ANALYSIS OF ACADEMIC PERFORMANCE OF VISUAL ARTS STUDENTS IN MATHEMATICS: A CASE OF THE ADANWOMASE SENIOR HIGH SCHOOL

By

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DECLARATION

I hereby declare that this submission is my own work towards the Master of Philosophy in Art Education, and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

The persistent mass failure in the Core Mathematics subject among the Visual arts students has attracted the interest of educational stakeholders and researchers to investigate the underlying factors responsible for such a teething challenge. Based on this background, the purpose of this study was to investigate the academic performance of the Visual Arts students in the Core Mathematics subject at the Adanwomase Senior High school in the Ashanti Region. This study emphasized on analyzing the trends in their performance in Mathematics, the major factors that account for their poor performance in Mathematics and the appropriate measures to improve their performance. The descriptive Survey design was employed where a total sample of 183 respondents were randomly selected to participate in the study. The sampled respondents comprised 33 teachers at the Adanwomase SHS, 149 Visual Arts students in SHS 2 and SHS 3 as well as the assistant Headmaster in the school in charge of academics. The results were analyzed using descriptive statistics, and simple statistical analyses such as the t-test, mean, standard deviation and graphs. The main research instrument used was the researcher-designed questionnaires and interviews to collect appropriate data for the analysis. The Findings from the study revealed that, Students' performance in mathematics was found to be consistently very poor as mass failures have always been recorded in the WASSCE in the school. The results from the t-test indicate that, there is no statistical significant differences between the mean scores from male respondents and female student's respondents regarding their academic performance. Findings from the study also revealed that, the students have low interest, and negative perception in studying Mathematics in the school. Regarding the study habit of the students, the results show that, majority of the females students prefer engaging in cooperative learning with their colleagues to other individual studies while the male students prefer independent studies. Larger class size, negative attitude of the students towards mathematics, lack of academic competition in class, absenteeism, increased indiscipline account for their poor performance in school. It is recommended that, the school authorities, and the PTA should ensure that, the counseling unit in the school is well resourced and professional counselors are employed to provide counseling services to the students. These counseling services should particularly emphasize on fear and negative perception about learning Mathematics in the students. How the students should manage their time especially spending enough time to complete their assignment and homework are crucial.

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CHAPTER ONE

INTRODUCTION

Background to the Study

The issue of poor academic performance in mathematics particularly among Senior High Schools (SHS) in Ghana has become a worrying issue and has received increased attention hotly debated by many stakeholders, policy makers, researchers and educationists since the past decade. Mathematics is one of the compulsory subjects that students are mandated to pass before they can progress to the tertiary or any higher educational institutions. For instance, students are expected to meet the pass mark of grade A1-C6 before they can progress to the university or any other higher educational institution in Ghana. This places a greater responsibility on the students to work hard to pass the subject. Yet, academic performance of SHS students in Mathematics especially among the Visual Arts students in Ghana continue to fall, as about 70% of the students fail in the final WASSCE almost every year (WAEC, 2016).

Mathematics skills is seen as essential tool playing a major role in activities of almost all streams of life ranging from academic, business, and career choices (Trusty, 2002). It is in this direction that (Wagner, 2008), suggests that students of today need insights into what he calls 'a diversity of 21st century skills', involving quantitative skills, arithmetic, initiative, critical thinking, collaboration, oral and written communication skills, ability to analyze information and imagination.

In Ghana, Visual Arts students are among the group of students who perform poorly in mathematics for the past decades (Asihene, 2009), though, according to Cunningham, 2005), Visual Arts students should perform better in mathematics since they have the ability to visualize what is not visible and this attribute is one of the critical potential

skills needed to perform better in mathematics. Similarly, educational organizations in mathematics and science have greatly emphasized that, visual presentation and reasoning abilities of the visual arts students put them at a greater capacity to perform better in mathematics and Science. In this context, Whitely (2004) is of the view that visualization is one of the most significant tools needed for solving mathematics problems and these Visual Arts have that ability and for that are expected to perform better in the mathematics. Gardner (2007) also contends that the Visualization skills acquired by the Visual arts students in their programme should be applied in the skills of mathematics. It can also be added that every subject under the Visual art programme is supposed to be practically oriented, and that, in practice, can be said of the teaching or learning Mathematics generally.

Various studies have investigated the key factors influencing the academic performance among students (Hunt and Tyrrell, 2000, Stuart, 2000, Asihene, 2009, Adinyira, 2012). Findings by (Staffolaniand and Bratti,2002) suggest previous academic achievement as a predictor of the students' current and future performance in the academic activities. Students who had higher previous academic achievement demonstrate good performance in their current academic activities and they are most likely to repeat their high performance in the future. An assertion by Graetz (1995) on the other hand shows that the socio-economic status of parents plays a key role in the academic performance of students. The author argued that the difference0s in the academic performance and success were accounted by the differences in the socioeconomic statuses of their parents. It is in the light of this that first class family continues to maintain their children in higher education than the poor or low class families.

Again, several studies have attributed the academic performance of students in Mathematics to the attitude of enjoyment and ability among the students. As Garfield

(1994) opined, the attitudes of learners play a key role in their performance of especially subjects involving calculations and analysis. That notwithstanding, findings from (Ma, 1997) revealed that students who tend to enjoy mathematics perform better than those who see mathematics as boring and not enjoyable. More ambitiously, belief and the thinking of the usefulness of mathematics also account for the academic performance of the students in the subject. It is observed that students who see mathematics as useful tend to achieve higher score than those who do not see any usefulness in mathematics (Martin, 2000).

Nonetheless, poor academic performance in mathematics among high school students has been also attributed to absenteeism among students (Howie, 2001). The author contends that students who absent themselves from school habitually are likely to perform poorly than their colleagues who are always punctual in class.

Similarly, according to Stuart (2000), negative peer pressure among students is of the influential factors that affect the performance of students in the study of Mathematics subject. The author asserts that, this attitude of peer pressure have a detrimental effect on both the brilliant students and the weak students in the study of Mathematics. It is revealed that, student's performance in mathematics is greatly influenced by their group attitude and even the family attitude towards the learning of Mathematics.

Previous studies such as (Walberg, 1992) and (Stuart, 2000) report that attitude towards learning of a particular curriculum such as mathematics has a major role in predicting the performance of the learners and even the teachers. It has been indicted that student's ability and attitude towards the study of mathematics even though is necessary, the teachers' attitude towards his or her students' ability and attitudes in the studying mathematics is key. The teacher's attitude and beliefs about his or her

students' ability and competence towards the study of Mathematics actually determine how best the teacher teaches and the performance of the students. Teachers' confidence and beliefs in the ability of his or her students influence the performance of the teacher himself and as such the students are also affected by the teachers' attitude (Fennema and Romberg, 1999). Teachers who see the, his or her students do not have the ability and positive attitude to learn mathematics do no put much effort to teach them (Fennema and Romberg, 1999).

In Ghana, a study by Asihene (2009) reveals that core subjects' teachers usually argue that, the poor performance of the Visual Arts students in the core Subjects particularly the mathematics was as a result of the fact that they are non-serious, academically poor and mostly are not able to keep pace with students in other programs apart from Visual Arts.

It is against this background that this study seeks to investigate the academic performance of the Visual Arts students in mathematics in the Adanwomase Senior High School and the factors influencing their performance by paying attention to their attitude, competence, ability and the perception of their teachers about the students toward teaching and learning of mathematics. The performance of the Visual Arts at the Adanwomase SHS has received severe condemnation as it has remained poor for many years particularly during their WASSCE. Statistics in the school reveal that, the performance of the Visual Arts Students in the Core Mathematics for years now has been very poor meanwhile, passing Mathematics is a compulsory requirement to for s student to obtain before progressing into the tertiary institutions. The figure 1.0 below depicts the percentage failures recorded from the year 2015-2017 of these students.

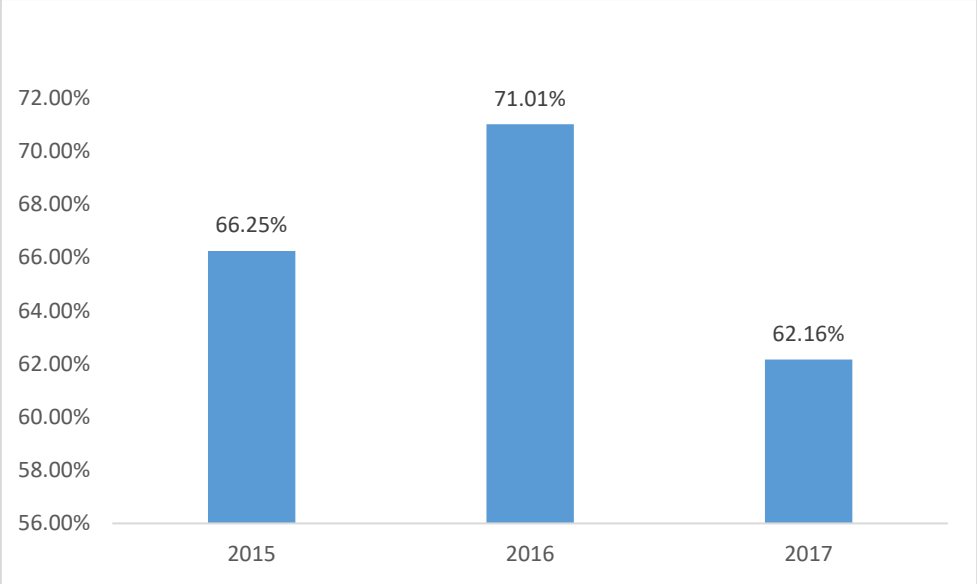


Figure 1.0: Percentage of Visual Arts student who obtained D7 - F9 in their WASSCE (2015-2017)]

Source: Academic Headmasters' Office, Adanwomase SHS, 2018

Results from the figure 1.0 shows that, during the 2015 WASSCE, more than half (66.25%) of the Visual Arts students failed with Grade F9, while in 2016 this poor performance continued to about 70.01% and remained poor in 2017 also. The implication is that, for every 100 visual Arts students, who sat for the Final WASSCE, about 66 students could to continue to any tertiary institutions or for example in 2017, about 71 count not continue to any of the tertiary institutions with these results. This has attracted the attention of the stakeholders, PTA, education directors and school administrators to find out why these abysmal performances and this has necessitated this study to be conducted.

1.2 Statement of the Problem

Studies have observed that Mathematics is one of the curricula activities that have large impact on the socio- economic development of individuals and on the society. Yet it is

one of the subjects students find it difficult to study and have thus developed some negative attitude towards it (Molepo, 1997). Mathematics has a lot of influence on the daily activities of individuals, business, and the society as a whole. People's career choices are greatly influenced by their skills and knowledge in mathematics. In the real life situation, most of the career opportunities through the world involve a bit of application of mathematics. The indication therefore is that students' poor performance in mathematics has a dire effect on their later career choices (Trusty, 2002). As Howie (2001) revealed, many students in South Africa have greater interest in mathematics and as such, their career aspirations are directed towards mathematics oriented vocations.

In Ghana, studies such as Evans-Solomon and Opoku-Asare, (2011) found that, most students in the senior high schools perform poorly in Mathematics but the situation is particularly worse among Visual arts students. This has always been the challenge hindering the educational progression of the Visual Arts students who complete the Senior High Schools (Adinyira, 2012). This has led to the situation where most parents do not even want to enroll their Children in the Visual Arts program and most brilliant students have also diverted from doing Visual Arts in the Senior High to other programs.

In the past three (3) years, the researcher has been a Visual Arts tutor at Adanwomase SHS and is currently a form master of the second year Visual Arts 1 Class. It has been observed from the analysis of the terminal examination reports of students of Adanwomase SHS that their performance in Mathematics is not encouraging. For example, during the first term of the 2017/2018 academic year, only one (1) student who scored B3, and seven (7) students who scored between C4-C6 out of the eight-one

(81) students of the class passed. The rest all failed, that is, they had between D7-F9. The analysis of the term two also showed that nine (9) student had between C4-C6. The third term was even worst. A student had B3 and five (5) others had between C4-C6. The analysis of our students' performance in the final examination (i.e. WASSCE) is not different. During departmental meetings, where the Head of Department (HOD) presents the final analysis, the Visual Arts students perform poorly in Mathematics as compared to other departments.

This raises an alarm because the quality of education in Ghana is affected due to the massive failures in the core Mathematics among the Visual Arts students. Also, given that a pass in Mathematics is prerequisite for every SHS student in Ghana, the students' ability to progress to the next academic ladder is halted when he/she fails in Mathematics. In the long run, this has a high potential to collapse the Visual Arts program offered at the Senior High School. In spite of the unfortunate background, as far as I know, only few studies have been conducted in Ghana to deeply examine why the Visual Arts students perform poorly in the Mathematics Curriculum. The scarcity of attention that Visual Art students' performance in Mathematics have received in Ghana, not only presents challenges, but also, opportunities for further investigations.

Motivated by this background, the present study aims to carry out this study to investigate the academic performance of the Visual Arts students in Mathematics at the Adanwomase Senior High school in the Ashanti Region. This study also seeks to account for the factors that influence their poor performance in Mathematics and identify the ways to help the students to improve their performance.

1.3 Research Objectives

The specific goals of this study are to

i. Examine the performance of the visual arts students in Mathematics at Adanwomase SHS
ii. Investigate the factors that influence their poor performance in Mathematics.
iii. Identify the ways to help the students to improve their performance.

1.4 Research Questions

i. What is the performance of the visual arts students in Mathematics at Adanwomase SHS?
ii. What are the factors that influence their poor performance in Mathematics?
iii. What are some of the ways that the students' performance in Mathematics can be improved?

1.5 Significance of Study

The study is designed to primarily investigate the academic performance of the Visual Arts students in Mathematics and Science in the Adanwomase Senior High school. The study will provide information of on how the Visual arts students are performing in the Core subjects especially Mathematics and science, determinants of academic performance, and attitude of the Visual Arts students towards the teaching and learning of Mathematics and science in the senior high schools. It is hoped that, the outcome of the study will help provide knowledge on these thematic areas to guide the teaching and learning pedagogies employed in the schools since the academic performance is the key product of theses teaching and learning pedagogies. This would inform the decision of parents, teachers and the stakeholders on how to improve upon the performance of the students particularly, the Visual Arts Students. It is again hoped that, the findings of the

study would specifically inform educational research and curriculum and developers design appropriate teaching methods and learning styles to help suit the needs of the students. The outcome of the study will also provide sufficient information for future researchers to utilize in the area of predictors of academic performance in the senior high schools. Finally, the findings from the study will fill the limited information gaps information in literature specifically in the area of academic performance of Visual Arts students in the core subjects such as Mathematics and Science in the Senior High Schools in Ghana.

1.6 Delimitation

The study will be conducted in the Adanwomase Senior High school in the Ashanti Region of Ghana. The scope of the study will include investigation into the trend of academic performance of only the Visual arts students at the Adanwomase Senior High School in the Cores subjects particularly Mathematics . The Adanwomase Senior High school is one of the Category C schools located in the Ashanti Region of Ghana. The study will also focus on the attitude of the students towards the teaching and learning of the Mathematics subjects in the schools. Again the factors that determine their performance in the subjects will be established and their significance will be estimated through hypothesis testing approach.

The study will be limited to only the Adanwomase Senior High school and the choice of this school is not only based on nearness to the researcher, but due to the fact that, the research is a teacher in the school and the school authorities have also assured him of needed cooperation to make the work successful.

Finally, the cross sectional data will be utilized for the study. The cross sectional data is the type of data collected at a point in time from the response dents who will constitute only the Visual Arts students and their teachers. The study will be quantitative in nature and the researcher-designed questionnaires will be used as the main research instruments for the study.

1.7 Organization of the Study

The entire thesis is organized into five main chapters. The chapter one describes the background to the study, statement of the problem, objective, research questions, significance of and the study organization of the study. This is closely followed by the chapter two which focuses on the related literature, theoretical framework, as well as some empirical review in the study area. The Chapter Three also covers the methodology of the study which include, research design, type of data, and data analysis plan. Again, the Chapter four presents results and discussion of the findings of the study. The final part of the study is the Chapter five which also comprises the summary of the study, conclusion and recommendations.

