya. Therefore, it is clear that the causes of students‟ poor performance in Mathematics include inadequate qualified teachers, inadequate stock of relevant instructional materials, inadequately resourced libraries and laboratories, poor attitude of students, improper teaching methods,

anxiety, home background, overcrowded classrooms, interrupted teaching, dyscalculia, poorly motivated teachers.

2.10.1 Teacher Factors Affecting Students' Performance in Mathematics

Idowu (2017) noted that Mathematics teachers had on several accounts been judged as the main determinant in the success or failure of students in the subject. This is assertion is justifiable for a number of reasons. According to Idowu (2015), Mathematics teachers are the main custodians of students hence, the way and manner in which they perform their role is important. Mathematics teachers are expected to have the required knowledge necessary for teaching as well as the ability to disseminate such knowledge appropriately that will result in learning. Mathematics teachers, according to Soer (2009), should be able to communicate the required knowledge in a clear, informative and precise manner to their students. This, unfortunately, according to Okafor and Anaduaka (2013), is not being done by the Mathematics teachers. Thus, most Mathematics teachers are not ready to go the extra mile in their teaching to help students to learn better.

Avong (2013) identified shortage of qualified Mathematics teachers in remote schools to be the major contributing factor to students‟ poor performance in Mathematics. Kaplan and Owings (2002) also noted that teacher and teaching quality including teacher knowledge about content and pedagogy, can greatly impact student achievement. According to Masinjila (1989), quality education requires quality teaching force. Highly qualified teachers are most capable of helping their students to learn and have deep mastery of both subject matter and pedagogy (Darling-Hammud, 1997). Preparations that teachers receive before beginning their work varies significantly especially within the least developed countries. Makau and Sommerset

(1986) noted that academic and professional qualification of teachers were crucial factors in influencing performance. The differences in teaching affects performance and those schools with the best qualified teachers tended to be the most successful in examinations. A number of teachers typically lack the expertise to prepare effective pedagogical material, employ effective teaching methods and develop valid and reliable tests hence, students‟ test scores on teacher made tests often do not accurately reflect the mastery of the content. Adeyemi (1989) reported that a teacher who does not have both academic and professional teacher qualifications would undoubtedly have negative influence on teaching and learning of Mathematics. Adeyemi, further noted that a teacher who is academically and professionally qualified but works under unfavourable conditions of service would be less dedicated to his or her work.

Fettler (1999) investigated the relationship between measures of teachers‟ experience and students‟ achievement in Science and Mathematics. Fettler, found that teaching experience as measured by years of service correlated positively with students‟ test results. Effective teaching embraces a variety of different aspects of teaching such as subject mastery, effective communication, lesson preparation and presentation, pacing the class to the students‟ level and taking into account individual differences, allowing students to practice and applying what they have learned, letting students know what is expected of them, and monitoring and evaluating performance so that students learn from their mistakes. Jacob and Lefgren (2006) found a positive correlation between effective teaching and academic achievement. Similarly, Adediwura and Tayo (2007) suggested that effective teaching is a significant predictor of students‟ academic achievement and that effective teaching produces students of higher academic quality.

Teacher regularity in the classroom is a most important factor for achievement level of the students. A widespread problem of teacher absenteeism is likely to contribute to poor students‟ performance. The prevailing evidence is that teacher absenteeism in Ghana appears to have worsened in the last fifteen years (World Bank, 2004). The World Bank impact evaluation education in Ghana found that in 2003, nearly 13 per cent of teachers had been absent in the past month, compared to just over 4 per cent in 1988. It also uncovered that in 1988, 85 per cent of schools did not suffer at all whereas this figure fell to 61 per cent, with 13 percent of schools with over one-third of the teachers being absent for reasons other than sickness in the past month.

The World Bank (2004) also found teacher non-attendance to be significantly worse in rural schools than in urban schools, and worse in public schools compared to private schools. The CARE International (2003) report which looked at deprived rural areas in northern Ghana talked of chronic teacher absenteeism which adversely affects the learning environment. According to Dunne and Leach (2005), the low levels of professionalism in schools (especially low performing ones), with teachers having high rates of lateness, absenteeism and sometimes refusing to teach during classes is on the increase.

The World Bank (2004) report put forward a number of reasons for the increasing teacher absenteeism in Ghanaian schools. These included teachers living long distances from schools and experiencing transportation difficulties, teachers having to travel to town once a month to collect their salaries which may or may not have arrived and rural teachers engaging in farming activities at the expense of teaching. Although factors were context-specific, multivariate analysis on teacher

survey data in Ghana also indicated that teacher absenteeism was more likely to occur if the following factors were prevalent: poor working conditions, low morale, and high pupil-teacher ratio, living with spouse, being in their home district, and having good social relations (World Bank, 2004).

Barnes (2003) indicated how teachers are being encouraged in Ghana to facilitate local level development which although could have positive impact on schooling can also lead to teacher absenteeism and lateness.

Fobih et al. (1999) surveyed some 60 Ghanaian schools and found that about 85 per cent of teachers go to school late. Lateness ranged from five minutes up to one and a half hours. This meant teaching time was lost, teachers taught fewer school subjects (i.e. taught mainly English and Mathematics out of eight subjects), and the shortening of the school day for students. Lateness and absenteeism affect completion of syllabus. When the syllabus is not completed, students find it difficult to understand content that is to be taught in the next class which foundation in most cases is based on the previous class. This assertion buttresses Pryor and Ampiah‟s (2003) view that most students do not follow school work because they do not possess the understanding from previous work that is prerequisite for the syllabus. Both teacher absenteeism and lateness according to Bennell and Akyeampong (2007), are symptomatic of education systems that are unable to manage teachers effectively, have weak teacher management structures, and are unable to provide incentives to motivate teachers to improve their attitudes to work in schools.

A teacher who lacks both the academic and professional teacher qualifications will surely have a negative impact on the teaching and learning of the subject (Agyeman, 2005). A sizeable portion of the mathematics teachers in Ghana's

educational system are not certified to instruct the subject but are instead hired to make up for the shortage of qualified mathematics instructors. Such teachers lack the necessary abilities and teaching strategies for teaching mathematics. In comparison to students who are taught by competent, professional mathematics teachers, students of such teachers do not score well in the subject (Oduro & MacBeath, 2003). Agyemang (2005) went on to say that a teacher who is academically and professionally qualified but is employed under unfavourable conditions of service would be less committed to their work and consequently less productive than a teacher who is unqualified but is employed under favourable conditions of service.

Good teachers are familiar with the unique blending of pedagogy and subject. In order to encourage or enhance the learning of that information by various students, Stephenson (2018) said that pedagogical content knowledge pertains to knowing how to provide precise content in a way that is understandable to students. Most teachers lack the ability to encourage students' mathematical thinking. Pedagogical knowledge, on the other hand, is general knowledge about teaching and includes topics like classroom administration. The distinction between pedagogical and content knowledge may not always be clear-cut because they overlap and build upon one another (Stephenson, 2018). To teach students to comprehend mathematics and perform effectively in it, teachers must have adequate material and pedagogical understanding.

Lack of instruction is another teacher-related reason to blame for students' poor mathematics performance. In order to succeed, motivation is an important component of education. It is the force that propels human behaviour and is connected to sincere interest, tenacity, and commitment, as well as academic performance

(Sekreter & Doghonadze, 2016). The urge to teach or learn is more or less aroused in students or teachers through motivation (Farr & Riordan, 2015). It has been demonstrated that a teacher's enthusiasm, self-determination, or self-efficacy affect their behaviour, which in turn affects the motivation and accomplishment of their students (Sahakyan et al., 2018). Teachers who are motivated also regard changes in the educational system with greater flexibility and openness (Abós et al., 2018). More specifically, motivated teachers use a range of instructional strategies, give more engaging courses in the classroom, and develop strong relationships with their students (Sekreter & Doghonadze, 2016). If a teacher's needs are not satisfied, they may become unstable psychologically and hence unproductive. Asamoah (2009) added that motivation is the key to raising performance. Hence, it is important for employers to know what drives their staff members. Ghana's lack of widespread implementation of mathematics teacher motivation prevents instructors from performing to the best of their abilities (Asamoah, 2009).

Allen et al. (2018) assert that as instructors serve as role models for students, their attitudes and beliefs have a significant impact on students' lives. According to Afif et al. (2017), teachers who have a good attitude about mathematics are more likely to instil that attitude in their students. Evidence has demonstrated that some teachers' attitudes toward their jobs are reflected in their poor attendance at lessons, tardiness to school, critical comments about students' work that may undermine their self-esteem, and ineffective teaching strategies that ultimately have an impact on students' academic performance (Harris & Bourne, 2017). According to research, students who have motivated teachers are brave and ready to take on the challenges of school life (Keighren et al., 2017). This implies that in order to inspire students to adopt a good attitude toward learning mathematics, teachers must cultivate positive

attitudes themselves. Students are organically motivated to learn mathematics and perform better by teachers' attitudes toward mathematics (Zee & Koomen, 2016). The majority of mathematics teachers in Ghana do not view mathematics as a profession, and they have a negative attitude toward research into innovative teaching and learning techniques. As a result, they consistently apply the same approaches, with the same outcomes.

2.10.2 Student Characteristics

The most important factor affecting a student's capacity to perform well academically is their level of intellect (Nichols & Sutton, 2013). They will not like teaching and learning if they lack the cognitive ability to comprehend and retain the knowledge and skills provided. Additionally, it has been noted that smart students frequently assist the underachievers in improving their grades and boosting their self-esteem (Butakor & Dziwornu, 2018). The academic performance of students with low IQ levels is bad. Nichols and Sutton (2013) claim that in order to identify children with limited mental capacity and help them grasp mathematical concepts so they may perform better in mathematics, teachers need to build strong relationships with their students.

Students' attitudes toward mathematics have an impact on the effort they make to comprehend and practice mathematical ideas and techniques. According to Akey (2006), students' expectations for academic success and perceptions about their competence have a direct impact on their levels of involvement as well as on emotional states that either support or hinder this capacity. As a result, a student's attitudes influence the amount of work he or she is likely to put into learning mathematics. For students to perform well, mathematics teachers must work to

maintain a favourable attitude toward the subject (Butakor & Dziwornu, 2018). Additionally, students' and adults' hatred of mathematics is linked to dread and anxiety. Adults who experience this anxiety and terror may develop unfavourable attitudes regarding the issue, and these attitudes are then passed on to children by adults (Butakor & Dziwornu, 2018).