The diagram below show the schematic structure of the thesis

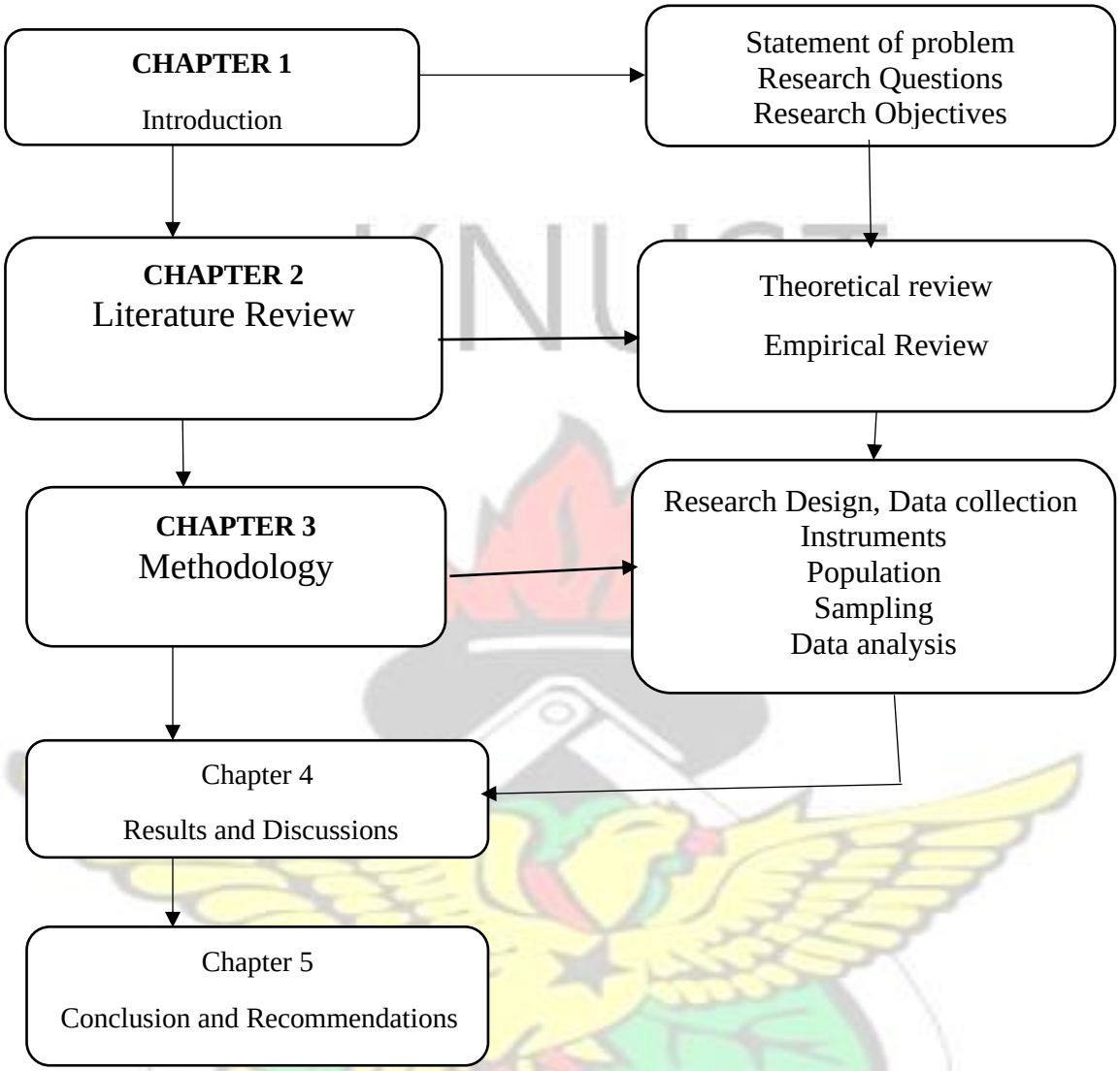


Figure 2.0: Structure of the thesis

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Theoretical Frameworks: Attribution Theory

Thompson (1995) postulates this theory. a central assumption of the Attribution theory is that people attempt to maintain a positive self-image .Therefore if people do well in an examination they are likely to attribute their success to their own efforts or abilities ,but when they do poorly they believe that failure is due to factors which they have no control.

Basing on this theory, if learners perform badly in mathematics they attribute the cause to other factors other than themselves and in most cases it is the teacher who is given the blame and the teacher acts likewise and blames the students for not putting enough effort in their learning .Oloyede (1996) adds credence to the above sentiments in this study on effects of psychological theories in mathematics teaching when he said that for any mathematics teacher to be academically functional and effective in the classroom the knowledge of educational psychology should be the basis for new encounter in his or her teaching .The tendency for individuals to consistently make particular kinds of attributions overtime is referred as attribution style Metalsky and Abramson (1981). This means a self-enhancing style is one that habitually gives credit to hard work for success and attributes failure to lack of effort.

Attribution Theory influences pupils' perceptions and deals with four explanations for success and failure in, achievement situations, ability effort, task difficulty and luck. The internal attributions are ability and effort to the individual, whilst task difficulty and luck are external to the learner. Ability is taken to be a relatively stable, unaltered state, whilst effort can be altered. One concept that is central to attribution is locus of

control (Bandura, 1997) .Locus of control has been defined by Weiner (2000) as a subjective personal belief that the extents to which one's actions determine outcomes. A student with locus of control believes that success or failure is due to his or her own efforts or disabilities. Locus of control can be either internal or external to the individual .A student with external locus of control always believes that external forces cause his or her failure. On the other hand, one with internal locus of control also known as self-efficacy believes that one's behaviour makes a difference (Zimmerman, 1998). Self-efficacy or locus of control can be very important in explaining a student's school performance if the teacher has knowledge of the theory

Several researchers have observed that students who are high in internal locus of control have better grades and test scores than students of the same intelligence who are low in internal locus of control (Shell, 1995). According to (Bandura, 1997) observes that studies have established locus of control to be the second most important predicator of student's achievement. Students who believe that success in school is due to luck, teacher's effort or other external factors are unlikely to work hard because they have no confidence in their ability. In contrast, students who believe that success and failure are due to their efforts can be expected to work hard provided they are prepared to do so. If pupils believe that hard work results in improved performance they will put more effort and an improved performance will motivate them in future and will not blame external factors for their failure. Salami (1997) also agrees with the above statement when he says, success that is attributed to good luck is not sustainable, as failure may occur in the future since luck is unstable. Furthermore it has been observed that students who attribute their performance to luck avoid the front seats but prefer the back seats. In addition attribution to luck has been known to be characterised poor

attitude to study, low motivation and low motivation to achieve (Forsyth and MacMillan 1981).

Attribution of failure to lack of effort may result in improved success because performance might be improved if more effort is exerted. This is echoed by Rao (2007) who asserts that, when students fail, they are most likely to persist and eventually succeed if they attribute their failure to lack of appropriate effort. Effort is most effective if it is reviewed as the persisting devotion of effective academic time to the task .It is important that when students perceive themselves as unsuccessful they are helped to develop the conviction that they have the ability to succeed in mathematics and they could succeed if they give their best. Attributing mathematics failure to lack of ability may result in low expectance for future success because ability is stable and will not increase greatly and also future performance will show little improvement.

In reality success in a learning situation is a product of the student's effort (internal factors) and luck, task difficulty, behaviour of the teachers thus teaching methods and availability of resources (external factors).

2.2 The Essence of Mathematics Education

The main goal of mathematics education is to promote students 'learning of mathematics. It focuses on the content and the tools, methods and the approaches that facilitate the teaching/ learning activities. This makes mathematics education essentially practical and dynamic, necessitating new changes in teaching the subject. According to Bush (2009), there have been many changes in both the content and the style of mathematics teaching for the last thirty years. They note that modern methods made greater demands for visual and physical aids to help children understand concepts and processes. The old didactic methods of teaching mathematics, which involved rote

learning, are gradually being replaced by interactive teaching methods On the other hand, the introduction of the use of graphic calculators and computers in mathematics classrooms is another worth mentioning recent change in mathematics. The power of using computers in the teaching of mathematics has been emphasized by Bush (2009) as a strategy for developing problem solving skills which was seen as a touchstone for reform. For this reason, the Bush (2009) advised that mathematics education programmes must take full advantage of the power of calculators and computers at all grade levels.

2.3 The Concept of Academic Performance

In educational institutions, success is measured by academic performance, or how well a student meets standards set out by local government and the institution itself (Osei-Mensah,

Cary, Roseth, David and Roger (2008) define academic achievement as: Performance on task with measures including comprehension, quality and accuracy of answers of tests, quality and accuracy of problem solving, frequency and quantity of desired outcome, time 2012). Academic performance according to the Cambridge Dictionary of English (1995) refers to how well a school, college, university, an individual or a group is able to perform when given a learning task, activity or one's achievement in standardized tests in academic pursuit. Thus academic performance refers to how students deal with their studies and how they cope with or accomplish different tasks given to them by their teacher. Academic performance is related to content and intellect, meaning that academic performance depends on the learner's competence. or rate to solution, time on task, level reasoning and critical thinking, creativity, recall and retention, and transfer of tasks. The researcher believes academic achievement refers to

a successful accomplishment or performance in a particular subject area and is indicated by grades, marks and scores of descriptive commentaries. Dimbisso, (2009) argued that academic performance refers to how students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers in a fixed time or academic year. Ferla, Martin and Yonghong (2009) use the notion of academic self-concept referring to individuals' knowledge and perceptions about themselves in academic achievements, and convictions that they can successfully perform a given academic tasks at designated levels. They further stated that academic self-concept represents a more past-oriented, aggregated and relatively stable judgment about one's self-perceived ability in a particular academic domain; while academic self-efficacy represents a context specific and relatively future oriented judgment about one's confidence for successfully performing an upcoming subject-specific academic task.

Dimbisso (2009) stated that achievement encompasses actual accomplishment of the students‟ of potential ability. Kobal and Musek (2001) stated that: there are two broad groups of definitions of academic achievement. The first one could be considered more objective, because it refers to numerical scores of a pupil’s knowledge, which measure the degree of a pupil’s adaptation to school work and to the educational system. The second group is a more subjective one, as its determination of academic success is reliant upon the student’s attitudes towards his academic achievement and himself, as well as by the attitudes of significant others towards his/her success and him/herself. The concept of low academic performance varies in its definition.

Tapia (2002) considers low academic performance or academic failure as the situation in which the subject does not attain the expected achievement according to his or her abilities, resulting in an altered personality which affects all other aspects of life.

Similarly, Tapia (2002) notes that while the current educational system perceives that the student fails if he or she does not pass, more appropriate for determining academic failure is whether the student performs below his or her potential.

Aremu (2000) defines poor academic performance as performance that is adjudged by the examinee/testee and some other significant as falling below an expected standard. The understanding of this expected or desired standard is better appreciated from the perpetual cognitive ability of the evaluator of the performance. The evaluator can therefore give different interpretations depending on some factors. Bakare (1994) described poor academic performance as any performance that falls below a desired standard.

The criteria of excellence can be from 40 to 100 depending on the subjective yardstick of the evaluator or assessor. For example, a 70 per cent performance of senior high three students in junior secondary English language examination is by all standards a very good performance. However, a cursory look at the performance and the individual examined and the standard of the examination he or she took could reveal that the performance is a very poor one. On the other hand, a junior secondary two student's performance of 37 percent in senior secondary three mathematics can be said to be a poor performance when in actual fact the performance is by all standards a very good one. This shows that the concept of poor academic performance is very relative and this depends on so many intervening variables (Osei-Mensah, 2012).

2.4. Determinants of Students' Performance in Mathematics

2.4.1 Family Background

Majoribanks (1996) holds the view that family is the key to a student's life outside of school; it is the most important influence on students' learning and includes factors such as socioeconomic status and family structure. The environment at home is a primary socialization agent and influences a child's interest in school and aspirations for the future. Osuafor (2013) noted that family background including family structure, parental occupation and parental education level had a significant influence on students' achievement in biology. Further McIntosh (2008) in his study concluded that in Canada, children who came from low income households, having divorced or separated parents, would actually perform better than average scores if they came from homes that had positive attitudes and that strongly supported their children. This was supported by another study on Children and Youth in Canada that was carried out by Rothstein (2000) who reported that there was a significant effect of family background variables, parental support, and teacher support on a child's educational achievement. The relationship between parental resources on the academic performance of children has received a great deal of attention in the economic literature in African Countries. For instance, Guo and Harris (2000) observed that in Ghana and South Africa states, students' performance in school was strongly associated with their parents' educational attainments.

2.4.2 Learning Environment

Barry (2005) holds the view that, a student's educational outcome and academic success is greatly influenced by the type of school they attend. In his view, 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 free of barriers, or 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, Johnson, and Elder (2004) have 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.

According to Danesy (2004), other factors that compliment environmental and socio-economic factors to produce high academic achievements and performance include good teaching, counselling, 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 (2004) 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 and pictures perform better than those trained without them (Osei-Mensah, 2012). This implies that teaching and learning should be done under organized, planned, and fortified environment with learning instructional aids to stimulate students' sense of conception, perception and concentration to facilitate systematic understanding and acquisition of knowledge in them. In sum, a combination of a healthy family background, good environment plus the child being educated in a conducive environment with a fortified learning or instructional aids or motivational incentives prompt academic performance whiles a lack of this will retard academic performance.

2.4.3 Instructional Materials (Learning Facilities)

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 Moreover, the school location and quality of the physical building 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 that of Danesy (2004) who stressed 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. Availability and use of teaching and learning materials affect the effectiveness of a teacher's lessons during instructional delivery.

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 Isangedighi (1998) refers to as learner's environment mismatch. According to him, this promotes poor academic performance. Engin-Demir (2009) argue that attending a school with a better physical environment is associated with increased maths scores. Adepoju (2001) found that students in urban schools manifest more brilliant performance than their rural counterparts. Also, Ogunleye (2002) revealed a significant difference in the achievement of students in urban peri-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, Brai-Abu and Adeniji (2007), for instance, 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. They revealed that small schools performed better than medium and large schools. In 2001, Tremblay, Ross and Berthelot found class size to be inversely related to achievement, especially for children in early grades. Kraft (1994) in his study of the ideal class size and its effects on teaching and learning in Ghana concluded that class sizes above 40 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, Amedahe and Edjah (2005) in a study of 60 schools from peri-urban (29 schools) and rural (31 schools) areas in Ghana found that academic performance was better in private schools than public schools because of more effective supervision of work. According to Etsey *etal*. (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 school.

2.4.4 Classroom environment

To many people classroom environment is just another expression for classroom setting. It is an undeniable fact that classroom lighting, temperature and ventilation affect student‘s performance but creating an environment conducive to learning is more than having attractive sights, relaxing sounds, and good ventilation. In addition to that, a classroom environment conducive to learning is a place where everybody feels comfortable and at ease. It is a place where there is mutual respect in a friendly and nonthreatening atmosphere (Sorensen, 2003).

The teacher is the key factor in influencing the mood of the classroom environment. It is the teacher who creates learner‘s attitudes towards the subject. With the help of their students, teachers foster positive classroom climate which encourages students to be comfortable and at ease in participating in all kinds of teaching learning activities. The teacher is always the decisive element in the classroom. It is the teacher‘s knowledge,

personality, mood and skills that mold the entire classroom climate. Although most teachers are not aware of it, it is them who mend or end the children‘s ability to learn the subject (Sorensen, 2003).

On the other hand, clear and simple standards of conduct that all students understand are essential to a productive classroom environment. Classroom routines and procedures are the best way to establish these standards. Effective classroom management is more than rules and discipline. Rather, effective teachers establish responses to common classroom issues of order that allow them to focus maximum time and energy on the instructional process. A classroom environment is affected by both physical and psychological factors. Having emotionally safe and encouraging classroom climate is equally important, in creating an effective environment, as the physical makeup of the room (Sorensen, 2003).

2.4.5 Teacher qualifications

Quality of teachers and commitment are key inputs in educational production to perform better achievement (Osei-Mensah, 2012). A teacher’s knowledge of the subject matter coupled with textbooks, instructional time and other learning materials have great influence on learning at the basic school level. Agyemang (1993) reported that “a teacher who does not have both the academic and the professional teacher qualification would undoubtedly have a negative influence on the teaching and learning of his/her subject”. According to Hedges (2002) many trained teachers are unwilling to accept postings to deprived communities in Ghana. As a result there is a tendency for less qualified teachers to be employed in these communities, which affects their academic performances negatively. Darling-Hammond (2000) found that teacher quality

characteristics such as certification status and degrees in subject to be taught are very significant and positively correlated with subject outcomes in science and mathematics. Oskemp (2002) analysis of teachers' qualification and students' mathematics performance found a positive relationship between these variables; with higher levels of performance among students whose teachers held a bachelor's or master's degree in mathematics than among students whose teachers were diplomates. Oskemp (2002) examined data on the degrees and certification status of teachers and their students' performance in mathematics and observed a positive relationship between teachers' degrees and student performance in mathematics. Oskemp (2002) further found that students whose teachers were certified in mathematics but did not hold a degree in mathematics did not perform as well. Ingersoll (1999) found out that 63 per cent of chemistry, physics, and earth and space science instructors do not have certification in the subjects and this result in the poor performance of students in American Secondary schools.

Also, Hedges (2002) found academic achievement to be positively correlated with teacher qualification. Additionally, Abuseji (2007) found teachers' qualification to be the second most potent causal effect on student's achievement in chemistry. Its direct and indirect effect accounted for 4.37 per cent, and 5.00 per cent of the total effect on students‟ achievement in chemistry in Lagos state, Nigeria. Okoruwa (1999) found that teachers‟ teaching experience had significant effect on students‟ achievement in science. Also, Fettler (1999) investigated the relationship between measures of teachers‟ experience and student achievement in science and mathematics. He found that teaching experience as measured by years of service correlated positively with student 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 practise 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) suggest that effective teaching is a significant predictor of students‟ academic achievement and concludes that effective teaching produce students of higher academic quality.

2.4.6 Teacher's Experience

Teacher characteristics such as years of teaching experience have been investigated to determine their effect on student outcomes (Chapman, 2002). A more recent analysis by Mwangi (2002) used multilevel structural equation modeling to analyze data and found that teachers with a major or minor in the subject area that they are assigned to teach produce greater gains in student achievement in both mathematics and science. This remained true even after controlling for teacher professional development, teacher classroom practices, class size, and student demographics. Interestingly, Aiken (2000) found that students with mathematics teachers' assigned infield scored higher and had greater gains than students with mathematics teachers' assigned out-of-field which indicates a connection of content-knowledge, but not necessarily applying pedagogical knowledge to other content areas.

However, teacher experience is a topic of potential concern to policymakers, because experienced teachers often try to move to districts, schools, and classrooms with a more privileged student body and higher resources. Thus, if teacher experience is related to student achievement, and more experienced teachers are able to some extent select the

schools and districts in which they teach, or even their teaching assignments within a school, poor students and students at risk of educational failure may end up being doubly disadvantaged because they are more likely to be taught by inexperienced teachers.

Akey (2006) found in their meta-analytical study that teaching experience had a positive and significant effect on student achievement. Akey (2006) further found evidence that although teaching experience appears to be related to student achievement, the relationship may not be linear; students whose teachers had fewer than 5 years of experience had lower levels of mathematics achievement, but there were no differences in mathematics achievement among students whose teachers had more than 5 years of experience.

2.5.7 Methods of teaching mathematics

According to Anthony and Walshaw (2009), effective teaching of mathematics cannot be possible if the teacher does not have mastery over what he teaches, that is, he or she should have a strong content knowledge base, know the various learning theories and how to apply them and also have mastery of the various teaching strategies. However, Fredua-Kwarteng (2004) indicates that most teachers are usually interested in the answers that students give to mathematical questions at the end of instruction than the processes in solving the tasks to arrive at those answers during mathematics instruction in Ghana. To Fredua-Kwarteng, this makes attention shift from following systematic steps to arrive at answers; thus, adversely affecting understanding of mathematical concepts.

According to National Mathematics Advisory Panel Report (2008), four methods of instruction that show the most promise for successful mathematical teaching are:

1. **Systematic and explicit instruction:** This involves a detailed instructional approach in which teachers guide students through a defined instructional sequence. From this method, students learn to regularly apply strategies that effective learners use as a fundamental part of mastering concepts. Kroesbergen and Van Luit (2003) add that explicit instruction has been found to be especially successful when a learner has problems with a specific or isolated skill.
2. **Self-instruction:** This refers to a variety of self-regulation strategies that students can use to manage themselves as learners and direct their own behaviour, including their attention (Graham, Harris & Reid, 1992). With this method, learning is essentially broken down into elements that contribute to success: setting goals, keeping on task, checking your work as you go, remembering to use a specific strategy, monitoring your own progress, being alert to distraction and taking corrective action and checking your answer to make sure it makes sense and that the math calculations were correctly done.
3. **Peer tutoring:** This is an approach that involves pairing students to learn or practise an academic task. According to Kunsch, Jitendra and Sood (2007), peer tutoring works best when students of different ability levels work together. Research has also shown that a variety of peer-tutoring programmes are effective in teaching mathematics, including Class wide Peer Tutoring, Peer-Assisted Learning Strategies and Reciprocal Peer Tutoring (Barley, Lauer, Arens, Apthorp, Englert, Snow & Akiba, 2002).
4. **Visual representation:** This requires the use of manipulative, pictures, number lines, and graphs of functions and relationships to teach mathematical concepts.

> Visual representations bring research-based options, tools, and alternatives to bear in meeting the instructional challenge of mathematics education (Gersten et al. Gersten, Ferrini-Mundy, Benbow, Clements, Loveless, Williams, Arispe, & Banfield, 2008). "Representation approaches to solving mathematical problems include pictorial (diagramming), concrete (manipulative), verbal (linguistic training) and mapping instruction (schema-based)" (Xin & Jitendra, 1999:211).

Research has also explored the ways in which visual representations can be used in solving story problems (Walker & Poteet, 1989); learning basic math skills such as addition, subtraction, multiplication and division (Manalo, Bunnell & Stillman, 2000); and mastering fractions (Butler, Miller, Crehan, Babbitt & Pierce, 2003) and algebra (Witzel, Mercer & Miller, 2003). Xavier (2012) also stipulates that in order to teach mathematics effectively, activity based learning, jigsaw method, think-pair-share and play-way method have been identified as some of the strategies that can be used.

It can be concluded from the discussions that mathematics teachers should adopt student-centered approach to teaching the subject to give more room for learners to systematically and logically interact, reason, discuss and brainstorm to arrive at answers.

2.4.8 Teacher Attitude towards Mathematics

An understanding of how attitudes are learned should establish a connection between teachers and students' attitudes, and attitudes and performance. Schofield (1981) reports that positive teacher attitude towards Mathematics was significantly related to high achievement in pupils. Bridget, Vemberg, Twemlow Fonag, and Dill (2008) studied how the teachers' attitude contributed to students' academic performance and behaviour. The study unveiled, among other things, that students with more devoted

teachers were regarded by their peers as helpful to victims of bullying relative to students with less devoted teachers. The study also disclosed that students with the devoted teachers had the courage and determination to face difficulties in school life. Teachers were recognised as those who provided support, encouraged students and their value for love eradicated unwanted behaviour in students.

Teachers are, invariably, role models whose behaviours are easily copied by students. What teachers like or dislike, appreciate and how they feel about their learning or studies could have a significant effect on their students. Unfortunately however, many teachers seldom realize that how they teach, how they behave and how they interact with students can be more paramount than what they teach (Yara, 2009).

Like all other kinds of attitude, a teacher's attitude towards Mathematics can be measured by the emotional response towards Mathematics (affective), beliefs about Mathematics (cognitive), as well as behaviour. Clarke, Thomas and Vidakovic (2009) postulate that attitudes and practices of teaching Mathematics are complexly affected by beliefs, emotions, social context and content knowledge. Studies confirm that emotional responses toward Mathematics that are found in teachers include like and dislike of Mathematics, anxiety associated with Mathematics and self-confidence in relation to Mathematics (Phillipou & Christou, 1998, Brady & Bowd, 2005, Henderson & Rodrigues, 2008). These emotional factors have been found to have an impact on student performance. In their study of teachers' self-esteem connected to Mathematics, Henderson and Rodrigues (2008) found that approximately half of the participating pre-service teachers, some of whom were highly qualified, lacked self-esteem in relation to Mathematics.

Burks, Heidenburg, Leoni and Ratliff (2009) stipulate that teachers' exhibition of self-confidence when teaching Mathematics motivates student achievement in Mathematics. The learner draws from the teacher's disposition to form his own attitude which may affect her learning outcomes. Teachers' beliefs about Mathematics such as the usefulness of Mathematics, the way Mathematics should be learned, the difficulty or ease of Mathematics, as well as gender ability and beliefs also affect their attitude towards the subject and impact on students' performance.

According to Philippou and Christou (1998), teachers' beliefs about the utility of Mathematics are often found to correlate with either a more positive or negative attitude towards the subject. It is believed that a teacher who sees no usefulness of Mathematics in the real world and believes that Mathematics should be learnt as a set of rules and algorithms will require his students to memorise procedures and rules without meaning. This is a negative outlook that will make his students develop a negative attitude towards the subject. Also, a teacher who believes that girls are poor in Mathematics is likely to impact negatively on girls in his class who will begin to believe that they cannot do Mathematics.

Another aspect of the teacher's attitude towards Mathematics is the teacher's behaviour in relation to Mathematics. Such Mathematics-related behaviour as avoidance of Mathematics, pursuit of Mathematics and instructional behaviour in the classroom all affect student attitude and performance. Usually, the way that Mathematics is represented in the classroom and perceived by students, even when teachers believe they are presenting it in authentic and context dependent way stands to alienate many students from Mathematics (Barton, 2000, Furinghelti & Pekhoren, 2002). Ogunniyi, as cited in Yara, (2009) stipulates that students' positive attitude towards Mathematics is

enhanced by the following teacher-related factors: teachers' enthusiasm, teachers' resourcefulness and helpful behaviour and teachers' thorough knowledge of the subject-matter and their making Mathematics quite interesting. It is inferred that teachers can foster in students the positive attitudes about Mathematics that help to build confidence by: encouraging the belief that everyone can "do" Mathematics– emphasizing effort, not innate ability; modelling enthusiasm for teaching and learning Mathematics; addressing the learning styles of students by providing a variety of ways for students to gain an understanding of difficult concepts; helping students to appreciate the value of Mathematics in their lives; and choosing activities carefully (not too easy, not too hard), so that students can be both challenged and successful (Ministry of Education, Ontario, 2004).

2.4.9 Teacher-students interaction

Students learning mathematics do so with assistance from their teachers. Teacher-learner interaction in classroom should be geared towards achieving a goal; to learn mathematics, teachers should be conscious of their own attitudes towards mathematics and other subjects and towards his/her students regardless of their gender (Zan & Martino, 2007). They further emphasized that there should be provision of guidance and counseling to students with repeated under-achievement to reinforce the students accordingly and motivate them by providing for the individual differences.

2.4.10 Teachers/Students ratio

Githua (2002) there is a plethora of literatures to show that our primitive secondary schools are hampered by scores of problem: shortage of well-trained teachers, inadequacy of teaching facilities, lack of funds to purchase necessary equipment, poor quality textbooks, large 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, over-crowded classrooms or laboratories, automatic promotion of pupils, the negative role of public examination on the teaching-learning process, inequality in educational opportunities (Githua, 2002). Githua (2002) emphasized that for education to be effective, especially at the junior school level, teaching staff strength has to be adequate. A student-teacher ratio of 40:1 may be considered adequate but where they exceed, the teacher cannot perform effectively and efficiently.

Martens and Witt (2004) asserts that owning to the bloated class-size, the work becomes unwieldy and tedious; personal attention to individual pupils becomes impracticable, marking of assignments becomes tedious and burdensome, while compilation of results became a frustrating exercise. The resultant effect is the pathetic situation of poor performances in Mathematics examination. They wonder how a single teacher can take care of 50 students at a time. In most cases, the rooms are too small and poorly ventilated. It becomes difficult for the teachers to establish any close individual contact with the students.

Baldacchino and Farrugia (2002) affirm the effects of class size and teacher/student ratio on performance of students especially in mathematics. They further concluded that small classes have an advantage over larger classes in school performance and confirms that students in small classes scored higher on standardized test than students in regular class.

2.4.11 Teacher Self-Efficacy

Self-efficacy as a teacher, on the other hand, is a powerful predictor of how and whether a teacher will act (Dienes, 2000). Self-efficacy is the belief that one is capable of exercising personal control over one's behaviour, thinking and emotions. Effective teachers believe that they can make a difference in children's lives, and they teach in ways that demonstrate this belief (Dienes, 2000). What teachers believe about their capability is a strong predictor of teacher effectiveness. To Dienes (2000) teachers who hold strong self-efficacy beliefs tend to:

- be more satisfied with their job
- demonstrate more commitment and
- have lower absenteeism

Dienes (2000) further emphasized that teachers who have high self-efficacy tend to: persist in failure situations; take more risks with the curriculum; use new teaching approaches; make better gains in children's achievement and have more motivated students.

2.4.12 Student Attitude towards Mathematics

The conceptions, attitudes, and expectations of students regarding Mathematics and Mathematics teaching have been considered to be very significant factors underlying their school experience and achievement (Borasi, 1990; Shoenfeld, 1985). In general, the concepts students hold about Mathematics determine how they approach the subject. In many cases, students have been found to approach Mathematics as procedural and rule oriented. This prevents them from experiencing the richness of Mathematics and the many approaches that could be used to develop competence in the subject.

Attitude can also be gender related. There are many who hold the view that boys do better in Mathematics than girls. This belief tends to affect the attitude of girls towards Mathematics. Farooq and Shah (2008) in a study of secondary school students in Pakistan found that there was no significant difference in confidence of male and female students towards Mathematics at secondary school level. They rather found that students' success in Mathematics depended on attitude towards the subject. Nonetheless, some studies have found gender difference in students' confidence in Mathematics. Compared to boys, girls lacked confidence, had debilitating causal attribution patterns, perceived Mathematics as a male domain and were anxious about Mathematics (Casey, Nuttal & Pezaris, 2001). In the study, girls were found to have lower self-confidence in Mathematics than boys.

Instructively, research on the relationship between student attitude and performance has also been inconclusive. Researches that have been conducted to determine the relationship between students' attitude towards Mathematics and achievement in Mathematics have yielded contradictory results. The findings have thus lacked consistency on the subject. Some studies have demonstrated a strong and significant relationship between Mathematics attitude and Mathematics achievement (Minato & Yanase, 1984, Randhawa & Beamer, 1992, Schenkel, 2009). In the Schenkel's (2009) study of elementary school pupils, positive correlation between student attitude and student performance was found. Student beliefs and attitudes were found to have the potential to either facilitate or inhibit learning. In a comparative study of factors influencing Mathematics achievement, Burstein (1992) found that there is a direct link between students' attitudes towards Mathematics and student outcomes. Cheung (1998), in his study of 11-13 year olds, also discovered positive correlation between

attitude and Mathematics achievement. The correlation showed that the more positive the attitude, the higher the level of achievement in the student.

Some research have, however, demonstrated that the correlation between attitude towards Mathematics and achievement in Mathematics was rather weak and could not be considered to be of practical significance (Wolf & Blixt, 1981). In a meta-analysis of 113 primary studies involving elementary and secondary school children, Ma and Kishor (1997) found that attitude towards Mathematics and achievement in Mathematics was positively and reliably correlated but not strong. The correlation was not statistically significant. Flowing from the preceding findings, studies in different cultural settings are eminent to realise the influence of student attitude towards Mathematics on student learning outcomes in the subject.

2.4.13 Student's willingness towards problems solving and mathematics achievement

Willingness towards problem solving is believed to play a significant role in mathematics achievement. Schenkel, (2009) found that excellent students have high level of willingness to solve mathematics problems compared to average and weak students. His finding is also supported by Aiken (2001) that excellent students have high level of willingness towards problem solving. Aiken (2001) further highlight that Bandura (1977) claims that an individuals' self-efficacy expectation of their individual ability to successfully perform a given task is a reliable predictor of whether or not they will attempt the task, the amount of effort they will expend and their level of perseverance in the face of unanticipated difficulties (Aiken, 2001). Watson (2002) shown that self-efficacy has been used in the evaluation of performance in a variety of academic areas but a major focus has been related to mathematical skills.

2.4.13 Value of mathematics to students

Sayers (1991) asserts that, pupils failed to see the usefulness of mathematics as applied to daily living. It was taught as an abstract subject, a subject that is not related to life, with no social context of problems exploited. Failure to accept and recognise the usefulness of mathematics at school and in society caused low achievement of pupils in the subject. Most pupils thought that at school mathematics was mainly needed in science subjects like Physics which could not have been in their field of interest. A study carried out in Jamaica on poor attitudes to mathematics as a subject proved that many students had negative attitudes towards the subject and some viewed it as being of little or no use to them outside school, Ministry of education Youth and Culture Jamaica (2003). Hence pupils memorise formulas for examination purposes and forget about the subject as soon as they leave school.

In South Africa Mji and Makgato (2006) pointed out that, few students take mathematics and those who do so do not perform well because they are not motivated which ultimately lead to mass failures .Many factors can cause lack of motivation in the student and it could be how the subject is taught or it's because of pupils' ability .If students know the true value of the subject they would make an effort to understand it. Yeya (2002) had similar views that many teachers, students and parents have a negative attitude towards the teaching and learning of mathematics. Chiriswa (2002) agreed with the issue and recommended that mathematics teachers and students be given incentives to raise their morale for better grades in mathematics. He recommended students to be given awards for excelling in mathematics or offered scholarships even at school level or encourage mathematics projects where students display their accomplishments.