According to Butakor et al. (2017), students' time commitment to their homework and other related tasks is also closely related to their motivation. Etsey (2005) discovered a correlation between academic success and homework. According to Etsey (2005), homework has a beneficial impact on learning outcomes when it is pertinent to the learning objectives, given out on a regular basis in manageable amounts, clearly explained, motivating, and collected and discussed in class. It also serves as a platform for giving students feedback. When measuring academic progress, homework is a crucial component of the educational process since it bridges the gap between school and the home (Etsey, 2005). In addition, due to financial difficulties, students have recently felt the necessity to work while continuing their studies part-time. According to research on the issue, students who frequently miss class do worse than those who regularly attend classes (Oduro & MacBeath, 2003). Additionally, a lot of students think that they are successful for a number of reasons, and their beliefs and passions have a big role in how they react to failure, take chances, and engage with new opportunities. It goes without saying that a number of fundamental factors, effort foremost among them, affect students' academic success.

Students‟ characteristics that have generally been identified to influence their performance in Mathematics include; the amount of time they spend with their books

and homework, attendance to school, students‟ attitude towards schooling, students‟ self-concept and motivation, and health and nutritional status of students.

According to Engin-Demir (2009), regardless of intelligence, students who spend more time on assignments and homework are more likely to improve upon their grades. The amount of time students invests in homework and other related activities have also been found to be strongly related to motivation. Butler (1987) found homework to be a correlate of academic performance. Butler, noted that homework bore a positive relationship with learning outcomes when it is relevant to learning objectives, assigned regularly in reasonable amounts, well explained, motivational and collected, reviewed during class time, and used as an occasion for feedback to students. Homework and assignments are in reality an interaction between school and the home, and an essential ingredient of the educational process when measuring academic achievement.

Moreover, Stricker and Rock (1995) conducted an analysis by assessing the impact of the students‟ initial characteristics (gender, ethnicity, parental education, geographic region and age) and the academic performance. Stricker and Rock, established that the student‟ initial characteristics have a modest impact on their academic performance with parental education being the most significant. In addition, school attendance has a high correlation with individual academic achievement (Osei-Mensah, 2012).

The success of a student in school is predicated on regular school attendance. According to Welsh et al. (2000), poor attendance such as truancy or unexcused absence from school, cutting classes, tardiness, and leaving school without permission is seen as important in determining students‟ academic performance. Heady (2003)

argued that there is a negative relationship between students‟ academic achievement and work during school hours. As Akabayashi and Psacharopoulos (1999) found that additional working hours decrease a child‟s reading and computational ability, whereas with additional hours of school attendance and study the reading and computational ability increased. This implies that such a student requires maximum time to study in the classroom, the issue of extra classes should be looked at to ensure quality and not quantity of academic exercise.

From their findings, Ray and Lancaster (2003) concluded that time spent at work had negative impact on education variables with marginal impact weakening at higher levels of study hours. Several researchers have investigated the significant role of student attitudes toward learning with regard to their academic achievement. Students‟ attitudes such as absenteeism, truancy, and indiscipline can affect their performance. For instance, McLean (1997) found by distinguishing between the attitudes of high and low achievers, that five attitudinal factors were significantly related to academic performance. Students‟ attitudes may not only directly affect academic achievement but may indirectly influence the effect of other factors as well. In another study, Abu-Hilal (2000) found the effect of attitudes on student level of aspiration. Hassan (2002) further complemented the results of earlier studies with the former proving that the students‟ initial attitude towards school was significantly related to academic performance while the latter found that attitudes predicted the students‟ basic approach to learning.

According to Hamachek (1981), self-concept refers to the set of perceptions or reference points that a person has about himself, the set of characteristics, attributes, qualities and deficiencies, capacities and limits, values and relationships that he

knows to be descriptive of himself and which he perceives as data concerning his identity. It is the set of knowledge and attitudes that people have about themselves. The perceptions that the individual assigns to himself/herself and characteristics or attributes that people use to describe themselves. According to Osei-Mensah (2012), self-concept concerns the group of thoughts and beliefs that a student has about his/her academic ability. Self-concept results from the student‟s internalization of his/her social image.

Self-concept is developed from different interactions with the social environments and agents. Great importance is assigned to the students‟ self-image and the acceptance or rejection by others. This factor has also been investigated by several authors, as regards the relationship between self-concept and academic achievement. Marsh (1990) investigated the reciprocal relationship between self-concept and academic achievement and found that an individual‟s present achievement is affected by prior academic self-concept, and that grades had no effect on subsequent academic self-concept. Similarly, Marsh and Yeung (1997) revealed that prior academic achievement did affect subsequent academic self-concept, and likewise, prior academic self-concept also affected subsequent achievement, with prior achievement being the control. Contrary to these results, Helmke and Van Aken (1995) found that elementary school achievement did not affect prior self-concept. Edwards (2002) found that self-concept better predict performance than variables such as age or student gender.

Another variable most studied in relation to self-concept is motivation. Motivation is considered to be the element that initiates the student‟s own involvement in learning. When a student is strongly motivated, all his effort and

attention are directed toward the achievement of a specific goal. In relation to students‟ academic achievement motivation is influenced by the students‟ perception of parental support and involvement. If students‟ perception is positive on their parents‟ support and involvement, they will perform well academically. Gottfried (1994) revealed that parental motivational practices have significant direct effects on academic intrinsic motivation, and indirect effects on subsequent motivation and achievement. According to Engin-Demir (2009), students‟ perceptions that their parents are involved and interested in their schooling and encourage them to do well are positively related to academic achievement. Through their involvement, parents convey the message that schooling is important and provide their children with positive emotional experiences in relation to schooling. Fuchs and Woessmann (2004) observed that students performed significantly worse in reading, Mathematics and Science in schools whose principals reported that learning was strongly hindered by the lack of parental support however, some researchers have shown that most aspects of the relationship between educational support of parents and scholastic achievement of children to be negative.

Studies have also looked at students‟ nutritional and health status on school indicators such as classroom concentration, general intelligence and performance on selected cognitive tasks including achievement test scores. Research by the Ghana National Commission on Children (GNCC, 2000) found that in total, a little over 16 per cent of school-aged children surveyed, suffered from recurring health problems such as headache, malaria/fever, stomach disorder and other ailments. Research by Fentiman et al. (2001) revealed that 70 per cent of all primary school-age children were anaemic. Sarris and Shams (1991) studied malnutrition among school age children in Ghana and found that about 36 per cent of children surveyed were

malnourished. Most weighed below the 80 percent Harvard weight-for-age standard. This means, much as teachers may try as much as they can to deliver lessons appropriately, several aspects of the student‟s well-being should be taken care of by parents to ensure a sound mind for students to learn.

The GNCC (2000) survey also reported that only about a third (29%) of children ate meals with protein. The research indicates that in general malnutrition is higher in Northern Ghana (Sarris & Shams, 1991) where socio-economic indicators are low. In these regions enrolment, attendance, completion rates and achievement tend to be lower as well. Health has the potential to affect access to schooling. Research indicates a student‟s health can influence when and whether they go to school, their functioning in school and how long they are expected to stay in school. Research in Ghana indicates a correlation between malnutrition, stunted growth and delayed enrolment in school (Fentiman et al., 1999).

The researcher believes a student‟s health status affects how he/she functions at school. Children who suffer from malnutrition, hunger, or who lack certain micronutrients do not have the same potential for learning as healthy and well-nourished children. Harbison and Hanushek (1992) found a statistically significant relationship between health and nutritional indicators and academic achievement. They concluded that the influence of poor health and nutritional status on achievement begins early in a student‟s life and have cumulative impact on students‟ achievement.

Vegas and Petrow (2008) asserted that although the mechanisms by which malnutrition affects academic performance are not known, deficiencies in proteins, calories and micronutrients are believed to impair cognitive development. Lockheed

and Verspoor (1991) indicated that three aspects of nutritional status that affect academic achievement adversely are temporary hunger, micronutrient deprivation, and protein-energy malnutrition. A local study on early primary school children in Malaysia showed a weak but significant association between poor nutritional intake and academic achievement. Pollitt (1990) reported a significant relationship between protein-energy, nutritional status, and school performance in Kenya. Pollitt, further indicated that children who are temporary hungry as a result of not eating breakfast are more easily distracted from their school work than those who have eaten.

2.10.3 Home Environment and Academic Performance

Throughout the world, educationalists and scholars have long been interested in understanding and recognizing the factors that contribute to academic excellence and interventions homes have put in place to enhance pupil‟s academic performance. Various factors including economic status, parental involvement, family size as well as family education background have been examined in relation to academic achievement (Eamon, 2005). Parents‟ socio-economic status is a factor that contributes to students‟ academic achievement. Students‟ academic achievement is negatively correlated with the low level of parent‟s socioeconomic status (SES) because it hinders the individual in gaining access to funds and resources of learning (Duke, 2000). Low SES level strongly affects the achievement of students, bringing them to a lower level (Sander, 2001). It is observed that the economically disadvantaged parents are less able to afford the cost of education of their children at higher levels and consequently they do not work at their fullest potential (Rouse & Barrow, 2006). Socio-economic status is a critical issue when it comes to pupil schooling and academic performance. Otieno and Yara (2010) explained that learners from low socio-economic status families tend to value domestic activities more than

schooling. Walters and Soyibo (2001) further elaborated that students‟ performance is very much dependent on socio-economic back ground (SEB). Walters and Soyibo (2001) were of the view that high school students‟ level of performance is with statistically significant differences, linked to their gender, grade level, school location, school type, student type and socio-economic background (SEB)".

A number of studies have been conducted on parents‟ socio-economic status as a factor which contributes to academic achievements. In Pakistan for instance, Qaiser et al., (2012) conducted a study on the effects of parental socio-economic status on the academic achievement of secondary school students in Karak District. The study considered sixty government boys‟ high schools, 10th grade classes from which 1500 students were selected using simple random sampling. The study was a study and used self-developed structured questionnaire to collect data. Findings of the study reveal that parents‟ educational level, parental occupational level and parental income level affect the academic achievement of secondary school students. The findings of Qaiser et al., (2012) give an insight into factors to consider in enhancing students‟ academic performance. The use of one thousand five hundred (1500) students in the study gives a wider representation of the population however, had the sample involved both male and female secondary schools the findings would have been more gender balanced and would have shown a true picture of whether or not female pupils do get affected by their parents‟ socio-economic status.