Values influence how students feel about mathematics .If students learn mathematics because it is one of the core subjects at senior high school, they are likely to aim for a

minimum pass, but if they learn that they would need the subject in their lives they are likely to develop an interest in the subject .This knowledge would influence the students, attitude towards the subject. Attitude is the behaviour that is measured by various evaluating processes .In Zimbabwe, Ordinary level students view mathematics as a subject for the gifted students, mainly because when students start Ordinary level syllabus they are screened into sciences, arts and commercial subjects. After high school a pass at Ordinary level mathematics is also a prerequisite for entry into college irrespective of what one wants to study .Therefore mathematics subject is viewed as a filter that filters students out of careers or university.

In Ghana, to get admission to tertiary one needs to pass mathematics at senior high school. If students are aware of how necessary mathematics is before getting admission to tertiary, then one has to seriously examine the amount of time allocated to the learning of the subject in the school system.`

2.4.14 Proper guidance

Students face a lot of problems in developing positive study attitudes and habits especially at the high school level. Proper guidance is one of the factors through which a student can improve his or her study attitudes and habits. According to Noble, Roberts and Sawyer (2006), students' academic achievements, perceptions of their coping strategies and positive attributions and background characteristics (such as family income, parents' level of education, guidance from parents and number of negative situations in the home) are related to their composite scores and academic achievement in high school. Zajacova, Lynch and Espenshade (2005) have stipulated that students who are properly guided by their parents perform well in examinations.

Students' academic performance depends on proper guidance by both teachers and parents.

2.5 Causes of Poor Performance in Mathematics Among Senior High Students in Ghana

In Ghana, mathematics is a core subject at all levels of education. It is regrettable, that in the contemporary times many learners of mathematics still struggled with mathematics and also performed poorly in most jurisdictions in Ghana (Mensa, Okyere & Kuranchie, 2013). In Ghana, learners' performance in mathematics at high school level has not been encouraging of late (Chief Examiner's Report, 2017). The cause of poor performance in mathematics might be that some candidates are reportedly exhibiting poor understanding of mathematical concepts. In addition, such learners of mathematics are unable to develop the appropriate mathematical models which could be tackled with the requisite skills (Chief Examiner's Report, 2017).

In Ghana, it has also been realised that as a direct result of the large number of students that fail mathematics every year, many learners have developed negative attitude towards the study of the subject. Similar attitudes have been observed in South Africa, especially in the circuit under study. This finding is contrary to the findings of Mbugua, Kibet, Muthaa, and Nkoke (2012) in Kenya where the majority of learners and teachers displayed positive attitude towards mathematics regardless of their poor performances in the subject.

According to Mensa *et al*. (2013), the seriousness attached to the teaching of mathematics invariably affects learners' performance in their final examinations. For example, the conceptions, attitudes, and expectations of learners regarding mathematics learning and mathematics teaching have been considered to be very significant factors

underlying their school experience and achievement (Mensah, *et al*., 2013). In general, the misconceptions that learners hold about mathematics would determine how the learners approach the subject. In many cases, learners have been found to approach mathematics as procedural and rule-oriented. This prevents them from experiencing the richness of mathematics and the many approaches that could be used to develop competence in the subject.

Educational researchers have expended time and energy trying to unravel the possible causes of learners' poor attitudes and performance in mathematics. A study was conducted in Ghana which focused on the correlation between teacher attitude and student attitude toward learning mathematics (Mensah, *et al*., 2013). The study sought to determine the attitude of mathematics teachers as perceived by the learners. The results demonstrated that all the teachers had positive attitude towards mathematics based on their attitude score. The results again show a positive and significant correlation between teacher attitude and student attitude.

The findings by Mensah, *et al*., 2013 corroborate the assertion postulated by Yara (2009) who opined that teachers with a positive attitude towards mathematics are inclined to stimulate favourable attitudes in their learners. The study disclosed that the attitudes of mathematics teachers were related to the attitude of the learners towards the subject. This connotes that irrespective of the mathematical capacity of learners, if teachers display negative attitude towards mathematics, learners may not develop positive attitude towards the subject and vice versa. The more positive the attitude of mathematics teachers towards the subject, the more positive the learners' attitude towards the study of the subject. From the above findings, it is evident that the negative

attitude of both teachers and learners in mathematics is a contributory factor of poor performance of mathematics in Ghana.

2.6 Ways of Improving the Performance of Senior Secondary School students in Mathematics

Miheso (2002) emphasized that there are many ways suggested by teachers, students on how to improve the performance of students in mathematics. Miheso (2002) further stated that the government recognized the importance of mathematics in science and technology and in fact in all areas of human knowledge. Mensah, *et al*., (2013) were of the view that mathematics performance of students can be improved by provision of proper staffing, teaching and learning materials, curriculum motivation and attitudes, and fees and levies.

On the other hand, Wasiche (2006) was of the opinion that ways of improving performance of students in mathematics include creation of positive attitude towards mathematics, administering of more examinations and quizzes, provision of adequate teaching and learning materials, motivation, completion of the syllabus in time, provision of adequately trained mathematics teachers, using variety of teaching methods as well as monitoring of lesson by the school administration.

Douglas & Kristin (2000) were of the opinion that provision of instructional materials, library, laboratory and other physical facilities, developing good rapport with parents by the head teachers, reducing students and teacher's ratio to manageable size are some of the ways of improving performance in mathematics. In another vein, Miheso (2002) suggested four strategies for improving the performance of students in mathematics as follows: groupings into students' ability during teaching of mathematics in the classroom; the strategy of constructivism should be imbibed in teaching mathematics,

that is for students to learn and sustain their learning they must be in control of their learning. He also added that use of instructional aids and games as well as using computer-aided instruction are the strategies that can be used to improve performance of students in mathematics.

Miheso (2002) suggested addressing the following:

- Changing the perception of students that mathematics is a very difficult subject.
- Reversing the negative statistics from WAEC showing a high failure rate in mathematics exams.
- Enhancing the understanding that mathematics is the bedrock of technological inventions and growth.
- Ensuring that students pass mathematics to facilitate admission for higher studies in numerate academic disciplines.
- Awakening a conscious interest for mathematics amongst pupils from their cradle age.
- Creating a credible medium for identifying, encouraging and rewarding brilliance.

Therefore, it is clear that there are many ways that can be followed in order to improve the performance of visual art students in mathematics, such as the provision of adequate facilities both teaching and physical, qualified mathematics teachers, developing positive attitude of students towards mathematics, involvement of parents in the education of their children, using proper methods of teaching the subject, organization of quizzes and competition among and between schools.

CHAPTER THREE

METHODOLOGY

This chapter describes the procedures, and techniques to be used for the study. The chapter discusses the type of study design, study population, sampling, sample size, sampling method, data collection procedures, data analysis of the study and the study area.

3.1 Research Design

Research design refers to a master plan, blueprint or an outline specifying the procedure to be used in seeking an answer to the research questions (Creswell, 2009). There is basically three main research designs which include qualitative, quantitative and mixed methods.

The qualitative research approach has been defined as the use of any data collection technique (such as interview) or data analysis procedure (such as categorical data) that generates or uses non-numerical data, (Kothari, 2004). The qualitative method provides complex descriptions of opinion, behavior, experience, and how people perceive a given research issue. Qualitative method gives information about the 'human' side of an issue – that including behaviour, beliefs, opinions, emotions and relationships of individuals. The strength of the qualitative methods is that Participants have the opportunity to respond more elaborately and in greater detail on an issue, phenomena and research problem. Qualitative approach can also be used to collect the intricate details about phenomena such as feelings, thought processes, skills, and emotions that are difficult to identify through quantitative methods.

In the other hand, the Quantitative research involves a numerical representation and manipulation of observations of a study. According to Creswell (2009) quantitative research is the type of research whereby a numerical data is collected and the events or phenomena analyzed using mathematical and statistical procedures. Quantitative research approach purposefully seeks to maximize objectivity, reliability and generalization of findings. It mostly involves predictions and forecasting. With this approach, the research has to set aside his personal experience and interest in order to achieve objective results and to minimize biases. Quantitative studies rely on testing of hypotheses and probabilistic analysis of data (Harwell, 2011).

The mixed approach involves the use of both the numerical data collected usually through questionnaires and the qualitative data also usually gathered through interviews. This study used the mixed approach which specifically utilized the both descriptive survey as the main quantitative design and the case study as the qualitative research approach.

Creswell maintained that descriptive survey research design aims at providing a picture of a situation as it naturally happens without manipulating the variables or the characteristics or elements of the subjects (2009). According to (Creswell, 2009) this kind of research design is mostly suitable for investigating comparisons, relationships or differences of samples of subjects in a study.

Descriptive survey research uses instruments such as questionnaire and interviews to gather information from groups of subjects. Descriptive survey research may investigate associations between respondents' characteristics, such as age, sex, academic grades, social class, race and their current attitudes or beliefs towards some issue (Johnson & Christensen, 2012). Kothari, (2004) noted that this kind of research

involves collecting data to answer questions concerning the phenomenon under study, and it is used to describe the nature of existing conditions, identify standards against which existing conditions can be compared, and/or investigate the relationship that may exist between events. Descriptive research attempts to find general attributes and deals with present conditions. The design involves asking a number of individuals the same set of questions either by mail, telephone or in person. Similarly, Creswell (2009) argues that this design helps to produce a good amount of responses from a wide range of participants and provides a more accurate picture of events and seeks to explain people's perception and behaviour on the bases of data gathered at a particular point in time. Creswell (2009) cites other advantages of the descriptive survey to include the economy of the design and rapid turnaround in data collection.

Again the opinion and views of some key informants were elicited through the interviews as the qualitative approach. Within the qualitative research design selected for the study, the case study method was used to collect pertinent information from Head of departments and the school authorities through the use of key informant interviews. The case study method presents data of real-life situations as well as detailed insights into behaviour, experience, opinions and of the despondence of the study in spite of its inability to generalize results (Creswell, 2009). The design provides in-depth explanations of the behavior and perceptions.

3.2 Target Population of the Study

The target population is the kind of population about which information is wanted and on which generalization is made (Creswell, 2009). The target population of the study constituted all Visual Arts students (275) in form 2 and form 3 who have been in the school for at least one year and had his or her academic performance records in the

school and 60 teachers currently teaching in form 2 and form 3 classes the Adanwomase Senior high School making a total population of 335, the headmaster, two (2) assistant headmasters and the PTA chairman were also considered as key informants. The total targeted population then stood at approximately 339.

3.3 Sample Size

A sample involves the actual final group selected from the sampling frame of the targeted population who are included in the study and from whom the data are collected. Since the determined population is often too big to investigate in its entirety, the researcher needs to decide a mode of selecting a part of the population to actually examine. A sample is hence a small group of respondents which have been drawn from the target population in which the researcher is concerned with in obtaining information and drawing conclusion (Creswell, 2009)

The Sample size for the study was estimated with the formula developed by Yamane (1971). This method estimates the sample size particularly when the total population is known. It takes into account the degree of error margin of the study. The formula is given as:

$n = N/1+ N(e)^2$, where ***n*** is the sample size, ***N*** is the total population and ***e*** is the error margin. Since the headmaster, two assistant headmasters, and the PTA chairman were all selected as key informant for interviews in the qualitative aspect of this study, a further sample size has to be estimated from the remaining total population of 335 consisting of 60 teachers and 275 students.

Therefore, to estimate the total sample size from 335 population size for the study, the formula was utilized, thus:

$n= N/1+ N(e)^2$

In this case, N= 335, and e= 0.05 hence:

Sample size (n) =335/1+335(0.05)^2

Sample size (n) = 182.

This sample size was used for the study which comprised of teachers and the students selected for the study. The proportionate mathematical approach was then employed to estimate the final sample for the teachers and students. Based on this the formula used is given as:

(nx)= $\frac{Nx}{N}\ x\ n$

Where nx is the sample proportion from group x, Nx is the total population of group x, N denotes the total target population for the study n is the total sample size estimated for the groups (teachers and students)

Final sample size for teachers

(nT)= $\frac{60}{335}\ x\ 182$ = 33 teachers

Final sample size for students

(nS)= $\frac{275}{335}\ x\ 182$ = 149 students

Hence 33 teachers and 149 students were selected for the study. In addition, four key informants, including the Head teacher, two assistant head teachers and the PTA chairman were selected for an interview to solicit their opinion on the research problem studied. The sample characteristics of respondents are given in the Table 1.0 below.

Table 3.1 characteristic of respondents

Respondents	Male	Female	Total
Teachers	18	15	33
Students	124	25	149
Assistant headmaster	1	-	1

Total	143	40	183

Source: Field survey, 2018

3.4 Sampling Procedure

Sampling is the process of selecting subjects of a study from the study population (Creswell, 2009). Several sampling methods have been designed for efficiently selecting participants for a study. A sampling technique may be probability or non-probability method. In the probability method, all the elements within the target population are given equal chance to be selected and it is done randomly while with the non-probability method, the selection is not done randomly.

The study employed a multistage sampling procedure involving proportionate stratified random sampling, simple random sampling and the purposive sampling techniques.

A multistage sampling procedure is described as the sampling technique where by the sampling is carried out in the various stages using smaller sampling units at each stage in the sampling procedure. It is used when the members of the population are spread over a wide geographical locations and it may not be possible to obtain a fair representative sample with only sampling technique (Alvi, 2016).

In the first stage, the target population which comprised of teachers and the students were divided in to strata (teachers and students) using the proportionate stratified sampling method. In the second stage, the simple random sampling was used to select the 33 teachers as final sample while the same simple random sampling was used to select the male students. However, since the number of the female students were small, all the 25 female students were purposively selected for the study and to also consider gender balance. Intuitively, the researcher selected 25 respondents from the female stratum purposively and 124 respondents from their counterpart's male group using the

simple random sampling and specifically the lottery method which was also applied to the teachers. Within the teachers, too, all the female teachers were selected due to their number and gender representation of the study while the simple random sampling method was used to select the male teachers for the study.

The sampling of the key informants was done purposively since they were the participants who could give some rich information needed for the analysis of the study. They were the very people who had full information about the academic performance of the students and in that direction could give the vital information necessary to achieve the objectives of the study. Purposive sampling in the order hand describes a sampling method which encompasses a deliberate selection of particular units of the respondents who possess rich information and experience in the area of study for constituting the sample (Kothari, 2004).

3.5 Research Instrument

The data was collected using self-administered structured questionnaires and Non-structured key-informants' interviews guide. The structured questionnaires were used for both the students and the teachers because all the respondents were literate. The non-structured interview guide consisted of a mixture of both closed and opened ended sampled interview questions. This instrument helped the researcher to get the in-depth information from the key informants respondents. The use of questionnaires promises a wider coverage and gives assurance of greater anonymity. Again, the questionnaires are completed at respondents' convenience and it is less expensive than other methods such as interview (Saunders, Lewis & Thornhill, 2009).

The Semi-structured key-informants' interviews was employed in gathering data from key stake holders of the educational matters in the school (Headmaster, Assistant

headmasters, and the PTA Chairman) for the analysis in the study. The semi-structured key informant interviews involve a set of predetermined open-ended and closed questions, with other questions emerging from the dialogue between interviewer and interviewee. The key-informants' interviews took the form of personal face-to-face interactions and the interview focused on eliciting the key information for the respondents on students' academic performance, factors accounting for the performance, and the measures to improve upon academic performance among the students.

The research questionnaires for both the students and teachers were divided into three main parts. Part I was about the demographic characteristics of the respondents, Part II constituted a 5-point Likert scale questions on the factors influencing the performance of the students and the part III bothered on the measures to improve the performance of the students.

3.6 Pilot test of instrument

According to Kerlinger, 2004, Pilot test will assist the researcher to identify and discard all unnecessary, difficult or ambiguous questions, and will provide the opportunity for the researcher to re-word or re-scale any question that would be answered wrongly. The pilot test in this case helps the researcher to record the time that will be taken to complete the questionnaire by each of the respondents and will decide whether that time allocation would be appropriate. The study was piloted in the Bonwire Senior high school to check the reliability and the validity of the research instrument. The Bonwire Senior High School is located in the same Municipality and the students there have almost the same characteristics of the students at the Adanwomase Senior High School, the research area.

Based on the responses of the respondents during pilot study, items that are ambiguous and those irrelevant ones were refined before they were used during actual data collection. Pilot test indicates whether the choice options to the closed ended questions were clear and exhaustive as well as being sensitive or not. All these measures were taken to ensure reliability of measurement in the study.

3.7 Reliability test

The worth of results from a study depends solely on the reliability and validity of the research instruments used for the data collection. Validity refers to how well a researcher measures what he or she intends to measure whilst reliability denotes consistency and stability of measurement results (Kothari, 2004). Measurement of results is reliable if it is consistent and stable when applied to different people, context or time period (Polit & Beck, 2008). In order to minimize measurement errors and increase measurement reliability of the questionnaires the interview instrument were tested using the SPSS software to estimate the Cronbach's Alpha values.

The Cronbach's alpha is a commonly used reliability indicator that estimates the extent to which different subparts of an instrument items are reliably measuring the critical attribute" (Polit & Beck, 2008). The typical values of the cronbach alpha from a reliability test results range from .00 to +1.00, and higher values reflect greater reliability. George and Meary (2003) offered the following guidelines regarding interpretation of Cronbach's alpha scores: " ≥ .9 – Excellent, ≥ .8 –Good, ≥ .7 – Acceptable, ≤ .6 – Questionable, ≤ .5 –Unacceptable. Using this guide, the Cronbach's alpha score.

With this the researcher ensured that the study instruments were reliable and consistent to achieve the intended outcome of the study. Using the SPSS computer software version 18.0, the reliability test was conducted to obtain the reliability coefficient using the Cronbach's' alpha (α).

Results from Reliability Test conducted in the study revealed that, students questionnaire comprised 40 items yielded a reliability value of (α=0.78) while the questionnaires for the teachers contained 31 items which also produced a reliability value of (α=0.86).

The results from the test show that, all the item constructs have a reliability coefficient ranging with Cronbach's alpha value ranging from 0.78 to 0.86 which are within the acceptable range. This implies that, these construct items are reliable and were able to measure what they we intended to measure. This contributed to producing a very reliable results from the analysis.

3.8 Data Collection Procedure

An introductory letter was obtained from the Department of Educational Innovations in Science and Technology, Kwame Nkrumah University of Science and Technology and a copy was given to the headmaster of the Adanwomase SHS. The researcher then explained the purpose of the study to the headmaster of the school in order to seek for approval for the study. After the researcher had sought for approval from the headmaster, the researcher then led by the Headmaster met the visual arts students to brief them about the nature and purpose of the study. The headmaster encouraged the students and teachers to respond to the researcher's questions with honest and faithfulness. The researcher again assured the respondents of secrecy and

confidentiality of any information given and therefore developed a good rapport with the study before the distribution of the questionnaire.

The entire visual Arts student in form 2 and 3 were gathered at their assembly hall for the exercise. The students were grouped into males and females. The lottery method was then used to select the final respondents for the study. Pieces of papers were cut and inscription IN'' and OUT' were written on them. The papers were then mixed thoroughly in a container. All the students who selected papers with inscriptions IN'' were given the questionnaires to answer. Questionnaires were administered during schooling days at the school premises in their assembly hall and the students were given enough time to return the answered questionnaires. All the respondents returned their questionnaires answered giving the return rate of 100%. The Hand-delivering of the questionnaires to the respondents was efficient as it gave the researcher the opportunity to meet the respondents one-on-one and established a rapport with them which will positively contribute to the successful completion of the work (Saunders, Lewis & Thornhill, 2009).

Again, the simple random sampling method used to select the students was then applied to select the teachers and administered the questionnaire to them. The teachers returned the answered questionnaires in two days' time and all the questionnaires given to the teachers were answered and returned.

Due to their different schedule of the key informants selected for the interviews, different days were scheduled for the interview for each of the four respondents. In all four days were used to conduct the interview for the assistant headmaster. During the interview with the Assistant Headmaster Academics, his concerns were sought to record

their conversation so that after the interview, the researcher took ample time to transcribe them and develop them into themes for further analysis of the study.

3.9 Data Analysis Technique

The data from the field were first checked for accuracy, consistency and organized for the analysis. The data was first coded and entered into the SPSS software version 20.0 for the analysis. The analyses were done using descriptive statistics, regression, correlation and independent sampled t –test. The results from descriptive analyses were then presented in tables using percentages, frequencies and standard deviation. The hypotheses were also tested using the t-test, correlation, and the regression procedures. The qualitative responses were also presented using the various appropriate themes.

3.10 Independent Sampled *t*-Test,

The independent-samples t-test is an inferential statistical test that determines whether there is a statistically significant difference between the means in two unrelated groups (Howell, 2007).The independent sampled t-test was used to compare the means scores of the academic performance of the male and the female students in the mathematics. It was also used to compare their attitudes, learning habits and time management in the school.

The independent sampled t-test is given as:

$t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{SE}$, where SE is the standard error, X_1 represent the mean score for group 1 (boys) and X_2 represent the mean score for group 2 (girls) while $\mu 1 \; and \; \mu 2$ population means for group 1 and group 2 respectively which are assumed to have equal variance (Gibbons and Chakraborti, 2003).

3.11 Study Area

The study was conducted at Adanwomase Senior High School in the Kwabre East municipality in the Ashanti Region. The Adanwomase Senior High School is one of the category C schools in the Municipality. The school has a student's population of 810 and a teacher population of 103 with two assistant headmasters and one headmaster. The school has five academic departments running five different programs name: Visual arts, Science, general Arts, Business, Home economics, and Agriculture with a total of 52 classrooms. The school was establishing in the year 1972 by the traditional council of the Adanwomase community. The Adanwomase SHS was chosen as the study area due to the fact that, the researcher has taught in the school for more than six years in which a lot of experience gained in the school informed the decision to investigate into this problem. Again, enough time would be available for data collection since the respondents could easily be reached. The location of the school gives the school an advantage to enroll students from different communities as it connected to the main road from Ejura to Kumasi. the Adanwomase is located in the Kwabre Municipality in the Ashanti region. The Kwabre Municipal is located in the Ashanti region and shares boundary with the Ejisu Juaben Municipal to the East, Sekyere South to the North and Kumasi Metropolis to the South.

The figure below represents the map of the Ashanti region of Ghana showing the Municipal where the study is conducted

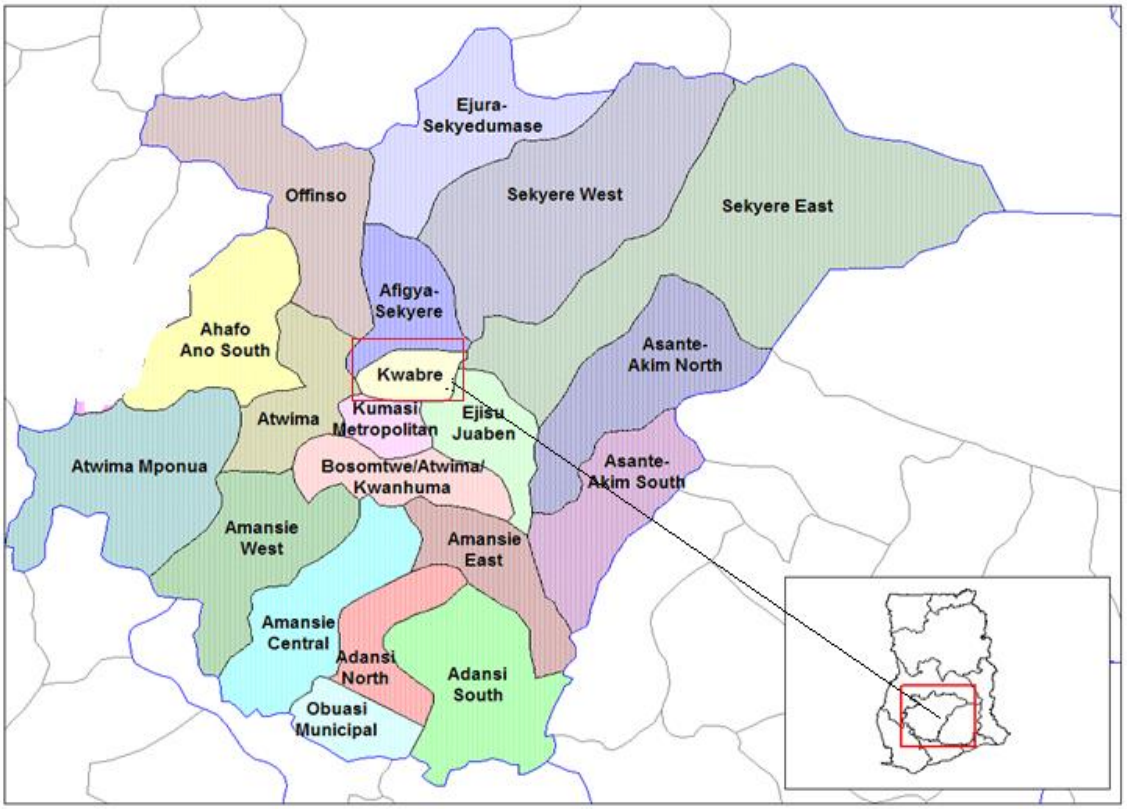


Figure 1.0 Map showing location of the Kwabre Municipal where the study is conducted

The Adanwomase senior high school has a students' enrollment of 1010 with 103 teachers. The school was established in the year 1972 by the Adanwomase Traditional council. The Adanwomase SHS offers five different programs namely, Visual Arts, General Science, Home Economics, General Arts and Business. Kente Weaving is the main occupation of the people in the area where the school is located, and farming is the second predominant occupation apart from Kente Weaving. The Adanwomase Town shares boundary with Bonwire the popular town in the Ashanti known as the originators of Kente, one of the Ashanti's cultural clothes.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

This study investigated the academic performance of the Visual Arts students in Mathematics at the Adanwomase Senior High school in the Ashanti Region. This study emphasized on analyzing the trends in their performance in Mathematics, the major factors that account for their poor performance in Mathematics and the appropriate measures to improve their performance. The following specific research questions were addressed in the study.

i. What is the performance of the visual arts students in Mathematics at Adanwomase SHS?
ii. What are the factors that influence their poor performance in Mathematics?
iii. What are some of the ways that the students' performance in Mathematics can be improved?

4.1 Socio- Demographic Characteristics of Respondents

The respondents of the study constituted the Visual Arts students and Teachers in the Adanwomase Senior High School. The demographic characteristics of these respondents are presented in the Table 4.1 below.

Table 4.1 Demographic Characteristics of Respondents

(Students and Teachers)

Variables	Frequency	Percentage (%)
Sex of Students		
Male	95	63.8
Female	54	36.2
Age Students		
Below 15 Years	43	28.9
15-18 Years	90	60.4
Above 18 Years	16	10.7
Class		
SHS 2	81	54.4
SHS 3	68	45.6
Sex of Teachers		
Male	20	60.6
Female	13	39.4
Age of Teachers		
Below 31 Years	8	24.2
31-40 Years	15	45.5
41-50 Years	9	27.3
51-60 Years	1	3.0
Academic Level of Teachers		
First Degree	26	78.8
Master's Degree	7	21.2
Professional Experience of Teachers		
1-3 Years	3	9.1
4-6 Year	20	60.6
7-9 Years	9	27.3
10 Years and Above	1	3.0
Number of Years Taught in the School		
Less than 1 Year	2	6.1
1-3 Years	11	33.3
4-6 Year	16	48.5
7 Years And Above	4	12.1
Marital Status of Teachers		
Single	9	27.3
Married	24	72.7

Source: Field Survey, 2018

The Table 4.1 below shows that the survey consisted 63.8% of male students while female students comprised 36.2%. This reflected the fact that, the total number of students who offer the Visual arts consisted more male students than the female students. The study also comprised 28.9% of the students below 15 years, while those

aged 15-18 years were 60.4% and those above 18 years were 10.7%. Majority of the student respondents were adolescent teenagers below 19 years consisting approximately 89.3% where only few of them about 10.7% were early adults from age 19 and above.

This conforms to the assertion that, the senior high school comprise mostly students who are at their adolescent stage who are full of energy with high level of emotions. Among these students' respondents, 54.4% were in SHS 2 while 45.6% were in SHS 3. This was based on the statistics from the school that reveals that, those students in the SHS2 are more than those in the current SHS3.

Among the teacher respondents, about 60.6% were male teachers while the female counterparts consisted 39.4%. About 24.4% were below 31years, 45.4% aged 31-40 years, and 27.3% aged 41-50 while 3% aged 51-60%.This implies that, majority of the teachers were in their youthful age with full energy for the teaching profession.

Regarding teaching experience of the teacher respondents, about 9.1% of the respondents have 1-3 years of teaching experience in the profession, 60.6% had 4-6 years of teaching experience while 3% had 10 years or more years of teaching experience. Similarly, respondents were asked to indicate the number of years taught in their current school. The results show that, 6.1% of the respondents had less than 1 years teaching experience in their current school, 33.3% had 1-3 years teaching experience in their current school. In the same way, about 48.5% had 4-6 years working in the school while those with 7 years or more teaching experience in their current school were 12.1%. Based on the educational qualifications, the survey reveals that, about 78.8% had first degree as their highest academic qualification while 21.2% had their master's degree as their highest academic qualification. The survey also reveals

that, about 72.7% of the teachers were married while those where were single constituted 27.3%.

4.2 Analysis of the students' Academic Performance in Mathematics

The study sought to examine the academic performance of the Visual Arts students (respondents) in the Core Mathematics subject taught in the School. This follows the consistent failures recorded in the Core mathematics by the Visual Arts students in the WASSCE for the school. For example, evidence from the 2015 WASSCE results, revealed that, more than half (66.25%) of the Visual Arts students failed with Grade F9 in Mathematics, while in 2016 , about 70.01% failed and similar results occurred in 2017(WAEC Report, 2018). This implies that, the number of visual Arts student who graduate to the tertiary continue to drop hence this is of greatest interest to examine the current performance of the visual arts students currently in school and preparing to write the final examination. Results from Table 4.2 presents the academic performance of the Visual Arts students within three academic terms in SHS 2.

Table 4.2 End of Term Examination Results of Respondents in SHS 2(2018)

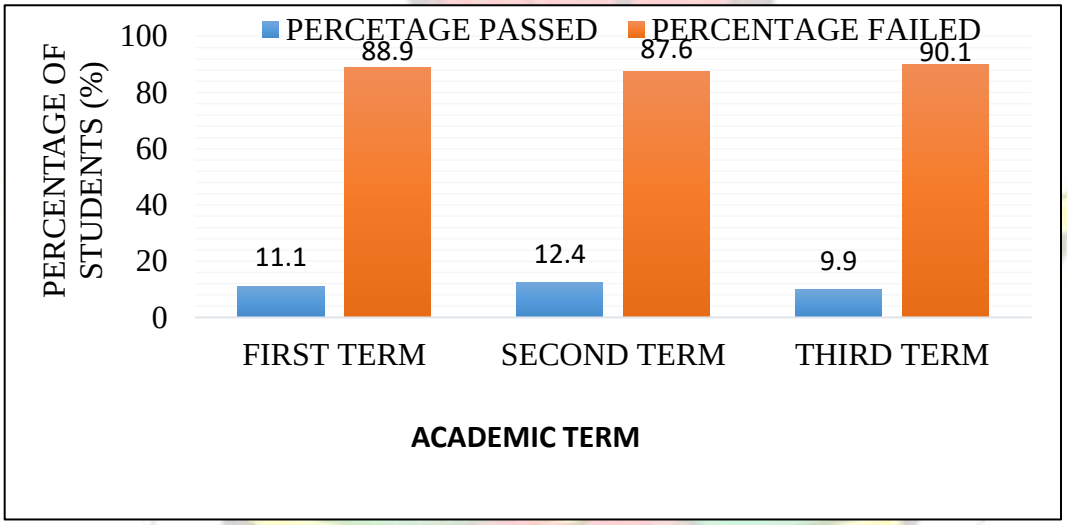
Term/Grade	A1	B2	B3	C4	C5	C6	D7	E8	F9
First Term	0	0	1(1.2%)	0	2(2.5%)	6 (7.4%)	12(14.8%)	33(40.7%)	27(33.3%)
Second Term	0	0	0	2(2.5%)	3(3.7%)	5(6.2%)	18(22.2%)	29(35.8%)	24(29.6%)
Third Term	0	0	0	0	0	8(9.9%)	12(14.8%)	32(39.5%)	29(35.8%)

Source: Office of the Assistant headmaster in charge of academic, 2018

The grading of these end of term examination results was based on the WAEC grading scale for Examination scores interpreted as 100-80(A1), 79-70(B2), 69-65(B3), 64-60(C4), 59-55(C5), 54-50(C6), 49-45(D7), 44-40(E8) and below 40(F9). Within these ranges of grading scale, students obtaining grade D7 –F9 are considered as failures in terms the requirement for further studies in the university, colleges of education and other undergraduate programs. Hence, the senior high schools and WAEC uses the A1-C6 as their pass grade and any students who obtains D7-F9 has indirectly failed since she or he cannot progress to do any degree program with that grade. Results from the

Table 4.2 show that, none of the students scored grade A1or B2 in either the First, second or third term among 81 students. This gives impression of how weak the students are such that, even in the internal SHS 2 examinations, they are exhibiting poor performance.