In India, Mushtaq et al., (2016) conducted a study on the effect of socio-economic status on academic performance of secondary school students of Ganderbal District of Jammu and Kashmir States. The study had one hundred and twenty (120) student participants, a socio-economic status scale was constructed and standardized,

and data was collected using previous academic progress records from schools. The results showed that there was a significant difference in the academic achievement of high socio-economic status of students in comparison to low socio-economic status of students. Significant differences were found between the students with (high and low) and (high and middle) socio-economic status.

In Africa, Kapinga (2014) conducted a study on the impact of parental socio-economic status on students‟ academic achievement in secondary schools in Tanzania. The study employed a qualitative research approach informed by a case study. The study included sixty (60) informants which where teachers and students. The study found that majority of the students from selected secondary schools are from low SES, and their parents are not concerned with their children‟s learning. The study established that there is a closer relationship between SES and academic achievement.

Okemwa (2014) conducted a study in Kenya on the influence of parental socio-economic status on pupil‟s academic performance at Kenya Certificate of Primary Education in Kiamokama Division of Kisii Country. The study focused on eight selected secondary schools, the informants included pupils, head teachers and teachers, and the study sample was four hundred and sixteen (416) respondents. The findings revealed a significant relationship between the parents‟ education level and the academic performance of pupils in schools in the study area.

With regards to parental involvement in children‟s education undertakings, research has shown that the educational level of parents plays a pivotal role. According to Halle et al., (1997) mothers with higher education have higher expectations for their children‟s academic achievement and these expectations are

related to their children‟s subsequent high academic achievement. Literature reveals that, the positive beliefs parents have in their children‟s abilities to achieve excellence, creates a platform for higher amounts of achievement-related behaviour as well as more positive perceptions of achievement by the children. According to Duke (2000) parent-child interactions lead to high academic achievement performance as the attitudes of the pupil‟s parents affect the academic success of their children.

There is adequate documented literature on the impact of parental involvement in children‟s education globally. In Western Australia a study was conducted by Malik (2000) on the influence of the home and school environments on the academic performance of Chinese Australian and Anglo-Australian students. The findings of the study suggest that the reason why Chinese-Australian and Anglo-Australian children have different educational outcomes is that these families socialize their children differently. From the findings of Malik (2000) it is evident that parental socialization with school going children is likely to yield positive academic performance for the children.

Ghanney (2007) also examined the effects home environment has on the student‟s achievement in primary schools in Winneba Township. Ghanney, found that positive parental attitude towards education, great parental support and interest combine to enhance student‟s progress in education rather than the level of parent‟s educational attainment.

In Kenya, Kamuti (2015) conducted a study on the influence of the home environment on academic performance of students in public secondary schools. The study sought to determine the influence of parent/family involvement on students‟ academic performance. The findings of the study were that the parent‟s economic

status influences students‟ academic performance, parent/family involvement as well as parenting styles influence students‟ academic performance in public schools.

Family size has as well been looked at as a factor that affects the academic performance of pupils. Large family size from a low SES home affects the pupil‟s academic performance in that usually the pupil might not have all school materials that they need, they might not have space at home to study from and they might not even have their parents check through their school books because parents might be busy selling to meet the needs of the big family. According to Karue and Amukowa (2013), poverty of parents has effects on their children‟s academic work because it makes them lack adequate resources and funds to sponsor their education. The United States Census Bureau on the relationship between poverty and student‟s performance found that a student from a family of low economic status plays a huge role in his/her own education. Parents with lower incomes often have to work longer hours to earn their small income.

In Australia, Deborah and Julie (2013) conducted a study on the impact of family size on school achievement. The sample involved primary school pupils aged between eight and nine years old and ten and eleven years old in Victoria. The impact of family size was identified via instrumental variables (IV), exploiting plausibly random differences in the gender mix of siblings and twin births. The study results provide strong evidence for the existence of a quantity-quality trade-off, with IV estimates suggesting an economically meaningful negative impact of having more than one sibling. The study was longitudinal and it commenced in 2004 with the recruitment of two cohorts where one was of five thousand, one hundred and seven (5,107) children aged between zero and one-year-old and the second was of four

thousand, nine hundred and eighty-three (4,983) children aged between four and five years old. Deborah and Julie, gave detailed findings on whether or not family size does affect academic achievement, especially by the use of a longitudinal study however, considering the duration of the study, there is a high possibility of incurring a lot of changes with the characteristics of the sample with which the study started and these changes might alter what the study initially intended to find out.

Ella et al. (2015) conducted a study on the influence of family size and family type on academic performance of students in government schools in Calabar municipality cross River State, Nigeria. A sample of two hundred (200) students from six public secondary schools were used for the study. The data was analyzed quantitatively using one-way analysis of variance. The study used a survey research design and the results revealed a significant influence of family size and family type on academic performance of secondary school students. It must however, be pointed out that the number of siblings that a pupil has is assumed to have an influence on his/her academic achievement. The larger the family size the less the attention and devotion a child gets from the parents. Also, the larger the family size the more the difficulties encountered by the parents in meeting the needs (both physically and emotionally) of children particularly in this austerity period when the prices of essential goods and services keep skyrocketing (Asikhia, 2010). An increase in the number of children in the family lead to less favourable child performance outcome. Children from larger families have been found to have less favourable home environments and lower levels of verbal facility as well as highest rates of behavioural problems and lower levels of education achievement (Donkor, 2019).

Socio-economic status may be linked to family structure. There is evidence to show that children from single-parent household do not perform well in school as compared with students from intact (two-parent) households (Majoribanks, 1996). Barry (2005) supported Majoribanks, by explaining that students from single-parent families are likely to have lower educational performance because sole parent families on average have lower levels of income, are headed by parents with lower educational attainment, and are less likely to be in the labour force. According to Barry (2005), other factors that is likely to adversely affect educational outcomes of such students compared to those from two-parent families could include: the custodial parent having less time to spend with students in terms of supervision of school-work and maintaining appropriate levels of discipline; increased responsibilities on students such as childcare roles; domestic duties which impede the time available for school work; and the nature of parent-child relationships in sole parent families may cause emotional and behavioural challenges for the child.

Divorce has been found to negatively affect academic performance (Jeynes, 2002) as students whose parents are divorced are among those who scored lowest on a standardized test. A possible explanation for this relationship, according to Majoribanks (1996) is that divorce can cause a family‟s socio-economic status to decrease and parental connection harmed. This implies that the quality of parents and home background of a student goes a long way to predict the quality and regularity of the satisfaction and provision of a child's functional survival and academic needs. Poor parental care with gross deprivation of social and economic needs of a child, usually yield poor academic performance of the child (Donkor, 2019). On the other hand, where a student suffers parental and material deprivation and care due to divorce or death, or absconding of one of the parents, the student‟s schooling may be

affected as the mother (in most cases) alone may not be financially buoyant to pay school fee, purchase books and uniforms. Therefore, such a student may play truant and his/her performances in school may be adversely affected. Similarly, good parenting supported by strong economic home background could enhance strong academic performance of the child. This further predicts academic performance where the student is properly counselled in the choice of his/her courses and vocation that matches his mental ability, interest and capability.

2.10.4 School-Related Factors

Several school environmental factors have generally been identified as influencing academic performance. They include availability of instructional materials, school location and quality of the physical facilities, class size and pupil-teacher ratios, teacher qualification and experience, and supervision.

Barry (2005) was of the view that students‟ educational outcome and academic success are greatly influenced by the type of schools they attend. Barry, noted that the school one attends is the institutional environment that sets the parameter of a student‟s learning experience. Depending on the environment, a student can either close or open the doors that lead to academic achievement. A learning environment that is not free of obstacles or distractions such as noise, gas/smoke pollutions and so on can constitute health hazards, which in turn affect or reduce the student‟s concentration or conceptual focus to learning. According to Barry (2005), markets and garages located near schools have always posed a threat to students. Noise and pollution from these sources have always endangered students‟ life and concentration. Therefore, for an effective learning and high academic performance, schools in both rural and sub-urban and urban areas should be located off zones characterized with

smoke/gas pollutions, market centres or garages, as conducive learning environments stimulate learning, understanding and high perception (Osei-Mensah, 2012).

Crosnoe et al. (2004) suggested that school sector (public or private) and class size are two important structural components of schools. Private schools tend to have better funding and smaller class size than public schools especially in Ghana. The additional funding of private schools leads to better academic performance and more access to resources such as computers which have been shown to enhance academic achievement (Eamon, 2005). Smaller class size creates more intimate setting and therefore can increase teacher-students bonding which has also been shown to have a positive effect on students‟ success (Donkor, 2019).

According to Danesy (2004), other factors that compliment environmental and socio-economic factors to produce high academic achievements and performance include good teaching, counseling, good administration, good seating arrangement and good building. Dilapidated buildings, lacking mentally stimulating facilities that are characterized with low or no seating arrangements are also destructive to students‟ academic achievement. Danesy, indicated that innovative environment do stimulate head start learning and mental perception. It has also been proved that students who come from simulative environments with laboratory equipment or those that are taught with rich instructional aids perform better than those trained without rich instructional aids (Osei-Mensah, 2012). This implies that teaching and learning should be done under organized, planned, and fortified environment with learning and instructional resources to stimulate students' sense of conception, perception and concentration to facilitate systematic understanding and acquisition of knowledge.

For education to be successful, it is essential to have access to teaching and learning resources such books, stationary, furniture, equipment, and recreational

areas. Due to the fact that these resources are learning aids, students perform better when they have access to them. The effectiveness of a teacher's teachings is influenced by the accessibility and utilization of teaching and learning resources. Teaching materials, which are frequently used to refer to the tools teachers use to give instruction, can assist student learning and raise students' accomplishment (Durlak et al., 2011)

Teaching and learning resources (TLRs) are crucial because by fostering student learning, they can considerably raise student accomplishment. Resources for teaching and learning exist in a wide variety of forms and sizes. However, they all share the ability to promote students' learning (Cohen et al., 2009). Resources for teaching and learning serve as a guide for the teacher and the students and add an important dimension to lesson planning and instruction delivery. Resources for teaching and learning can help teachers with a crucial professional responsibility like differentiating instruction (Ryan & Telfer, 2017). In order to better meet the needs of all students in the classroom, teachers must differentiate their teaching (Basal, 2015). This indicates that TLRs aid in achieving improved mathematics proficiency. Researchers have also argued that instructors should be resourceful and encouraged to look locally for the teaching materials they need to supplement or replace the ones provided by the government (Agudzeamegah, 2014). This indicates that educational resources are one of the key components of instruction in schools and aid in the teaching and learning of challenging mathematical concepts.