The results from the Table 4.2 above show that, in a class of 81 in SHS 2, about 72 students representing 88.9% obtained D7-F9 which was described as fail based on the grading scale in the school in the Frist term while only 9 students representing 11.2% passed. The results also reveal that, in the second term, 71 of the students also obtained grade D7-F9 representing 87.6% while in the Third term, about 73 students representing 90.1% obtained D7-F9 again. The results imply that, throughout the three terms, at approximately 88% of the students failed in the End of term mathematics exams. The figure 4.1 below present the Percentages of students who failed and those who passed within the three terms considered.



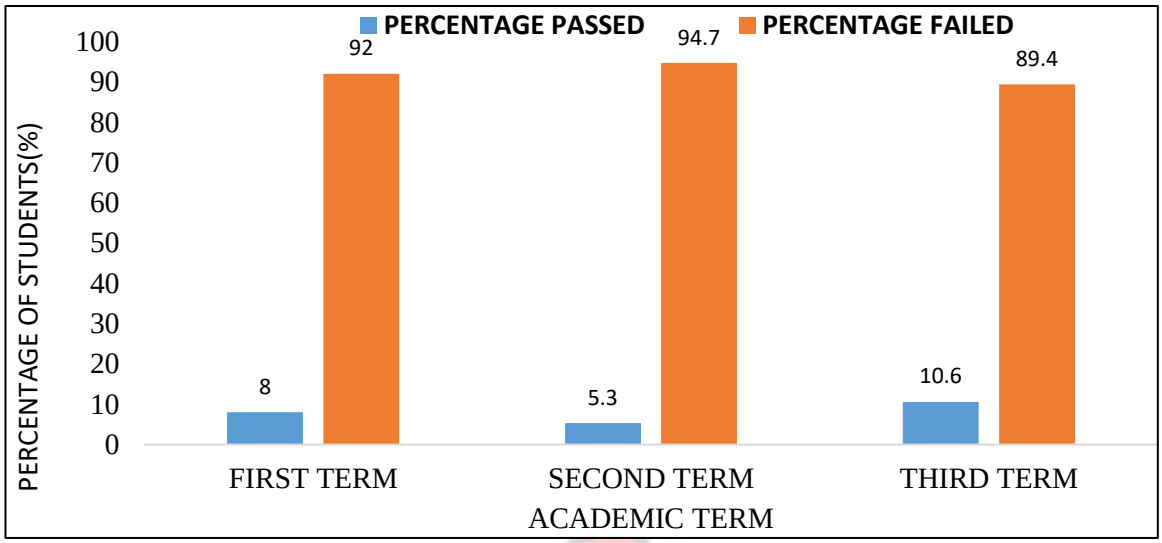
From the figure, 4.1 above, the blue bars represent the percentage of students who failed the examinations while the red bars represent the percentage of students who failed in the three terms considered.

Table 4.3 End of Term Examination Results of Respondents in SHS 3

Term/Grade	A1	B2	B3	C4	C5	C6	D7	E8	F9
First Term	0	0	1(1.3%)	0	0	5(6.7%)	3(4%)	25(33.3%)	41(54.7%)
Second Term	0	0	1(1.3%)	0	1(1.3%)	2(2.7%)	8(10.7%)	27(36%)	36(48%)
Third Term	0	1(1.3%)	1(1.3%)	0	0	6(8%)	8(10.7%)	25(33.3%)	26(32.1%)

Source: Academic Assistant Headmaster's Office

Results from Table 4.3 presents the academic performance of the form three students during the 2017/2018 academic year. Findings from the table indicate that, for the three terms, no student obtained A1 in the Mathematics examination conduced. During the first term, only one student obtained grade B3 while in the second term, only one student obtained B3. In the Third term, the results also show only one student obtained grade B3. However, results from the Table reveal that, majority of students obtained grades between D7 –F9. Figure 4.2 below presents the summary of percentage of the performance of the students.



The chart above show that, only 8% of the students passed in the first term while 92% obtained a fail. Similarly, in the second term, 5.3% of the students passed while 94.7% of the students failed again. The case of the third term examination was not different where only 10.6% of the respondents passed the examination while 89. 4% failed to obtain the pass mark in the mathematics examination.

Based on the scores obtained from the from the sampled respondents of the study, the average scores of respondents for the three terms were computed and t-test was used to estimate the mean differences of the academic performance between based on gender (boys and girls). The results from the t-test has been presented in Table 4.4 below.

Table 4.4 Results from T-Test Analysis of Academic Performance and Sex of Students

Academic Performance	SEX	N	Mean	Std. Deviation	Std. Error Mean	F	Sig.	t	P-value
Average scores in Mathematics promotion examinations	Male	95	32.832	3.351	.959	0.191	0.663	-0.405	0.686
	Female	54	33.5000	4.25293	1.39525				

Source: Field Survey, 2018

Results from Table 4.4 presents the mean score for the three terms' examinations taken by the student's respondents of the study in Mathematics. Results from the Table 4.4 show that, the mean score of the male students respondents was 32.832(SD=3.351) while the average score for the female was 33.500(SD=4.253). Using the Levene test of equality, the results show that, the F-statistics was not significant which implies that, Equal variance assumed. The results from the t-test also indicate that, there is no statistical significant differences between the mean scores from male respondents and female student's respondents. This implies that, the academic performance of male and female students do not differ and are almost the same.

4.3 Students Attitude, Interest Based on Gender towards studying Mathematics

The study sought to identify the attitude and interest of the students towards studying mathematics since several scholarly works have attributed academic performance of students to their attitude and interest they bring to learning particular subject. The Table 4.5 presents the results on the attitude and interest of the students based on their gender.

Table 4.5 Cross Tabulation of Students Attitude, Interest Based on Gender

Question items		Gender		Total
		Male	**Female**	
Did you intend to have your SHS here?	YES	63(66.3%)	16(29.6%)	79(53%)
	NO	32(33.7%)	38(70.4%)	70(47%)
Total		95	54	149
Are you happy to be in your current school?	YES	58(61%)	17(31.5%)	75(50.3%)
	NO	37(39%)	37(68.5%)	74(49.7%)
Total		95	54	149
Do you have interest in mathematics?	YES	32(33.7%)	48(88.9%)	80(53.7%)
	NO	63(66.3%)	6(11.1%)	69(46.3%)
Total		95	54	149

Result from Table 4.5 show that, 63 out of the 95 males' student respondents representing 66.3% of the males responded that they had intention to be in their current SHS while 32 out of the 95 representing 33.7% accepted that they did not have any intention to be in their current SHS. Similarly, 16 out of 54 females representing 29.6% accepted that, they actually had strong intention to be in their current SHS while 38 out of 54 representing 70.4%. In all, about 53% of the student respondents had intention to be in their current school while 47% had no intention to be in their current school.

The study again, examined the emotional feeling of these students to identify whether they are happy in their current school or not. Findings from the Table 4.5 show that, 61% of the males students were happy to be in their current school while 39% were not. Regarding their counterpart females, about 31.5% were happy while 68.5% were not happy. The findings imply that, most of the respondent students were quite happy about their presence in their current school.

Importantly, the study investigated the level of the students' interest in the study of mathematics in the school. The results show that, about 33.7% of the male students had interest in studying mathematics while 66.3% of them did not have interest in Mathematics. In the other hand, about 88.9% of the female student respondents expressed that they had interest in studying mathematics while 11.1% had no interest in studying mathematics. The results denote that, greater proportion of the females had more interest in studying the mathematics than the male study even though the male's students constitute the greater proportion of the students' population in the Visual Arts department. The t-test analysis was then conducted to identify the statistical significance of the mean difference between the male and female respondents in terms of their attitude and interest towards teaching and learning and learning of mathematics and the results are presented in Table 4.6 below.

Table 4.6 Results from t-test analysis of Students' Attitude and Interest towards Teaching and Learning of Mathematics

Question Items	Sex	N	Mean	Std. Deviation	t-test	p-value	F	P-value
Did you intend to have your SHS here?	Male	95	1.3368	0.47514	-4.579	0.000	1.063	0.299
	Female	54	1.7037	0.46091				
Are you happy about your current school?	Male	95	1.3895	0.49022	-4.618	0.000	3.652	.058
	Female	54	1.6852	0.4688				
Do you have interest in mathematics?	Male	95	1.6632	0.47514	7.621	0.000	57.304	.000
	Female	54	1.1111	0.31722				

Table 4.6 presents the mean difference between males and females. Student respondents of the study. The F-test was used for the Levene's test of equality while only interest in mathematics item showed a significant difference at 1% level. The results show that, there was a statistically significant difference between the males and

females in terms of students' intention to be in their current school (t=4.5, P>0.01). This means that, the male student's intentions were significantly different from that of their female counterparts. In the case of happiness in the school, the results revealed that, there is a statistically significant difference in their means (t=4.61, P<0.01). As indicated in the Table 4.5, the male students were much happier than the females. The study again, explored the interest of the students in mathematics based on the gender of the respondents. The findings show that, there is statistically significant difference between the male and female student respondents in terms of their interest in studying mathematics.

4.4 Learning Habit and processes of the Students towards Mathematics

The study examines the learning habit of the students and the strategies including the processes they learn in the school. The results from Table 4.7 below presents the t-test results on the habit of the students and the learning approaches towards mathematics in the school.

Table 4.7 Results from T-test on Study Habit of Students towards Mathematics based on Gender

Items	SEX	N	Mean	Std. Deviation	F	Sig.	t	P-Value
I consult my friends when I find any difficulty in any topic in mathematics	male	95	3.4737	.90908				
	female	54	3.5370	1.11106	6.357	.013	-.377	.707
I join studies group to discuss mathematics topics	male	95	2.5263	.78337				
	female	54	2.9259	1.02519	4.320	.039	-2.670	.008
I attend evening pre studies always	male	95	2.5263	.96582				
	female	54	3.3333	1.28856	4.609	.033	-4.332	.000
I have my personal study time Table	male	95	4.6421	.88625			-4.007	.000
	female	54	3.9259	1.11341	.923	.338		
I like solving mathematics questions	male	95	2.6632	.66221			-2.320	.022
	female	54	3.6296	1.10396	16.682	.000		
I am punctual in mathematics class always	male	95	3.7684	.98340				
	female	54	2.9444	.91973	1.549	.215	-1.075	.284
I always do my mathematics assignment	male	95	3.8211	.89892			-1.095	.276
	female	54	2.9630	.64319	14.168	.000		
I like the teaching methods of my mathematics teacher	male	95	3.9158	.78093			-1.590	.266
	female	54	3.1481	.97917	8.689	.004		

Source: Field Survey, 2018

Results from the Table 4.7 represent the output from the t-test analysis. The F- test was used for Levene test of equality with null hypothesis of equally variance while the alternative hypothesis is equal variance not assumed. The results show that, the F-

statistics for the responses bothering on students learning habits such as Consultation of friends, joining study groups, attending evening pre classes, and usage of personal timetable were significant at 10% which ejected the null hypothesis of equal variance assumed. While the rest of the responses were not significant hence had equal variance assumed. The t-statistics was utilized to test if there was significant differences in the means between the male and female learning habits exhibited in the survey.

The results show that, students do consult their friends for help in order to gain much understanding on certain topics they may find it difficult. Based on this Consultation learning strategy, the results show females (Mean=3.53) this more than the male students (Mean=3.47).The result show that there is no significant difference between the means of the male and female students in terms of consultations with friends (t= 0.37, P>0.1).

The results also show that, students also join study groups in order to overcome this difficulty in their studies. The findings reveal that Females join study groups (mean-=2.93) more than the males (Mean 2.52) students. The t-test show that, there is significant difference between the means of the male and female students (t=2.67, P<0.01).

Again, attending evening prep classes we utilized by the students towards achieving success in mathematics. The results depicts that, female (Mean=3.33) attend the evening prep classes more than the male (mean = 2.52). The t-test results show that, there is significant difference between the means of the male and female (t-2.67, P<0.01).

Findings from the Table also show that, male students (Mean=4.6) utilize their personal study time table, more than their female counterparts (Mean=3.9). The t-test of the results show that, there is significant differences between the male and the female (t=4.00, P<0.01). Continuous practice and solving of mathematics questions were also identified as one of the ways respondents. This was found predominantly among females (Mean=4.30) than the males students (Mean=2.5). The t-test show there is statistically significant difference between the mean between male and female students (t=2.3, P<0.05). The results also reveal that, differences mean between the male students (mean =3.76) and female (mean=2.94) was not significant (t=1.07, P>0.10). Similarly in term of their response to doing mathematics assignments, females (Mean=3.9) and Male (Mean=3.1) while t-test reveal that, there is no significant difference between the means (t=1.09, P>0.27).

Respondents were asked to evaluate the teaching methods of their teachers. The results show that, males students (Mean=3.9) like the teaching methods from their teachers more than the female students (3.1) however, the differences are not significant (t=1.5, P>0.1)

4.5 Perceived Causes of Poor Academic Performance in Mathematics from Student's Perspectives

One of the key objectives of the study was to examine the causes of such poor mathematics achievement among the visual Arts students from the students own point of view. Hence the Table 4.8 below presents the findings on the perceived causes of the poor student's achievement in mathematics from the student respondents' point of view.

Table 4.8 causes of poor academic performance from student's perspectives

Items	N	Min.	Max.	Mean	Std. Deviation
I don't have adequate learning materials for such as calculator and textbooks	149	3.00	5.00	3.7919	.79928
Students' absenteeism	149	2.00	5.00	3.8255	.84415
My teacher does not give adequate exercises and assignments	149	2.00	4.00	2.6309	.66117
My teachers dependent too much on text books	149	1.00	5.00	3.2886	1.04167
My teacher does not use any form of motivational techniques during lesson delivery	149	1.00	4.00	2.3154	.83088
Less qualified mathematics teachers in the schools	149	1.00	4.00	1.8456	.85996
Student's shyness to seek clarification from teachers and friends	149	2.00	5.00	3.4899	.76774
Insufficient time to read notebooks and textbooks	149	2.00	5.00	2.8993	.81161
Increased indiscipline among students	149	3.00	5.00	3.8121	.71063
Lack of academic competition in class	149	2.00	5.00	3.8993	.89853
Wrong choice of program	149	1.00	4.00	1.9396	.84812
Students negative attitude towards mathematics	149	2.00	5.00	4.0336	.83355
Peer group influence	149	2.00	5.00	3.3040	.71489
Inadequate time to do assignments	149	1.00	3.00	1.8993	.76886
Lack of adequate educational facilities in the school	149	2.00	4.00	2.5839	.63778
Class size causes poor instructional delivery	149	1.00	5.00	4.0403	.98557
Mathematics is too much of abstract calculation	149	3.00	5.00	4.3557	.77175

Our teacher does not have enough time for explanation	149	1.00	5.00	2.7315	1.01096
We don't solve more examples in class	149	1.00	5.00	2.9732	.95115
The period allocated for math is small	149	1.00	5.00	3.2416	1.16045
Our teacher does not make teaching interesting	149	1.00	5.00	2.8389	.97306
My teacher does not motive me and my colleagues	149	2.00	4.00	2.8926	.86322
Have you witnessed a speech and prize given day in this school	149	1.00	2.00	1.6040	.49071

Source: Field Survey, 2018

Results from Table 4.8 show that, several mixture of factors account for the poor performance of the students in Mathematics. According to the student's own view, the students' negative perception of too much abstract calculations in mathematics (Mean=4.36, Std Dev.=0.772) constitute the major cause of their poor performance. These mathematical concepts that are taught in abstraction greatly obstruct their understanding, articulation and synthesis from both theories, principles and practices.

The results also reveal that, the larger class size do obstruct effective teaching and lesson delivery (Mean=4.04, Std Dev.=0.986). For example, their class size was such that, 81 students per class and was difficult for one teacher to meet the demands of these students with different level of understanding and psychological orientations. In that case, teachers are not able to have Effective time to help all these students to achieve the expected output.

Again, the findings depict that, negative attitude of the students towards mathematics (Mean=4.33, Std Dev.=0.834) account for the mass failures in mathematics in the school. Most of the students have developed their conscience that, Mathematics is

difficult and are always afraid to learn or attend mathematics class. This has always affected their performance in Mathematics.

Table 4.8 also reports that, lack of academic competition in class (Mean=3.899, Std Dev.=0.89) account for their poor performance in class. There is no such environment to create competition in class which would help push the students to study hard and achieve more mathematical skills.

Students' absenteeism (Mean=3.82, Std Dev.=0.844) and increased indiscipline (Mean=3.81, Std Dev.= 0.711) constitute part of the major causes of the poor academic performance of the students in the school.

Leaning materials were also identified as part of the key causes of the poor mathematics achievement in among the students. The results show that, inadequate learning materials such as calculators, text books (Mean=3.79, Std Dev.=0.799) represents one of the key causes of the poor performance in mathematics among the students.

4.6 Perceived Causes of Poor Academic Performance in Mathematics from Teachers' Perspectives

The study identified the perceived causes of poor academic performance in mathematics among the Visual Arts students from the teachers' point of view. The perceived causes from the teacher respondents' point of view are presented in the Table 49 below.

Table 4.9 Perceived Causes of Poor Academic Performance in Mathematics from Teachers Perspectives

Items	N	Min	Max	Mean	Std. Deviation
Inadequate teaching materials for teachers	33	3.00	5.00	4.0303	.68396
Teacher absenteeism	33	1.00	3.00	2.1212	.59987
Inadequate assessment of students	33	2.00	4.00	2.5152	.75503
Teachers over dependence on text books	33	2.00	4.00	3.0000	.55902
Failure to use motivational techniques during lesson delivery	33	2.00	4.00	2.6970	.72822
Less qualified mathematics teachers in the schools	33	1.00	2.00	1.3939	.49620
Student's shyness to seek clarification from teachers and friends	33	3.00	5.00	4.0606	.74747
Insufficient time for students to read notebooks and textbooks	33	3.00	5.00	3.9394	.70442
Increased indiscipline among students	33	3.00	5.00	4.1818	.72692
Lack of academic competition in class	33	3.00	5.00	3.8788	.73983
Lack sufficient parental participation	33	2.00	5.00	3.6667	.77728
Students negative attitude towards mathematics	33	2.00	5.00	4.0303	.76994
Peer group influence	33	3.00	5.00	3.8788	.54530
Inadequate time to do assignments	33	1.00	3.00	1.9091	.57899
Lack of adequate educational facilities in the school	33	1.00	3.00	1.9697	.52944
Inadequate provision of teaching and learning materials	33	2.00	4.00	3.4545	.61699
Class size causes poor instructional delivery	33	2.00	4.00	2.6970	.72822

Source: Field Survey, 2018

Results from the table show that, inadequate teaching materials for teachers (Mean=4.33, Std Dev.=0.684), negative attitude of students towards Mathematics (Mean=4.06, Std Dev.=0.747), increase in indiscipline among students (Mean=4.18, Std Dev.=0.726) and 'students shyness to seek for clarification from teachers and students' are the predominating causes of the poor academic performance in mathematics among the students. These causal factors account for the massive weak performance achievement of the Visual Arts students in mathematics in the school.

Again, the findings reveal that, students don't spend sufficient time to read their notes, and textbooks (Mean=3.94, Std Dev.= 0.704), lack of adequate academic competition in class (Mean=3.8 Std Dev.= 0.739) and Peer group influences also contribute to their poor performance in mathematics.

Importantly, the results show that, lack of sufficient parental participation in their wards academic work (Mean= 3.8, Std Dev.=0.545) also contribute to the poor academic performance of the students.

4.7What are some of the ways that the students' performance in Mathematics can be improved?

Table 4.10 Measures to improve academic performance in mathematics from the students' respondents own perspectives

Items	N	Mean	Std. Deviation
Students Should spend a lot of time on their homework and assignments to improve performance	149	4.2282	.66901
Students should have enough time to read notebooks and textbooks	149	4.2617	.72964
Students should seek help from friends when found difficulty in a particular topic	149	4.2550	.67937
Regular motivation of students helps to improve performance	149	4.0000	.79695
Effectively assessment of students	149	4.2550	.57132
Appropriate use of instructional methods	149	4.1812	.69801
Adequate parental support	149	4.0738	.76312
Efficient measures to check teachers and students punctuality	149	4.3020	.69462
Adequate supply of teaching and learning materials	149	4.1544	.68502
Adequate supply of resources to Counselling posts at schools	149	4.2953	.73983

Results from the Table 4.10 reveal the findings from the students' respondents' perspectives on the measures to improve academic performance among the students. The findings show that, in order to address the situation of poor academic performance in Mathematics, factors such as cooperative learning (Mean=4.255, Std Dev. =0.679), motivation (Mean=4.00, Std Dev. =0.797), effective assessment systems,(Mean=4.25, Std. Dev.=0.57), Counselling services(Mean = 4.299, Std Dev.= 0.73) and parental support (Mean=4.20, Std Dev.=0.69) should be encouraged. Again, the results indicate that, appropriate instructional methods (Mean=4.18, Std Dev. =0.698), students and

teacher's punctuality in class (Mean=4.302, Std Dev. =0.698) are some keys measures to be tackled if the need to improve academic performance is desired.

This implies that, the school authorities and other stakeholders should ensure that, these measures are taken into consideration and appropriate attention is paid to them in order to enhance the performance of the students in mathematics.

Table 4.11 Measures to improve academic performance in mathematics among the students from teachers' perspectives

Items	N	Min.	Max.	Mean	Std. Deviation
Poor student to teacher ratio	33	3.00	5.00	3.9697	.63663
Students' health status should be good enough to help them learn efficiently	33	3.00	5.00	4.1818	.68258
students should spend a lot of time on their homework and assignments	33	3.00	5.00	4.5758	.61392
Students should have enough time to read their notebooks and textbooks	33	3.00	5.00	4.5152	.66714
Students can seek help from friends when they find difficulty in a particular topic	33	3.00	5.00	4.4242	.66287
Regular motivation of students would help improve their performance	33	3.00	5.00	4.3636	.60302
Effective assessment of students helps to improve their performance	33	3.00	5.00	4.1212	.64988
Appropriate use of instructional methods	33	3.00	5.00	4.1212	.81997
Adequate parental support	33	3.00	5.00	4.5758	.66287
Efficient measures to check teachers and students punctuality	33	3.00	5.00	4.2727	.76128
Good teacher to student ratio	33	3.00	5.00	4.2727	.71906
Regular and prompt refresher courses for teachers	33	3.00	5.00	4.3333	.64550
Adequate supply of teaching and learning materials	33	3.00	5.00	4.0909	.72300
Adequate supply of resources Counselling posts at schools	33	3.00	5.00	4.2424	.70844

Findings from Table 4.8 reveal teachers views on the measures to improve academic performance of the students. According the results, students' time management is very important particularly, time to do homework (Mean=4.576, Std Dev. =0.61), time to read text and notes books (Mean=4.515, Std Dev.=0.667). In addition motivation (Mean=4.363, Std Dev.=0.603), parental support (Mean=4.576, Std Dev. =0.662) and teaching and learning materials(Mean=4.12, Std Dev.=0.649) are some of the crucial measures to improve the performance of the students in mathematics.

4.8 Responses from the interviews on the measures to improve academic performance of the students

(Assistant Head master in charge of Academics)

The study sought to identify from the Assistant headmaster in charge of academic through and interview on his view of the academic performance of the Visual Arts students in Mathematics, the factors influencing their performance and the appropriate ways to improve their performance.

Regarding the level of the performance among the students, he responded that:

Most of the visual Arts students' performance are very weak in mathematics and the situation has been alarming. The causes of the problem may stern from many factors ranging from school related factors, student related factors and teacher related factor.

According to the respondents, these factors included *absenteeism among students, inadequate time for assignments and reading the notion that mathematics is difficult, teacher absenteeism, indiscipline among students and inadequate qualified teachers. Again, failure to motivate students, inappropriate use of methods and techniques, failure to give homework/assignments are all some major factors that account for the low performance rate among the students.*

The study also identified from the Assistant Headmaster in of the academic as whether the parents are aware of the academic performance of their wards in the school. The

assistant Headmasters responded that..... *Parents are aware of the performance of their children in the school because, they are always sent the terminal report of their wards which indicates their performance in class as far as the term is concern.*

Importantly, the study again ascertained from the respondents the measures to be undertaken in order to improve the performance of the students.

The assistant Headmasters suggested that….*making sure enough exercises are given out by teachers, encouraging that students are taught to appreciate mathematical concepts in different situation, encourage students to develop the skill of determining the demands of a question and students should be made to practice and investigate ideas in the topics they find difficult to understand. Moreover, the school should ensure that students are encouraged to solve a lot of problems, creating an enabling school environment, helping students to manage their time and ensuring that teachers don't shift the preparation on only students*

The responses from the interview of the Assistant Headmaster in charge of academic in the Adanwomase Senior High School strong support the findings from the previous respondents of the students and teacher. This shows clearly that, the problem persisted and has indeed called for the attention of almost all the stakeholders in the school. The respondent indicated that, several measures are underway to help the students to improve their performance.

4.9 DISCUSSION OF MAIN FINDINGS

The main findings from the study bothered on the following research questions:

a. What is the performance of the visual arts students in Mathematics at Adanwomase SHS?
b. What are the factors that influence their poor performance in Mathematics?

c. What are some of the ways that the students' performance in Mathematics can be improved?

4.9.1 Academic performance of the visual arts students in mathematics

The Findings from the study revealed that, Students' performance in mathematics was found to be consistently very poor as the failure rate of have always raged between 88% and 87% which have been recorded in the WASSCE. Meanwhile, students are expected to meet the pass mark of grade A1-C6 before they can progress to the university or any other higher educational institution in Ghana. What it means is that, majority of the students who completed the SHS had obtained D7-F9 which was described as a fail based on the grading scale and could not progress to the University. The WASSCE is the standard examination conducted for all the graduating students from the SHS through which successful candidates are qualified for further Studies in the universities or other tertiary institutions. However, with this continuous massive failures, majority of the students who complete the SHS would hardly secure space in the tertiary institutions. The results suggest that, even the performance of the current students in SHS 2 and SHS 3 are grossly not encouraging as the average pass rate in the End of Term examinations has always raged between 11% and 13%. And unfortunately, as these students move from SHS 2 to SHS 3 their performance also become worse off. The results from the t-test also indicate that, also emphasizes that there is no statistical significant differences between the mean scores from male respondents and female students respondents regarding their academic performance. This implies that, the academic performance of male and female students do not differ and are almost the same.

The findings from the study are in line with (Asihene, 2009) who confirmed that, Visual Arts students are among the group of students who perform poorly in mathematics for the past decades. However, studies such as Cunningham, 2005) have suggested that, Visual Arts students should perform better in mathematics since they have the ability to visualize what is not visible and this attribute is one of the critical potential skills needed to perform better in mathematics. In spite of this, ability, the academic performance of the Visual Arts students at the Adanwomase SHS remains worse and needs immediate interventions. The respondents expressed deep concerns about their current poor performance in Mathematics.

4.9.2 Causes of the Poor Academic Performance Mathematics among the Students

The findings brought to bear some key factors as the major causes of the poor academic performance of in Mathematics among the students and these factors included the following:

Findings from the study also revealed that, the students have low interest in studying Mathematics in the school. Nonetheless, the results denote that, greater proportion of the females had more interest in studying the mathematics comparatively than the male study even though the male's students constitute the greater proportion of the students' population in the Visual. Interest and attitude towards teaching and learning has been identified as one of the key requisite factors that influence academic performance of the students. According to Garfield (1994) the attitudes of learners play a key role in their performance of especially subjects involving calculations and analysis. The study found that, some of the students are not even interested in their current school while some proportion of the respondents also agreed that did not intend to continue their education after their JHS education. Therefore, this has certainly contributed to their poor attitude

and interest in the academic work in the school. In this case, the willingness of the students is missing and more effort from the teachers and parent must be employed to develop interest in these students to change their mentality. In similar case, Evans-Solomon and Opoku-Asare, (2011) found that, most students in the senior high schools perform poorly in Mathematics but the situation is particularly worse among Visual arts students who have low interest in the mathematics and were not willing to even study Mathematics in the school. This finding are also in line with (Stuart, 2000) who reported that attitude towards learning of a particular curriculum such as mathematics has a major role in predicting the performance of the learners and even the teachers. In this situation, the teachers and school authorities must develop good attitude towards the students to change their mindset and behaviour. The Findings from the study also agreed that, factors such as students' negative perception of too much abstract calculations in mathematics also accounted for their poor performance in the school. Student's shyness to seek for clarification from teachers and students' are the predominating causes of the poor academic performance in mathematics among the students. These causal factors account for the massive weak performance achievement of the Visual Arts students in mathematics in the school.

The study also found that, one major factor that account for the poor performance of these students in Mathematics was absenteeism and gross indiscipline in the school. Respondents agreed that, absenteeism among the students and even the teachers was high and as result could account for the low performance among the students. This confirms study by (Howie, 2001) who maintained that, poor academic performance in mathematics among high school students has been also attributed to absenteeism among students. The findings agree that, students who absent themselves from school habitually are likely to perform poorly than their colleagues who are always punctual in

class. As mathematics needs constant practice and continuous rehearsal, if students and teachers absent themselves from school consistently, it affects teaching and learning negatively. This consistent absenteeism and indiscipline among is as a result of peer group pressure among the students.

Similarly, Inadequate learning materials such as calculators, text books, and teaching materials for teachers have been some key factors that have contributed to the poor academic performance among the students. The students, teachers and the Assistant headmasters interviewed all accepted that, inadequate appropriate teaching and learning materials are key factors that contribute to low performance in mathematics among the students. The Instructional materials provide information, organize the scope and sequence of the information presented, and provide opportunities for students to use what they have. The students usually exhibit good performance when they have access to the appropriate learning materials 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 Moreover, the school location and quality of the physical building 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. Studies by Stuart (2000), also mad emphasis that, students' academic performance are greatly influence by their peer group pressure. They are mostly lured by their friends to even leave academic work to attend to their own business at the expense of the studies.

Lack of sufficient parental participation in their wards academic work was also identified to contribute to the poor academic performance of the students. The study revealed that, there is no significant differences in means in terms of how the male and female students respond to their homework or assignments. In all, there is significant

difference between time management and students performance between the female students and the male students. Quality of teachers and commitment are key inputs in educational production to perform better achievement (Osei-Mensah, 2012).

Again, teacher's knowledge of the subject matter coupled with textbooks, instructional time and other learning materials have great influence on learning at the basic school level. Agyemang (1993) reported that "a teacher who does not have both the academic and the professional teacher qualification would undoubtedly have a negative influence on the teaching and learning of his/her subject". According to Hedges (2002) many trained teachers are unwilling to accept postings to deprived communities in Ghana. The results agree with Oskemp (2002) and Abuseji (2007) who also accept that, teachers knowledge and qualification are key to improve the academic performance of the students. The teaching experience and commitment of the teachers are equally import to boost the performance of their students.

4.9.3 Measures to Improve Academic Performance among the Students

The findings show that, in order to address the situation of poor academic performance in Mathematics, factors such as cooperative learning, motivation effective, Guidance and Counselling Services, parental support, appropriate instructional methods, Students and teachers punctuality in class, Students' time management

Students need more motivation and interactions from the teachers to be more confident and enthused. Many students who perform well in learning mathematics do so with assistance from their teachers. Teacher-learner interaction in classroom should be geared towards achieving a goal and improving students' confidence and ability to learn mathematics. The attitude and interest of the teachers to motivate the students and interact with them could play a key role to improve the performance of the students

(Zan & Martino, 2007). In addition motivation and supply of adequate teaching and learning materials are some of the crucial measures to improve the performance of the students in mathematics.

The students found that proper guidance and counselling should be emphasized to support the students to develop much interest and love to study mathematics. According to Noble (2006), students' academic achievements, perceptions of their coping strategies and positive attributions and background characteristics (such as family income, parents' level of education, guidance from parents and number of negative situations in the home) are related to their composite scores and academic achievement in high school. More importantly encouraging students to solve a lot of problems, creating an enabling environment, helping students to manage their time, ensuring that teachers don't shift the preparation on only students and recruiting more qualified mathematics teachers are some factors to be considered for improvement in their performance.

Zajacova, Lynch and Espenshade (2005) have stipulated that students who are properly guided by their parents perform well in examinations. Students' academic performance depends on proper guidance by both teachers and parent

(Goodall et al., 2010) found that parental involvement is one of the major factors influencing the performance of the students especially in the high school. Parents who always respond to the urgency needs of their children and are more involved in their studies and academic activities have their children achieving greater success than their counterpart students whose parents are not involved in their academic activities.