According to Okyerefo et al. (2011), the majority of senior high schools in Ghana lack basic resources including textbooks, curricula, and other items required for efficient teaching and learning of mathematics. Another factor that affects how

well students succeed academically in mathematics is class size. According to studies, smaller class sizes are associated with higher academic performance in schools (Butakor & Dziwornu, 2018). According to Kraft's (2003) research on the ideal class size and its impacts on efficient teaching and learning in Ghana, classes larger than forty (40) have a negative impact on students' academic progress.

Mankoe (2002) asserts that supervision concentrates on six facets of education, including management, leadership, human relations, curriculum, and instruction. Therefore, it plays a significant role in how the school is run. As a result, good supervision enhances classroom instruction and student learning. According to Okyerefo et al. (2011), certain public school instructors' and administrators' attitudes do not support an efficient learning environment for students. Because there aren't enough administrators watching over the school, some teachers even leave the classroom on their own. This implies that efficient supervision would reduce teacher absences and enhance instruction in the classroom. Students would be pushed to alter their attitudes regarding school and attendance if teachers were always present after routine visits by supervisors (Butakor & Dziwornu, 2018).

A further educational element to blame for students' subpar arithmetic performance is the excessive amount of material covered in the curriculum. At the basic and secondary school levels in Ghana, Kraft (2003) acknowledged that the syllabus demonstrates overloading of the content to be taught in each grade level. Many teachers struggle to finish the yearly reading assignment as well as the syllabus. When he pointed out that teachers in the following grade begin with the new book, regardless of whether students have mastered the prior fundamental abilities or not, Kraft (2003) defined the scenario and the issue caused by the overload of the textbook

in particular. Students' scholastic performance in mathematics suffers as a result of this circumstance. Students' academic performance is also influenced by the climate of the school, which is shown by factors including classroom management, disciplinary measures, and leadership styles used by school administrators (Lee & Shute, 2010). According to Lubienski et al. (2008), students fared better in schools with a pleasant climate.

2.11 Parental Support

According to Okyerefo et al. (2011), the home has a variety of functions that support students' academic performance at school. Parents play the primary role in the household, with help from other major family members including siblings, uncles, and aunts among others. Different parenting practices result in varied ways to connect with children, and each of these ways plays a significant role in forming the child's worldviews. For instance, several studies have found that between the ages of six and ten, parents spend less time with their children because they are typically in school (Okyerefo et al., 2011).

Socio-economic status is a crucial component of the home environment and is typically influenced by a number of variables, including the educational attainment, employment status, and income level of the parents (Jeynes, 2002). Unsurprisingly, socio-economic class is cited as a key predictor of academic performance in the majority of studies on students' academic performance. For instance, children who have access to materials like a mathematics textbook and who have their parents engage them in mathematics study after school are likely to do better in mathematics (Stipek et al., 2017). Burt (2017) asserts that the majority of parents have unfavourable views about mathematics education. This can be a result of their little

mathematical training. Such parents are now unable to assist their children at home. Parents' jobs have an impact on their children's academic success as well. Children from wealthy homes are more likely to enrol in school at an early age and receive the finest support for their educational needs. However, students from low-income families confront numerous challenges, including the inability to pay tuition, purchase exercise books, purchase suitable textbooks, wear torn school uniforms, etc. All of these emotionally drain the youngster, decreasing their motivation to succeed academically (Sattin-Bajaj et al., 2018).

According to Schiller et al. (2002), parents with higher education are better equipped to give their children the social and academic support necessary for academic achievement. This could be because parts with higher education prioritize education and would ensure their children receive the best of education. This is in contrast to parents with less education. This indicates that parents who neglect to give their children intellectual and social support place their children in tough situations, which prevents them from performing better. A student's academic success is said to be influenced by how many siblings he or she has (Askhia, 2010). The size of the family affects how much time and effort parents devote to their children as well as how difficult it is for them to meet the children's emotional and physical needs, especially during these hard times when the cost of living is skyrocketing (Askhia, 2010).

Regular absences from school are associated with decreased achievement and can affect exam scores (Barker & Jansen, 2000). According to a research by Lotz and Lee (cited by Butakor & Dziwornu, 2018), prolonged absences could have an impact on retention since they could turn into truancy. The study also showed that children

with poor grades, inconsistent attendance, and later dropout rates are more likely to engage in delinquent behaviour. According to estimates, 22,000 more young students in the commonwealth's public schools would be able to perform better than the national average on standardized tests if excessive absenteeism were reduced by 25% (Applegate, 2003). Additionally, studies show that schools with higher attendance rates produced higher test scores regardless of socioeconomic and economic considerations (Applegate, 2003).

According to Dampson and Dominic (2010), children's attitudes toward education and challenge are impacted by their parents' unwavering fortitude and resolve to continue in the face of any obstacles. According to a study by Etsey (2005), some of the reasons for some Ghanaian public schools' poor academic performance include parents' inability to meet the basic needs of their children, attend Parent-Teacher Association (PTA) meetings, and communicate with their children's teachers. Lack of access to fundamental educational necessities including school supplies, lunch at school, school uniforms, and textbooks, among other things, has an impact on a child's academic performance (Butakor & Dziwornu, 2018).

2.12 Instructional Materials

Instructional materials provide information, organise the scope and sequence of the information presented, and provide opportunities for students to use what they have. Students usually perform better when they have books or study aids to foster their learning. These study aids or material resources could be textbooks, teachers‟ guides, wall pictures, maps, atlases and other learning aids. The availability and use of teaching and learning materials affect the effectiveness of a teacher‟s lessons during instructional delivery. Moreover, the school‟s location and quality of the physical

buildings influence the performance and achievement levels of students. Harbison and Hanushek (1992) stated that the quality of the physical facilities is positively related to student performance. This assertion buttresses the stance of Danesy (2004) that good sitting arrangement and good buildings produce high academic achievements and performance, while dilapidated buildings that lack mental stimulating facilities coupled with low or no sitting arrangements is destructive.

According to Asikhia (2010) where the school is located determines to a very large extent the patronage such a school will enjoy. Equally, the entire unattractive physical structure of the school building could de-motivate learners to achieve academically. This is what Isangedigh (1998) referred to as learner‟s environment mismatch. According to Isangedigh, this learner‟s environment mismatch promotes poor academic performance. Engin-Demir (2009) argued that attending a school with a better physical environment is associated with increased Mathematics scores. Adepoju (2001) found that students in urban schools manifest more brilliant performance than their rural counterparts. Also, Adepoju (2001) revealed a significant difference in the achievement of students in urban and sub-urban areas.

Class sizes have also been identified as determinants of academic performance. Studies have indicated that schools with smaller class sizes perform better academically than schools with larger class sizes. Fabunmi et al. (2007) indicated that three class factors (class size, student classroom space and class utilization rate), when taken together, determined significantly students‟ academic performance in Oyo State, Nigeria. Similarly, Salfi and Saeed (2007) found a significant correlation between school size and students‟ achievement in Pakistan. Salfi and Saeed, revealed that small schools performed better than medium and large schools. Tremblay, Ross and Berthelot (2001) found class size to be inversely related to achievement,

especially for children in early grades. Kraft‟s (1994) study of the ideal class size and its effects on teaching and learning in Ghana concluded that class sizes above forty (40) students have negative effects on students‟ achievement. Adeyela (2000) found that large class size is unconducive for serious academic work.

Furthermore, schools with effective supervision of teaching and learning activities have high performance rates. Etsey et al. (2004) found that academic performance was better in private schools than public schools because of more effective supervision of work. According to Etsey (2005), if Circuit Supervisors are more regular in schools, this would put the teachers on the alert to be more regular and early in school. This would forestall teacher absenteeism and improve teaching in the schools. If teachers are present always following regular visits of Circuit Supervisors, students would be challenged to change their attitudes toward schooling.

2.13 Learning Facilities and Academic Achievement

School facilities have been observed as a potent factor to quantitative education. The importance to teaching and learning of the provision of adequate instructional facilities for education cannot be over-emphasized. According to Akande (1985), learning can occur through one‟s interaction with one‟s environment. Environment here refers to facilities that are available to facilitate students learning outcome. It includes books, audio-visual, software and hardware of educational technology, size of classroom, sitting position and arrangement, availability of tables, chairs, chalkboards, and shelves on which instruments for practical lessons are arranged. According to Oni (1992), facilities constitute a strategic factor in organizational functioning. This is so because they determine to a very large extent the smooth functioning of any social organization or system including education. Oni further

stated that their availability, adequacy and relevance influence efficiency and high productivity.

Ajayi and Ogunyemi (1990) opined that the wealth of a nation or society could determine the quality of education in that land. This is because a society that is wealthy will establish good schools with quality teachers, and provide adequate learning infrastructures to help students learn with ease thus, bringing about high academic achievement. Writing on the role of facilities in teaching, Balogun (1982) submitted that no effective Science Education Programme can exist without equipment for teaching. This is because facilities enable the learner to develop problem-solving skills and scientific attitudes. Ajayi and Ogunyemi (1990) reiterated that when facilities are provided to meet relative needs of a school system, students will not only have access to the reference materials mentioned by the teacher but individual students will also learn at their own paces. The net effect of this is increased overall academic performance of the entire students. Adesina (1981) identified poor and inadequate physical facilities, obsolete teaching techniques, and overcrowded classrooms among others as factors inhibiting students‟ academic success.

Throwing more light on school facilities and moral guiding provision, Fabunmi (1997) asserted that school facilities when provided will aid teaching and learning and consequently improve academic achievement of students while the models guiding their provision to schools could take any form as rational bureaucratic and or political model. Whichever model is adopted, according to Fabunmi, there is always a common feature of differing allocation of facilities to schools. Ojoawo (1990) noted that certain schools are favoured in the allocation of facilities at the expense of others. Writing on poor performance of students in public examinations, London (1993)

stated that in many developing nations including Ghana, certain physical facilities are none existent and where amenities are available many are of sub-standard quality. What is even more alarming is the connection which researcher claim exists between quality of facilities and academic performance. Lamenting on the glowing inadequacies of school facilities in our educational industry, Akinkugbe (1994) opined that everywhere you look, primary, secondary, special, technical, tertiary, there is abundant evidence of crippling apathy, criminal neglect and a pervasive decay in values and standard. Other scholars have variously identified the significance of facilities in teaching learning spheres. Therefore, the absence or poor quality of educational facilities including instructional resources can affect students‟ academic performance.

2.14 Six Key Principles for Effective Teaching of Mathematics

The six principles are based on recommendations from Swan (2005), whose suggestions were derived from earlier studies of teacher learning and classroom practice on how teaching could move from promoting passive to active learning. Clarke and Clarke (2004), developed a similar set of recommendations, arising from detailed case studies of teachers who had been identified as particularly effective in the Australian Early Numeracy Research Report.

Similarly, the review on the six principles also draw on Anthony and Walshaw‟s (2009) detailed best evidence synthesis which reviewed important research on Mathematics teaching and learning. The study of Anthony and Walshaw produced a list of ten pedagogies which they argued are important for Mathematics teaching.

2.14.1. Articulating Goals

This principle emphasizes the importance of the teacher having clear and explicit goals that are connected to the pedagogical approach chosen to assist students in learning the goals. Hattie (2009), noted that feedback is one of the main influences on students‟ achievement. The key elements of feedback are for students to receive information on "where am I going to", "how am I going", and "where am I going to next". To advise students of the goals and to make decisions on pathways to achieving the goals interactively requires teachers to be very clear about their goals. This is what Swan (2005), described as making the purpose of activities clear. On their part, Clarke and Clarke (2004), proposed that teachers need to focus on important mathematical ideas and make the mathematical focus clear to their pupils.

This principle also reflects one of the key goals in The Shape of the Australian Curriculum: Mathematics (ACARA, 2010), which argued for the centrality of teacher decision making and for the curriculum to be written succinctly and specifically. This is precisely so that teachers can make active judgments on the emphasis in their teaching. The flexibility in the mods of presentation of the content descriptions also indicates to teachers that their first step in planning their teaching is to make active decisions about their focus and to communicate that focus to the students. In particular, according to the thinking underpinning Principle 1 (Anthony & Walshaw, 2009). It is assumed that teachers would specifically articulate the key ideas/concepts to be addressed in the lesson, even writing the goals on the board before beginning the lesson presentation. It is also expected that the students will learn through working on a task, listening to the explanations of others, or by practicing mathematical techniques.

2.14.2 Making Connections

This principle encourages teachers to build on what students know mathematically and experientially including creating and connecting students with stories that both contextualize and establish a rationale for the learning. Smith (1996), in a synthesis of recommendations for teachers argued that using engaging tasks can assist teachers in making connections between mathematical problem and mathematical context. The problem and the Mathematics are the same but the context is different. As such changes to questions and tasks should be made by teachers to make them appropriate for their students.

A second aspect of this principle relates to using assessment information to inform teaching. Callingham (2010), described the important role of assessment and some key processes that teachers can adopt. Similarly, Hattie (2009), and Swan (2005), each argued for the constructive use of the students‟ prior knowledge and to obtain this, teachers will need to assess what their students know and can do. Clarke and Clarke (2004), recommended teachers build connections from prior lessons and experiences and use data effectively to inform learning. Anthony and Walshaw (2009), emphasized building on students‟ experience and thinking to ensure effective Mathematics teaching.

2.14.3 Fostering Engagement

This principle is elaborated for teachers as follows: Engage students by utilizing a variety of rich and challenging tasks that allow students time and opportunities to make decisions and which use a variety of forms of representations. This principle is fundamentally about seeking to make Mathematics learning interesting for students. After reviewing video tapes of a broad range of Mathematics

lessons, Hollingsworth, Lokan, and McCrae (2003), suggested that students would benefit from more exposure to repetitive tasks, higher-level problems and discussion of alternative solutions, and more opportunities to explain their thinking. Hollingworth, et al., (2003), also argued that students need opportunities to appreciate connections between mathematical ideas and to understand the Mathematics behind the problems they are working on.

Swan (2005), emphasized appropriate challenges and challenging learning through questioning. Good, Grouws, and Ebmeier (1983), recommended the use of high order questions. Clarke and Clarke (2004), suggested using a range of practical contexts and representations having high expectations, and Anthony and Walshaw (2009), argued it is critical that teachers use "worthwhile tasks" which is interpreted to mean they are meaningful and relevant to the students. Implementing this principle will present challenges for some Mathematics teachers and these strategies can effectively be the focus of teacher learning. Sullivan (2010), inferred from student surveys that students‟ preferences are diverse and so the breadth of students‟ interests can only be addressed by teachers effectively presenting a variety of tasks.

2.14.4. Differentiating Challenges

This principle is elaborated for teachers as follows: Interact with students while they engage in the experiences, encourage students to interact with each other, including asking and answering questions, and specifically plan to support students who need it and challenge those who are ready. Fundamentally, this principle is about differentiating students support according to the different needs of individual students. It is also about the overall vision of what constitutes an effective classroom dynamic and structure. Students are more likely to feel included in the work of the class and to

experience success. Teachers offer enabling prompts to allow those experiencing difficulty to engage in active experiences related to the initial goal task. For example, requiring such students to listen to additional explanations, or assuming that they will pursue goals substantially different from the rest of the class. Likewise, those students who understand the task and complete the work quickly can be given extending prompts that challenge their thinking, within the context of the original task that was posed.

Smith (1996), suggested that teachers should predict the reasoning that students are most likely to use and choose appropriate representations and models that support the development of understandings. Swan (2005), also emphasized the notion of community which he linked to positive relationships and to encouraging learners to exchange ideas. Similar ideas emanate from Clarke and Clarke (2004), who emphasized the importance of the teacher holding back and encouraging students to explain their own thinking. Anthony and Walshaw (2009), emphasized processes for assisting students in making connections.

The personal and community advantages of successful Mathematics learning can only be realized through successful participation and engagement. Although there are challenges at all years of schooling, participation is most at threat in Years 6-9. Students‟ disengagement at these years could be attributed to the nature of the curriculum, missed opportunities in earlier years, inappropriate learning and teaching processes, and perhaps the students‟ stages of physical development. The implication of the ACARA document is that pedagogies need to provide opportunities for all students especially those who experience difficulty in learning.

2.14.5 Structuring Lessons

This principle is elaborated for teachers as follows: Adopt pedagogies that foster communication and both individual and group responsibilities, use students‟ reports to the class as learning opportunities, and teacher summaries of key mathematical ideas. This principle is essentially about the structuring of lessons. There is a lesson format that is commonly recommended to Australian teachers which in summary is described as: Launch; Explore; Summarize; Review. Yet this rubric does not communicate the subtlety of the ways of working that are intended by this principle. This principle of teaching can be learned from the Japanese way of describing the structure of their lessons. Inoue (2010) used four terms; hatsumon, kikanjyuski, nerige, and matome, which are described as follows. The elements and structure of Japanese Mathematics lessons "Hatsumon" means the posing of the initial problem that will form the basis of the lesson, and the articulation to students of what it is intended that they learn. "Kikanjyuski" involves individual or group work on the problem. The intention is that all students have the opportunity to work individually so that when there is an opportunity to communicate with other students they have something to say. There is a related aspect to this described as "Kikanshido" which describes the teacher thoughtfully walking around the desks giving feedback and making observations that can inform subsequent phases in the lesson. "Nerige" refers to carefully managed whole class discussion seeking the students‟ insights. There is an explicit expectation that students when reporting on their work communicate with other students. "Matome" refers to the teacher summary of the key ideas.

The last two steps are the least practiced by Australian Mathematics teachers and the Hollingsworth et al. (2003) report on Australian Mathematics teaching in the TIMSS video study found them to be very rare. There is an assumption in the

Japanese lesson structure and also in teaching Principle 3 and 4, that students will engage in learning experiences in which they have had opportunity for creative and constructive thinking. This Japanese lesson structure assumes that all students have participated in common activities and shared experiences that are both social and mathematical, and that an element of their learning is connected to opportunities to report the products of their experience to others and to hear their reports as well (Sullivan, 2011).

For the mathematical aspect, it is argued that students can benefit from either giving or listening to explanations of strategies or results. This can best be done along with the rest of the class with the teacher participating, especially facilitating and emphasizing mathematical communication and justification. A key element of this style of teaching and learning is students having the opportunity to see the variability in responses (Watson & Sullivan, 2008). Confirming this variability can indicate underlying concepts for students. Cheeseman (2003), similarly argued that a lesson review involves much more than simply restating the Mathematics. It encourages children to reflect on their learning and to explain or describe their strategic thinking. The end of the session gives the opportunity for teaching after children have had some experience with mathematical concepts (Cheeseman, 2003). An interesting aspect of the role of language in both teaching and lesson review was described by Clarke (2010) when he connected language, culture and Mathematics. Clarke reported a detailed study that compared public and private utterances by teachers and students, noting the variability in usage both within and across cultures. Clarke argued that in conceptualizing effective learning, researchers, teachers and curriculum developers need to locate proficiency within their framework of valued learning outcomes.

Another aspect of reviews at the end of lessons is the contribution they make to social learning. This is related to a sense of belonging to a classroom community and is also connected to building awareness of differences between students and acceptance of these differences. Such differences can be a product of the students‟ prior mathematical experiences, their familiarity with classroom processes, their social, cultural and linguistic backgrounds, the nature of their motivation, and persistence efficacy (Dweck, 2000).

2.14.6 Promoting Fluency and Transfer

This principle is elaborated for teachers as follows: Fluency is important and it can be developed in two ways. That is by short everyday practice of mental processes and by practice, reinforcement and prompting transfer to learnt skills. This principle is familiar to most Mathematics teachers but it is possible to misinterpret the purpose of practice and prompting transfer. Sullivan (2011), contrasted mechanical with automatic skills practice. With mechanical practice students have limited capacity to adapt the learnt skill to other situations. With automatic practice, built on understanding, students can be procedurally fluent while at the same time having conceptual understanding.

2.15 Summary

The foregone has been the literature review for the study. The chapter presented the conceptual framework, the socialization theories and students‟ performance in mathematics, gender gap in students‟ mathematics performance, five strands of desirable mathematical action for students, discussion of the desirable actions, identification of mathematics difficulties in children, mathematics: a universal problem, students‟ attitude and performance in mathematics, causes of

students‟ poor performance in mathematics, parental support, instructional materials, learning facilities and students‟ academic performance, and six key principles for effective teaching of Mathematics.

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter discusses the methodology for conducting the study. The research design, population, sample and sampling procedure, instruments, data collection procedure, data processing and analysis, and ethical issues were explained.

3.1 Research Paradigm

Methodologically, the study follows a mixed methods research approach and is anchored in the social constructivist philosophical tenet that emphasizes that learners learn better when they are actively engaged in their own learning. Hence, the social constructivist theory underpins the study (Buabeng et al., 2021).