Students and teachers punctuality in class, are some keys measures to be tackled if the need to improve academic performance is desired. The results revealed that, students'

time management is very important particularly, time to do homework, time to read text and notes books. These factors hold a promise to improve the academic performance of these visual arts students in Mathematics.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

Several studies have identified Visual arts students as poor achievers in Mathematics at the senior high school level in spite of the fact passing mathematics is a key to further studies after the Senior High School.

Motivated by this background, this study investigated the academic performance of the Visual Arts students in Mathematics at the Adanwomase Senior High school in the Ashanti Region. This study emphasized on analyzing the trends in their performance in Mathematics, the major factors that account for their poor performance in Mathematics and the appropriate measures to improve their performance.

A total sample of 183 respondents participated in the study and the sampled comprised 33 teachers at the Adanwomase SHS, 149 Visual Arts students in SHS 2 and SHS 3 AS well as the assistant Headmaster in the school in charge of academics. The descriptive survey method was used where simple statistical analysis such as the t-test, mean, standard deviation and graphs were used. The main research instrument used was the researcher-designed questionnaires and interviews to collect appropriate data for the analysis.

The Findings from the study revealed that, Students' performance in mathematics was found to be consistently very poor the as a failure rate of have always raged between 88% and 87% which have been recorded in the WASSCE. What it means is that, majority of the students who completed the SHS had obtained D7-F9 which was described as a fail based on the grading scale. Regarding the performance of the current

students, the results show that, their pass rate in the End of Term examinations has always raged between 11% and 13%. As students move from SHS 2 to SHS 3 their performance also become worse off. The results from the t-test also indicate that, there is no statistical significant differences between the mean scores from male respondents and female student's respondents regarding their academic performance. This implies that, the academic performance of male and female students do not differ and are almost the same.

Findings from the study also revealed that, the students have low interest in studying Mathematics in the school. Nonetheless, the results denote that, greater proportion of the females had more interest in studying the mathematics than the male study even though the male's students constitute the greater proportion of the students' population in the Visual

Regarding the study habit of the students, the results show that, majority of the females students prefer engaging in cooperative learning with their colleagues to other individual studies while the male students prefer independent studies. The study revealed that, there is no significant differences in means in terms of how the male and female students respond to their homework or assignments. In all, there is significant difference between time management and students performance between the female students and the male students.

Findings from the studies also agreed that, factors such as students' negative perception of too much abstract calculations in mathematics the larger class size, negative attitude of the students towards mathematics, lack of academic competition in class account for their poor performance in class as there is no such environment to create competition in

class which would help push the students to study hard and achieve more mathematical skills.

Again, Students' absenteeism, increased indiscipline constitutes part of the major causes of the poor academic performance of the students in the school. Inadequate learning materials such as calculators, text books, inadequate teaching materials for teachers, increase in indiscipline among students, student's shyness to seek for clarification from teachers and students' are the predominating causes of the poor academic performance in mathematics among the students. These causal factors account for the massive weak performance achievement of the Visual Arts students in mathematics in the school.

Peer group influences also contribute to their poor performance in mathematics, lack of sufficient parental participation in their wards academic work contribute to the poor academic performance of the students.

The findings show that, in order to address the situation of poor academic performance in Mathematics, factors such as cooperative learning, motivation effective assessment systems, Counselling services and activity parental support should be emphasized and encouraged. Again, the results indicate that, appropriate instructional methods, students and teachers punctuality in class, are some keys measures to be tackled if the need to improve academic performance is desired.

The results, students' time management is very important particularly, time to do homework, time to read text and notes books, In addition motivation and supply of adequate teaching and learning materials are some of the crucial measures to improve the performance of the students in mathematics.

More importantly encouraging students to solve a lot of problems, creating an enabling environment, helping students to manage their time, ensuring that teachers don't shift the preparation on only students and recruiting more qualified mathematics teachers are some factors to be considered for improvement in their performance.

5.2 Recommendations

Based on these conclusions and findings, the following recommendations are made. The school authorities, and the PTA should ensure that, the counseling's unit in the school is well resourced and professional counsellors are employed to provide counselling services to the students. These counselling services should particularly have emphasized on how the allay any fear and negative perception about learning Mathematics in the students. How the students should manage their time especially spending enough time to complete their assignment s and homework are crucial.

Again, teachers and the school leaders such as Form masters, class teachers, house masters and mistresses, Head masters and assistant headmasters must education and guide the Visual arts students on how to engage in cooperative studies and share ideas together. Forming study groups could be a great breakthrough for the students to obtain a greater achievement in mathematics in the school. The findings show that, females students learn better when they engage in cooperative learning.

More importantly, discipline measures must be instituted in the school to ensure that the Visual arts students portray good attitude and habit towards teaching and learning in the school. The results show that punctuality among the teachers and the students is a major issue which should be checked in the school.

Moreover, providing adequate teaching and learning materials are critical to achieve good performance outcome. Appropriate text books, calculators, teaching materials must be made available for effective teaching and learning in the school. In the same vein, appropriate teaching methods must employed by the teachers to ensure effective delivery and understanding of the mathematical concepts among the students.

Finally, sufficient parental participation is very critical if the student's success in examinations are required. Parents and guardians must ensure that, their wards are fully engaged in their studies, and every necessary learning material needed are equally provided to enhance their learning and performance.

5.3 Recommendations for future studies

The study was limited to only one school which would make it difficult to generalize the results from the study. Expanding the sample size and the survey to cover number of schools and to compare the findings will be more interesting and can be of valuable research area.

Again, future studies may conduct a comparative study between visual arts students in the schools located in the cities and those in the rural areas while controlling for the inter-regional and cultural differences. This kind of comparative study may be of interest to design sufficient policy interventions in the educational sector.

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APPENDIX I

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF EDUCATIONAL INNOVATIONS IN SCIENCE AND TECHNOLOGY

Dear Respondent,

LETTER OF INTRODUCTION

I am a final year student offering a postgraduate Programme in MPhil Art Education at the department of Educational Innovations in Science and Technology, Kwame Nkrumah University of Science and Technology in Kumasi. I am currently conducting a study on performance of Visual Arts students in Mathematics at the Adanwomase Senior High School. You have been selected to be part of the study. Please kindly give your candid opinion and information. You are assured that the information given will be treated as confidential and used for purely academic purposes. Please you can also opt out of the study at any time if you wish.

Thank you for your cooperation

Cosmos Yeboah

……

(Research Student)

APPENDIX II

RESEARCH GUIDE FOR SECONDARY DATA ON ACADEMIC PERFORMNACE FROM THE SCHOOL'S RECORDS OFFICE

RESEARCH QUESTION 1: What is the performance of the visual arts students in Mathematics at Adanwomase SHS?

PREVIOUS ACADEMIC PERFOMANCE IN MATHEMATICS FROM WAEC AND INTERNAL PROMOTION EXAMINATIONS RECORDS IN THE SCHOOL

	PERFORMANCE OF MALE STUDENTS IN MATHEMATICS				
Grade	**2014**	**2015**	**2016**	**2017**	**2018**
A1					
B2					
B3					
C4					
C5					
C6					
D7					
E8					
F9					
	PERFORMANCE OF FEMALE STUDENTS IN MATHEMATICS				
A1					
B2					
B3					
C4					
C5					
C6					
D7					
E8					
F9					

PREVIOUS ACADEMIC PERFORMANCE IN MATHEMATICS FROM INTERNAL PROMOTION EXAMINATIONS RECORDS IN THE SCHOOL

(FORM 2)

	PERFORMANCE OF MALE STUDENTS IN MATHEMATICS
Grade	2017/2018 ACADEMIC YEAR
A1	
B2	
B3	
C4	
C5	
C6	
D7	
E8	
F9	
	PERFORMANCE OF FEMALE STUDENTS IN MATHEMATICS
A1	
B2	
B3	
C4	
C5	
C6	
D7	
E8	
F9	

FORM 3

	PERFORMANCE OF MALE STUDENTS IN MATHEMATICS
Grade	2017/2018 ACADEMIC YEAR
A1	
B2	
B3	
C4	
C5	
C6	
D7	
E8	
F9	
	PERFORMANCE OF FEMALE STUDENTS IN MATHEMATICS
A1	
B2	
B3	
C4	
C5	
C6	
D7	
E8	
F9	

APPENDIX III

QUESTIONNAIRES FOR TEACHERS

SECTION I

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENT

(Instruction: please, kindly tick (√) where applicable)

1. Sex :

   a) Male ( ) b) Female ( )

2. What is your Age in years?

   a) Below 31 ( ) b) 31-40 ( ) c) 41-50 ( ) d) 51- 60 ( ) e) 60+ ( )

3. Highest educational qualification:

   a) First degree ( ) b) master's degree ( ) c) doctorate degree ( )

4. For how long have you been teaching as a professional teacher?

   a) Below 1 ( ) b) 1-3 ( ) c) 4-6( ) d) 7- 9 ( ) e) 10 years and above ( )

5. For how long have you been teaching as a professional teacher in this school?

   a) Below 1 ( ) b) 1-3 ( ) c) 4-6( ) d) 7- 9 ( ) e) 10 years and above ( )

6. Marital status:

   a) Single ( ) b) Married ( ) c) Widow () d) Divorced ( ) e) Separated ( )

SECTION II

What are the factors that influence their poor performance in Mathematics?

Please kindly indicate by ticking your level of agreement on the factors influencing the performance of the students based on the Likert Scale provided **(TICK ALL THAT APPLY)**

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Inadequate of teaching materials for teachers	1	2	3	4	5
2. Teacher absenteeism	1	2	3	4	5
3. Inadequate assessment of students	1	2	3	4	5
4. Teachers over dependence on text books	1	2	3	4	5
5. Failure to use motivational techniques during lesson delivery	1	2	3	4	5
6. Less qualified mathematics teachers in the schools	1	2	3	4	5
7. Student's shyness to seek clarification from teachers and friends	1	2	3	4	5
8. Insufficient time to read notebooks and pamphlets	1	2	3	4	5
9. Increased indiscipline among students	1	2	3	4	5
10. Lack of academic competition in class	1	2	3	4	5
11. Lack of sufficient parental care	1	2	3	4	5
12. Students negative attitude towards	1	2	3	4	5

mathematics					
13. Peer group influence	1	2	3	4	5
14. Inadequate time to do assignments	1	2	3	4	5
15. Lack of adequate educational facilities in the school	1	2	3	4	5
16. Inadequate provision of teaching and learning materials	1	2	3	4	5
17. Class size causes poor instructional delivery	1	2	3	4	5
18. Poor student to teacher ratio	1	2	3	4	5
19. Uncondusive atmosphere at school	1	2	3	4	5

SECTION III

What are some of the ways that the students' performance in Mathematics can be improved?

ITEMS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Students should understand concepts and practice what are taught in class	1	2	3	4	5
2. Students' health status should be good enough to help them learn efficiently	1	2	3	4	5
3. students should spend a lot of time on their homework and assignments	1	2	3	4	5
4. If students spend a lot of time on their homework and assignments it helps them understand concepts and practice of maths	1	2	3	4	5
5. Students should have enough time to read their notebooks and textbooks	1	2	3	4	5
6. Students can seek help from friends when they find difficulty in a particular topic	1	2	3	4	5

7. Regular motivation of students would help improve their performance	1	2	3	4	5
8. Effective assessment of students helps to improve their performance	1	2	3	4	5
9. Appropriate use of instructional methods	1	2	3	4	5
10. Adequate parental support	1	2	3	4	5
11. Efficient measures to check teachers and students punctuality	1	2	3	4	5
12. Good teacher to student ratio	1	2	3	4	5
13. Regular and prompt refresher courses for teachers	1	2	3	4	5
14. Adequate supply of teaching and learning materials Counselling posts at schools	1	2	3	4	5
15. Provision of conduction environment	1	2	3	4	5

APPENDIX IV

QUESTIONNARES FOR STUDENTS

SECTION I

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENT

(Instruction: please, kindly tick (√) where applicable)

1. Sex :

   a) Male ( ) b) Female ( )

2. What is your Age in years?

   a) Below 15 ( ) b) 15-18 ( ) c) above 18 ( )

3. Educational Level

   a) Form 2 ( ) b) Form three (3)

4. Did you intend to have your SHS here?

   a) Yes ( ) b) No ( )

5. Did you plan of being in this school after JHS?

   a) Yes ( ) b) No ( )

6. Are you happy about your current school?

   a) Yes ( ) b) No ( )

7. Do you have interest in mathematics?

   a) Yes ( ) b) No ( )

SECTION II

What are the factors that influence their poor performance in Mathematics?

8. Please kindly indicate by ticking your level of agreement on the factors influencing the performance of the students based on the Likert Scale provided **(TICK ALL THAT**

Item	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1. I consult my friends when I find any difficulty in any topic in maths	1	2	3	4	5
2. I join studies group to discuss maths topics	1	2	3	4	5
3. I attend evening pre studies always	1	2	3	4	5
4. I have my personal study time Table	1	2	3	4	5
5. I am competent in solving mathematics questions	1	2	3	4	5
6. I like solving mathematics questions	1	2	3	4	5
7. I am punctual in maths class always	1	2	3	4	5
8. I always do my mathematics assignment	1	2	3	4	5
9. I like the teaching methods of my maths teacher	1	2	3	4	5

9. Please kindly indicate by ticking your level of agreement on the factors influencing the performance of the students based on the Likert Scale provided **(TICK ALL THAT APPLY)**

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I don't have adequate learning materials for such as calculator	1	2	3	4	5
2. Teachers and students' absenteeism	1	2	3	4	5
3. My teacher does not give adequate exercises and assignments	1	2	3	4	5
4. My teachers dependent too much on text books	1	2	3	4	5
5. My teacher does not use any form of motivation techniques during less delivery	1	2	3	4	5
6. Less qualified mathematics teachers in the schools	1	2	3	4	5
7. Student's shyness to seek clarification from teachers and friends	1	2	3	4	5
8. Insufficient time to read notebooks and pamphlets	1	2	3	4	5
9. Increased indiscipline among students	1	2	3	4	5
10. Lack of academic competition in class	1	2	3	4	5
11. Wrong choice of programme	1	2	3	4	5

12. Students negative attitude towards mathematics	1	2	3	4	5
13. Peer group influence	1	2	3	4	5
14. Inadequate time to do assignments	1	2	3	4	5
15. Lack of adequate educational facilities in the school	1	2	3	4	5
16. Class size causes poor instructional delivery	1	2	3	4	5
17. Maths is too much of calculation	1	2	3	4	5
18. Our teacher does not have enough time for explanation	1	2	3	4	5
19. We don't solve more examples in class	1	2	3	4	5
20. The period allocated for math is small	1	2	3	4	5
21. Our teacher does not make teaching interesting	1	2	3	4	5
22. My teacher does not motivate me and my colleagues	1	2	3	4	5
23. Have you witnessed a speech and prize given day in this school	1	2	3	4	5

SECTION III

What are some of the ways that the students' performance in Mathematics can be improved?

ITEMS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Understanding the concepts and practice of mathematics taught in class can help improve our performance	1	2	3	4	5
2. Good health status helps to learn efficiently and comfortably.	1	2	3	4	5
3. Students Should spend a lot of time on their homework and assignments to improve performance	1	2	3	4	5
4. Students should have enough time to read notebooks and textbooks	1	2	3	4	5
5. Students should seek help from friends when found difficulty in a particular topic	1	2	3	4	5
6. Regular motivation of students helps to improve performance	1	2	3	4	5
7. Effectively assessment of students	1	2	3	4	5
8. Appropriate use of instructional methods	1	2	3	4	5

9. Adequate parental support	1	2	3	4	5
10. Efficient measures to check teachers and students punctuality	1	2	3	4	5
11. Good teacher to student ratio	1	2	3	4	5
12. Regular and prompt refresher courses for teachers	1	2	3	4	5
13. Adequate supply of teaching and learning materials.	1	2	3	4	5
14. Adequate supply of resources for counseling post at school					
15. Provision of conduction environment	1	2	3	4	5

APPENDIX V

ANALYSIS OF ACADEMIC PERFORMANCE OF VISUAL ARTS STUDENTS IN MATHEMATICS: A CASE OF THE ADANWOMASE SENIOR HIGH SCHOOL

INTERVIEW GUIDE FOR ASSISTANT HEAD MASTER ACADEMICS

- How do you assess the performance of the Visual Arts students in Mathematics
- What do you think are the causes of such performance?
- What measures has the school put in place to address the poor performance of the visual arts students in the school
- How do you think the students, teachers, school and the parents are contributing to the problem?
- Are the parents aware of the performance of their children in the school?
- Do you see something wrong with the Mathematics curriculum? If yes, what is wrong with it?
- How do you intend to improve the performance among these current students?