3.2 Research Approach

The study used the Convergent Parallel Mixed Methods Design. With this approach, Creswell (2014) notes that a researcher collects both quantitative and qualitative data, analyzes them separately, and then compares the results to see if the findings confirm or disconfirm each other.

3.3 Research Design

The study was a descriptive survey. Descriptive research is one of the most commonly used type of researches in social sciences. A descriptive research aims at describing a phenomenon the ways it is, for example, describing social systems or relationships between events (Adams et al., 2007). Surveys involve gathering data from relatively large number of respondents or cases. Surveys are concerned with describing, recording and interpreting of phenomena without manipulation of

variables that either exists or previously existed (Kothari, 2004). In survey method the respondents respond to questions administered through interviews or questionnaires and then the researcher analyze and describe the responses given. Surveys in research deal with the generation of quantitative data and are commonly used in disciplines such as education, political science, and business. It is considered a rapid and relatively cheap method of getting peoples‟ perceptions, attitudes, personal experiences and opinions about a product, people, or a situation (Harrison, 2013). In survey, participants respond to questions through interviews or questionnaires and the researcher describe the responses through frequency tables, charts, or graphs. It focuses on variables rather than on individual cases.

Survey is one of the main forms of descriptive research that is applied to demonstrate the existing phenomenon without manipulating the data, unlike Experimental Research that follows a systematic and logical method for answering the question and manipulation is a deliberate part of the experimental research design (Kothari, 2004). Survey is one of the most appropriate approaches for collection of descriptive data. It could be either structured or unstructured. Structured surveys use formal list of questions for all respondents in the same manner. In the case of unstructured survey, the researcher guides the research based on respondents‟ responses. It is important to note that reliability and validity of the data collected is a matter of concern hence, it is important to ensure that the questions are properly constructed for the respondents to easily understand and respond to the items. According to Fraenkel and Wallen (2000), obtaining information from a large group of people by setting carefully worded questions and carefully administered questionnaires lies in the heart of descriptive survey. Therefore, the use of the descriptive survey design was justified since, the purpose of the study was to

investigate the differences in junior high school students‟ perceptions of school factors, student factors, and teacher factors inhibiting students‟ academic performance in Mathematics at Asokore SDA College Demonstration Junior High School, Koforidua.

3.4 Population

A research population is generally a large collection of individuals or objects that are the main focus of a scientific query. A research population is also known as a well-defined collection of individuals or objects known to have similar characteristics. All individuals or objects within a certain population usually have a common binding characteristic or trait. Usually, the description of the population and the common binding characteristic of its members are the same (Amadehe & Asamoa-Gyimah, 2012). The population for the study was the students of SDA College Demonstration Junior High School. Data gathered from the head teachers‟ office indicated that at the time of the study the school had enrolment of three hundred and twenty-six (326) students. Thus, the population for the study was three hundred and twenty-six (326) students. This population is somewhat different from other populations in the sense that the students have easy access to learning resources from the SDA College of Education library. Hence, the students were academically brilliant and would be able to contribute data for the study to draw useful conclusions.

3.5 Sample and Sampling Technique

It is for the benefit of the population that researches are done. However, due to the large sizes of populations, researchers often cannot test every individual in the population because it is too expensive and time-consuming. This is the reason why researchers rely on samples. The sample for the study was one hundred and twenty-

six (126) respondents. The simple random sampling technique and purposive sampling technique were used to sample the respondents for the study. The names of students in each class were written on pieces of paper and placed into a container. Students volunteered to pick names from the container. In each case, the name picked was recorded and placed back into the container to ensure that each student had equal chance of being selected for the study. Thus, a sample of one hundred and twenty-six (126) respondents representing 37% of the population was used for the study. The sample size of 37% of the population was justified because Amadehe and Asamoa-Gyimah (2012) noted that a sample of 5% or more is appropriate for a survey.

3.6 Instrument

A closed-ended questionnaire was administered personally by the researcher to gather data for the study. Also, interviews were conducted to Questionnaire was used because it has the ability to limit inconsistencies in the responses given by the respondents. The Likert scale measurement of strongly agree, agree, disagree and strongly disagree was used so as to have quantity results easier for statistical analysis. The questionnaire was designed to gather responses on the gender differences in Junior High School students‟ perception of school, teacher, and students‟ factors inhibiting their performance in Mathematics at SDA College Demonstration Junior High School, Asokore-Koforidua. The questionnaire had four sections. The first section gathered the bio data of the respondents. The section had three items to which the respondents were to respond by indicating their preferred option. The second section gathered data on the gender differences in junior high school students‟ perception of school factors inhibiting their academic performance in Mathematics. The section had eight items to which the respondents were to indicate their preferred option for each item. The third section gathered data on the gender differences in

junior high school students‟ perception of student factors inhibiting their academic performance in Mathematics. The section had six items to which the respondents were to respond by indicating their preferred option. The last section of the questionnaire focused on gathering data on gender differences in junior high school students‟ perception of teacher factors inhibiting their academic performance in Mathematics. The section had six items to which the respondents were to respond by indicating the option they considered appropriate for each item. In addition, the researcher purposively sampled the three class prefects for the interview.

3.7 Validity and Reliability of the Instrument

In research trustworthiness of collection and analysis of the data is considered as traditional validity and reliability of the instrument used for conducting the qualitative research. Richards (2005), has demonstrated that the measures to meet the issues of validity and reliability in qualitative research include seeking the consent of all participants before asking them to complete and return questionnaire given to them and assuring them of the confidentiality of the data they provide. The consent of the teachers was sought before they were given the questionnaire to complete and return. In addition, the respondents were assured of the confidentiality of the data they provided. The data gathered were only used for research purpose and dealt with as confidential document. According to Patton (2002), to meet the validity and reliability of data collection and analysis, there must be neutrality, credibility, and consistency in the data collection and analysis procedures. In order to ensure the validity and reliability of the data collected the researcher was neutral in analyzing and reporting on the data gathered for the study. The researcher ensured that she analysed and reported only the data gathered from the respondents for the study.

3.8 Data Collection Procedure

Questionnaire was used to gather data from the respondents sampled for the study. The researcher sought permission from the head teacher of SDA College Demonstration Junior High School, Asokore-Koforidua for the data collection exercise. Due to the COVID 19 pandemic, the researcher met the students in batches after normal school hours and briefed them on the need for the study and how to respond to the items on the questionnaire. The students completed and returned the questionnaire within two weeks starting from the day the questionnaire was administered. When it became necessary the researcher meet some of the respondents face-to-face by observing social distancing. The whole data collection exercise lasted for six weeks.

3.9 Data Processing and Analysis

Descriptive analysis deals with describing a phenomenon. It attempts to examine the situations in order to describe the norm (Waliman, 2011). Descriptive Analysis describes what exists and tries to pave way for finding new facts. It includes gathering of data related to, products, people, individuals, events and situations and then organize, tabulates, depicts and describe the outcome. This type of research design is mostly guided with one or more research questions and often does not follow a structured research hypothesis. Descriptive Analysis provides a knowledge base which can be a foundation and ground for further quantitative analysis, since it maps the landscape of a specific phenomenon. It is argued if properly interpreted, the data analysed can provide useful insights which may lead to hypothesis formation (Waliman, 2011). The data gathered for the study were grouped into three categories in line with the research questions raised for the study. The data gathered were organized into tables of frequency counts and percentages for easy analysis and

interpretation. Also, the qualitative data gathered through the interview were presented using pseudo names.

3.10 Ethical Issues

The researcher obtained an introductory letter from the School of Graduate Studies, University of Education, Winneba. The researcher then sent the introductory letter to the head teacher of SDA College Demonstration Junior High School to obtain permission to gather data from respondents in the school. Anonymity and privacy of participants were guaranteed by asking them not to write their names when completing the questionnaire. Again, participants were assured of confidentiality in the handling of data they provided. In addition, respondents were assured that the data obtained from them would be used solely for the purpose of this research.

CHAPTER FOUR

RESULTS/FINDINGS AND DISCUSSION

4.0 Overview

This chapter dealt with the results and discussion of the data gathered for the study. The chapter is organized under four sub-heading; demographic data of respondents, research question one, research question two, and research question three. Under each of the sub-headings, the data gathered are analysed using tables of frequency counts and percentages.

4.1 Demographic Data of Respondents

The researcher presented the current class and age distribution of respondents for the study. Table 4.1 and Table 4.2 presented data gathered on the current class and age of respondents respectively.

Table 4.1: Current Class of Respondents

Response	Male		Female		Total	
	N	%	N	%	N	%
JHS 3	23	41	25	36	48	38
JHS 2	26	46	36	51	62	49
JHS 1	7	13	9	13	16	13
Total	**56**	**100**	**70**	**100**	**126**	**100**

Source: Field Data, 2020

From Table 4.1, twenty-three, representing forty-one percent of the male respondents were in the Junior High School Three class, twenty-six, representing forty-six percent of the male respondents were in the Junior High School Two class, and the remaining seven representing thirteen percent of the male respondents were in the Junior High School One class. Also, twenty-five representing thirty-six percent of

the female respondents were in the Junior High School Three class, thirty-six representing fifty-percent of the female respondents were in the Junior High School Two class and the remaining nine representing thirteen percent of the female respondents were in the Junior High School One class.

Thus, from Table 4.1, forty-eight, representing thirty-eight percent of the respondents for the study were in the Junior High School Three class, sixty-two, representing forty-nine percent were in the Junior High School Two class, and the remaining sixteen representing thirteen percent were in the Junior High school One class.

Table 4.2: Age Distribution of Respondents

Response	Male		Female		Total	
	n	%	n	%	n	%
17 years and above	0	0	3	4	3	2
15-16 years	27	48	28	40	55	44
13-14 years	27	48	33	47	60	48
11-12 years	2	4	6	9	8	6
Total	56	100	70	100	126	100

Source: Field Data, 2020

From Table 4.2, twenty-seven, representing forty-eight percent of the male respondents were between fifteen and sixteen years old, twenty-seven were between thirteen and fourteen years, and the remaining two, representing four percent of the male respondents were between eleven and twelve years old. Also, three, representing four percent of the female respondents were seventeen years and above, twenty-eight, representing forty percent of the female respondents were between fifteen and sixteen years old, thirty-three, representing forty-seven percent of the female respondents

were between thirteen and fourteen years old, and the remaining six representing nine percent of the female respondents were between eleven and twelve years old.

Thus, from Table 4.2, three, representing two percent of all the respondents were seventeen years and above, fifty-five, representing forty-four percent of the respondents were between fifteen and sixteen years old, sixty, representing forty-eight percent of the respondents were between thirteen and fourteen years old and the remaining eight, representing six percent of the respondents were between eleven and twelve years old.

4.2 Research Question One:

Students‟ perceptions of school factors affecting their achievement in Mathematics. The research question sought to investigate the students‟ perceptions of school factors affecting their achievement in Mathematics. Table 4.3 presents the responses gathered from the respondents.

Table 4.3: Students' Perceptions of School Factors Inhibiting their Academic Performance in Mathematics

School factors	S.A	A	D	S.D	Mean	St. D
Type of school – public or private	54 (43%)	24 (19%)	8 (6%)	40 (32%)	2.730	1.305
Class size	31 (25%)	44 (35%)	24 (19%)	27 (21%)	2.627	1.079
Quality teaching and learning environment	32 (25%)	20 (16%)	25 (20%)	49 (39%)	2.278	1.224
Guidance and counselling services	7 (6%)	10 (8%)	51 (41%)	58 (46%)	1.730	0.833
Effective school administration	10 (8%)	25 (20%)	43 (34%)	48 (38%)	1.976	0.950
Good seating arrangement	49 (39%)	44 (35%)	21 (17%)	12 (10%)	3.032	0.971
Good school building	22 (18%)	19 (15%)	41 (33%)	44 (35%)	2.151	1.089
Availability of teaching and learning resources	27 (21%)	23 (18%)	41 (33%)	35 (28%)	2.333	1.103

Source: Field data, 2020

S.A=Strongly Agree A=Agree D=Disagree S.D=Strongly Disagree

St. D=Standard Deviation

From Table 4.3, fifty-four, representing 43% of the students strongly agreed and twenty-four, representing 19% of the students agreed that the type of school (either public or private) had an effect of their academic performance in mathematics; but eight, representing 6% of the students disagreed and the remaining forty, representing 32% of the students strongly disagreed that the type of school (either public or private) had an effect of their academic performance in mathematics. Thirty-one, representing 25% of the students strongly agreed and forty-four, representing 35% of the students agreed that class size affected their academic performance in mathematics; however, twenty-four, representing 19% of the students disagreed and the remaining twenty-seven, representing 21% of the students strongly disagreed that class size affected their academic performance in mathematics. Thirty-two, representing 25% of the students strongly agreed and twenty, representing 16% of the students agreed that the quality teaching and learning environment affected their academic performance in mathematics; but twenty-five, representing 20% of the students disagreed and the remaining forty-nine, representing 39% of the students strongly disagreed that the quality teaching and learning environment affected their academic performance in mathematics.

Also, from Table 4.3, seven, representing 6% of the students strongly agreed and ten, representing 8% of the students agreed that guidance and counselling services influenced their academic performance in mathematics; but fifty-one, representing 41% of the students disagreed and the remaining fifty-eight, representing 46% of the students strongly disagreed that guidance and counselling services influenced their

academic performance in mathematics. Ten, representing 8% of the students strongly agreed and twenty-five, representing 20% of the students agreed that effective school administration influenced their academic performance in mathematics; on the other hand, forty-three, representing 34% of the students disagreed and the remaining forty-eight, representing 38% of the students strongly disagreed that effective school administration influenced their academic performance in mathematics. Forty-nine, representing 39% of the students strongly agreed and forty-four, representing 35% of the students agreed that good seating arrangement influenced their academic performance in mathematics; but twenty-one, representing 17% of the students disagreed and the remaining twelve, representing 10% of the students strongly disagreed that good seating arrangement influenced their academic performance in mathematics.

Again, from Table 4.3, twenty-two, representing 18% of the students strongly agreed and nineteen, representing 15% of the students agreed that good school building influenced their academic performance in mathematics; but forty-one, representing 33% of the students disagreed and the remaining forty-four, representing 35% of the students strongly disagreed that good school building influenced their academic performance in mathematics. Twenty-seven, representing 21% of the students strongly agreed and twenty-three, representing 18% of the students agreed that availability of teaching and learning resources influenced their academic performance in mathematics; however, forty-one, representing 33% of the students disagreed and the remaining thirty-five, representing 28% of the students strongly disagreed that availability of teaching and learning resources influenced their academic performance in mathematics.

Thus, from Table 4.3, the statement Students perceive that good seating arrangement influenced their academic performance in mathematics had the highest mean score (Mean = 3.032, Standard deviation = 0.971).

S1: I am able to write well when the tables and chairs are arranged well.

S2: When the tables and chairs are well arranged I feel happy and learn well.

S3: My teacher helps me to complete my work when the tables and chairs are arranged well.

This finding confirms the view of Danesy (2004) that dilapidated buildings, lacking mentally stimulating facilities that are characterized with low or no seating arrangements are destructive to students‟ academic achievement.

Also, from Table 4.3, the statement Students perceive that the type of school (either public or private) influenced their academic performance in mathematics had the second highest mean score (Mean = 2.730, Standard deviation = 1.305).

S1: The teachers do not care much about my academic performance

S1: Sometimes I do not understand what my teacher teach in class

S3: The school does not have enough teaching and learning resources to help me understand mathematics concepts in class.

This finding supports the assertion by Barry (2005) that students‟ educational outcome and academic success are greatly influenced by the type of schools they attend.

Again, from Table 4.3, the statement *Students perceive that class size influenced their academic performance in mathematics* had the third highest mean score (Mean = 2.627, Standard deviation = 1.079).

S1: Sometimes my class mates make a lot of noise that disturbs me.

S2: Sometimes my teacher does not mark the class exercises she give us.

S3: Some of my class mates make noise when the teacher is teaching.

This finding is in line with the opinion of Donkor (2019) that smaller class size creates more intimate setting and therefore can increase teacher-students bonding which has also been shown to have a positive effect on students‟ success.

4.3 Research Question Two:

Students‟ perceptions of student factors inhibiting their academic performance in Mathematics. Research question two sought to investigate junior high school students‟ perceptions of student factors inhibiting their academic performance in Mathematics. Table 4.4 presents responses gathered from respondents.

Table 4.4: Students' Perceptions of Student Factors Inhibiting their Academic Performance in Mathematics

Student factors	S.A	A	D	S.D	Mean	St. D
Students spend more time on studies	30 (24%)	26 (21%)	30 (24%)	40 (32%)	2.365	1.163
Gender of students	69 (55%)	30 (24%)	10 (8%)	17 (14%)	3.198	1.066
Parental education of students	28 (22%)	35 (28%)	26 (21%)	37 (29%)	2.429	1.134
Attitude of students	55 (44%)	20 (16%)	19 (15%)	32 (25%)	2.778	1.251
Regular school attendance	20 (16%)	6 (5%)	19 (15%)	81 (64%)	1.722	1.121
Students attitude towards studying mathematics	19 (15%)	16 (13%)	53 (42%)	38 (30%)	2.127	1.012

Source: Field data, 2020

S.A=Strongly Agree A=Agree D=Disagree S.D=Strongly Disagree

St. D=Standard Deviation

From Table 4.4, thirty, representing 24% of the students strongly agreed and twenty-six, representing 21% of the students agreed that students perceive that spending more time on studies influenced their academic performance in mathematics; but thirty, representing 24% of the students disagreed and the remaining forty representing 32% of the students strongly disagreed that spending more time on studies influenced their academic performance in mathematics. Sixty-nine, representing 55% of the students strongly agreed and thirty, representing 24% of the students agreed that students perceive that the gender of students influenced their academic performance in mathematics; however, ten, representing 8% of the students disagreed and the remaining seventeen, representing 14% of the students strongly disagreed that the gender of students influenced their academic performance in

mathematics. Twenty-eight, representing 22% of the students strongly agreed and thirty-five, representing 28% of the students agreed that students perceived that the parental education of students influenced their academic performance in mathematics; but twenty-six, representing 21% of the students disagreed and the remaining thirty-seven, representing 29% of the students perceived that the parental education of students influenced their academic performance in mathematics.

Also, from Table 4.4, fifty-five, representing 44% of the students strongly agreed and twenty, representing 16% of the students agreed that students perceived that the attitude of students influenced their academic performance in mathematics; but nineteen, representing 15% of the students disagreed and the remaining thirty-two, representing 25% of the students strongly disagreed that students perceived that the attitude of students influenced their academic performance in mathematics. Twenty, representing 16% of the students strongly agreed and six, representing 5% of the students that students perceived that regular school attendance influenced their academic performance in mathematics; however, nineteen, representing 15% of the students disagreed and the remaining eighty-one, representing 64% of the students strongly disagreed that students perceived that regular school attendance influenced their academic performance in mathematics. Nineteen, representing 15% of the students strongly agreed and sixteen, representing 13% of the students agreed that students perceived that students‟ attitude towards studying mathematics influenced their academic performance in mathematics; but fifty-three, representing 42% of the students disagreed and the remaining thirty-eight, representing 30% of the students strongly disagreed that students perceived that students‟ attitude towards studying mathematics influenced their academic performance in mathematics.

Thus, from Table 4.4, the statement Students perceive that the gender of students influenced their academic performance in mathematics had the highest mean score (Mean = 3.198, Standard deviation = 1.066).

S1: Boys in my class always score high marks in mathematics exercises.

S2: Boys in my class sometimes teach girls during examination.

S3: Girls in my class do not like mathematics at all.

This finding concurs with the conclusion by Stricker and Rock (1995) that students‟ initial characteristics including gender has a modest impact on the academic performance of students.

Also, from Table 4.4, the statement Students perceive that the attitude of students influenced their academic performance in mathematics had the second highest mean score (Mean = 2.778, Standard deviation = 1.251).

S1: Some of my class mates absent themselves from school frequently.

S2: Some of the boys in my class play with their mobile phones when the teacher is teaching.

S3: The boys in the class make noise when the mathematics teacher is teaching.

This finding is in line with the conclusion by Engin-Demir (2009) that students‟ attitude such as absenteeism, truancy, and indiscipline towards schooling influence their academic performance.

Again, from Table 4.4, the statement *Students perceive that parental education of students influenced their academic performance in mathematics* had the third highest mean score (Mean = 2.429, Standard deviation = 1.134).

S1: My father is a teacher and he buys every book I need for school.

S2: My father has a big store in Koforidua, he always gives me money for school.

S3: My father is a Taxi driver, he brings us to school and gives us money.

This finding confirms the view of Schiller et al. (2002) that parents with higher education are better equipped to give their children the social and academic support necessary for academic achievement.

4.4 Research Question Three:

Students‟ perceptions of teacher factors inhibiting their academic performance in Mathematics. Research question three also sought to investigate the differences in students‟ perceptions of teacher factors inhibiting their academic performance in Mathematics. Table 4.5 presents responses gathered from respondents.

Table 4.5: Students' Perceptions of Teacher Factors Inhibiting their Academic Performance in Mathematics.

Teacher factors	S.A	A	D	S.D	Mean	St. D
Shortage of qualified mathematics teachers	45 (36%)	29 (23%)	20 (16%	32 (25%)	2.691	1.203
Teacher knowledge about content and pedagogy	19 (15%)	10 (8%)	21 (17%)	76 (60%)	1.778	1.116
Teacher experience in teaching mathematics	13 (10%)	11 (9%)	22 (18%)	80 (63%)	1.659	1.013
Teacher regularity in the classroom	11 (9%)	15 (12%)	24 (19%)	76 (60%)	1.691	0.992
Teacher absenteeism	73 (58%)	18 (14%)	11 (9%)	24 (19%)	3.111	1.195
Teacher lateness to school	45 (36%)	32 (25%)	16 (13%)	33 (26%)	2.706	1.207

Source: Field data, 2020

S.A=Strongly Agree A=Agree D=Disagree S.D=Strongly Disagree

St. D=Standard Deviation

From Table 4.5, forty-five, representing 36% of the students strongly agreed and twenty-nine, representing 23% of the students agreed that students perceived that shortage of qualified mathematics teachers affected students‟ academic performance in mathematics; but twenty, representing 16% of the students disagreed and the remaining thirty-two, representing 25% of the students strongly disagreed that students perceived that shortage of qualified mathematics teachers affected students‟ academic performance in mathematics. Nineteen, representing 15% of the students strongly agreed and ten, representing 8% of the students agreed that students perceived that teacher knowledge about content and pedagogy affected students‟ academic performance in mathematics; however, twenty-one, representing 17% of the students disagreed and the remaining seventy-six, representing 60% of the students strongly disagreed that students perceived that teacher knowledge about content and pedagogy affected students‟ academic performance in mathematics. Thirteen,

representing 10% of the students strongly agreed and eleven, representing 9% of the students agreed that students perceived that teacher‟s experience in teaching mathematics influenced students‟ academic performance in mathematics; but twenty-two, representing 18% of the students disagreed and the remaining eighty, representing 63% of the students strongly disagreed that students perceived that teacher‟s experience in teaching mathematics influenced students‟ academic performance in mathematics.

Also, eleven, representing 9% of the students strongly agreed and fifteen, representing 12% of the students agreed that students perceived that teacher regularity in the classroom influenced their academic performance in mathematics; but twenty-four, representing 19% of the students disagreed and the remaining seventy-six, representing 60% of the students strongly disagreed that students perceived that teacher regularity in the classroom influenced their academic performance in mathematics. Seventy-three, representing 58% of the students strongly agreed and eighteen, representing 14% of the students agreed that students perceived that teacher regularity in the classroom influenced their academic performance in mathematics; however, eleven, representing 9% of the students disagreed and the remaining twenty-four, representing 19% of the students strongly disagreed that students perceived that teacher regularity in the classroom influenced their academic performance in mathematics. Forty-five, representing 36% of the students strongly agreed and thirty-two, representing 25% of the students agreed that students perceived that teacher lateness to school affected students‟ academic performance in mathematics; but sixteen, representing 13% of the students disagreed and the remaining thirty-three, representing 26% of the students strongly disagreed that students perceived that teacher lateness to school affected students‟ academic performance in mathematics.

Thus, from Table 4.5, the statement Students perceive that teacher absenteeism influenced their academic performance in mathematics had the highest mean score (Mean = 3.111, Standard deviation = 1.195).

S1: The mathematics teacher sometimes does not come to school.

S2: Sometimes the mathematics teacher gives us class exercises but he does not come to teach.

S3: The mathematics teacher sometime goes to town and does not return to teach us.

This finding agrees with the World Bank (2004) report that teachers living long distances from schools and experiencing transportation difficulties, teachers having to travel to town once a month to collect their salaries account for the increasing teacher absenteeism in Ghanaian schools.

Also, from Table 4.5, the statement Students perceive that teacher lateness to school influenced their academic performance in mathematics had the second highest mean score (Mean = 2.706, Standard deviation = 1.207).

S1: The mathematics teacher comes to class late and blames it on transportation difficulties.

S2: The mathematics teacher says he stays very far away from the school.

S3: The mathematics teacher sometimes come to class late and talk without teaching us anything.

This finding confirms the view of Dunne and Leach (2005) that the low levels of professionalism in schools (especially low performing ones), with teachers having high rates of lateness and sometimes refusing to teach during classes is on the increase.

Again, from Table 4.5, the statement Students perceive that shortage of qualified mathematics teachers influenced their academic performance in mathematics had the third highest mean score (Mean = 2.691, Standard deviation = 1.203).

S1: I don‟t like the way the mathematics teacher teaches us in class.

S2:The mathematics teacher gets angry when we ask plenty questions in class.

S3: The mathematics teacher likes playing with the girls when he is teaching.

This finding endorses the view of Avong (2013) that shortage of qualified Mathematics teachers in schools are the major contributing factor to students‟ poor performance in Mathematics.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter gives a summary of the methodology and results of the present study. Conclusions are discussed based on the insights gained in relation to the findings of the study. Recommendations are given for improvement in teaching and possible area for further research studies are suggested.

5.1 Summary of the Study

The study was conducted to investigate junior high school students‟ perception of school factors, student factors, and teacher factors inhibiting students‟ academic performance in Mathematics. The study was guided by three research questions. It was a descriptive survey with sample of one hundred and twenty-six respondents selected randomly from the three hundred and twenty-six students of Asokore SDA College Demonstration Junior High School, Koforidua. The researcher administered a closed-ended questionnaire personally to gather data for the study. The data collection exercise lasted for six weeks. The data were analyzed using tables of frequency counts and percentages.

5.2 Key Findings

The following findings were made.

i. Students‟ perceptions of school factors inhibiting their academic performance in Mathematics include; good seating arrangement, the type of school (either public or private), and class size.

ii. The students‟ perceptions of student factors inhibiting their academic performance in Mathematics include; gender of students, attitude of students, and parental education of students.

iii. The junior high school students‟ perceptions of teacher factors inhibiting their academic performance in Mathematics include; teacher absenteeism, teacher lateness, and shortage of qualified mathematics teachers.

5.3 Conclusions of the Study

The respondents of the study had a perception that the academic performance of junior high school students at Asokore SDA College Demonstration Junior High School, Koforidua was inhibited by school factors (good seating arrangement, the type of school either public or private, and class size); student factors (gender of students, attitude of students, and parental education of students); and teacher factors (teacher absenteeism, teacher lateness, and shortage of qualified mathematics teachers). From the findings, it can be concluded that any attempt at improving upon the academic performance of students in Mathematics at the junior high school should consider school related factors, student related factors and teacher related factors.

5.4 Recommendations of the Study

Based on the findings of the study, the following recommendations are made.

i. The head teacher of Asokore SDA College Demonstration Junior High School needs to ensure that the school has adequate stocks of quality tables and chairs for use by students. Also, the head teacher needs to ensure that the tables and chairs are neatly arranged in the classroom.

ii. The head teacher of Asokore SDA College Demonstration Junior High School, Koforidua through the School‟s Management Committee (SMC)

needs to ensure that the number of students in each class does not exceed the Ghana Education Service (GES) approved number. This will ensure that the teacher-students ratio is manageable in order to improve upon teaching and learning and performance of students in mathematics.

iii. Teachers of Asokore SDA College Demonstration Junior High School, Koforidua through the school"s Parent Teacher Association (PTA) need to educate and motivate students to adopt positive attitude towards the studying of Mathematics.

iv. The head teacher of Asokore SDA College Demonstration Junior High School, Koforidua need to put in place mechanisms to supervise teacher attendance and punctuality to school. This would ensure that mathematics teacher go to school regularly and on time.

v. The head teacher of Asokore SDA College Demonstration Junior High School, Koforidua needs to ensure that teachers attend workshops regularly to update their knowledge about content and pedagogy of teaching Mathematics.

5.5 Suggestion for Further Study

Based on the findings of the study, it is recommended that a similar study be conducted in public and private junior high schools in the New Juaben North Municipality and the results compared.

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APPENDIX A

UNIVERSITY OF EDUCATION, WINNEBA

QUESTIONNAIRE FOR STUDENTS

Differences in junior high school students' perception of school, teacher, and student factors inhibiting their performance in Mathematics at SDA College Demonstration Junior High School

This questionnaire seeks to gather data on students" perception of school, teacher, and student factors inhibiting their performance in mathematics in your school. The information you provide will be kept confidential and be used solely for the purpose for this study.

Instruction: Please respond by ticking the appropriate box. For example, [√]
S.A = Strongly Agree **A** = Agree D = Disagree **S.D** = Strongly Disagree

Section A: Demographic Data

1. Sex: Male [ ] Female [ ]
2. Current Class
   JHS 1 [ ] JHS 2 [ ] JHS 3 [ ]
3. Age of Respondent
   11-12 years [ ] 13-14 years [ ] 15-16 years [ ] Above 16 years [ ]

Section B: Differences in junior high school students" perception of school factors inhibiting their academic performance in Mathematics.

School factors	**S.A**	**A**	**D**	**S.D**
4. Type of school – public or private				
5. Class size				
6. Quality teaching and learning environment				
7. Guidance and counselling services				
8. Effective school administration				
9. Good seating arrangement				
10. Good school building				
11. Availability of teaching and learning resources				

Section C: Differences in junior high school students‟ perception of student factors inhibiting their academic performance in Mathematics.

Student factors	S.A	A	D	S.D
12. Students spend more time on studies				
13. Gender of students				
14. Parental education of students				
15. Attitude of students				
16. Regular school attendance				
17. Students attitude towards studying mathematics				

Section D: Differences in junior high school students‟ perception of teacher factors inhibiting their academic performance in Mathematics.

Teacher factors	**S.A**	**A**	**D**	**S.D**
18. Shortage of qualified mathematics teachers				
19. Teacher knowledge about content and pedagogy				
20. Teacher experience in teaching mathematics				
21. Teacher regularity in the classroom				
22. Teacher absenteeism				
23. Teacher lateness to school				

Thank you