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EXAMINING FACTORS AFFECTING STUDENTS' LEARNING OF ELECTIVE MATHEMATICS AT SENIOR HIGH SCHOOLS (SHS) WITHIN BOLGATANGA MUNICIPALITY OF UPPER EAST REGION OF GHANA

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ABSTRACT
The research was aimed at determining the factors that affect Senior High School (SHS) students' learning of Elective Mathematics. A stratified random sampling method was used to select three SHSs in five districts in Bolgatanga Municipality of the Upper East region of Ghana. The study involved 300 respondents (100 girls and 200 boys) who were sampled from three SHSs. A questionnaire on demographic, instructional and individual factors affecting learning was used to collect data. The data were analyzed using SPSS and presented using measures of central tendency and dispersion. The major findings of the study were: lack of people who will help students to do homework/ assignment, inadequate teaching/learning periods, inappropriate and lack of teaching/learning materials and teachers inability to meet individual learning needs. Additionally, students' fear and dislike of elective mathematics as a difficult subject and teaching of the subject in abstract manner in SHSs militate against students learning of elective mathematics. It was recommended that stakeholders in education should provide SHSs with adequate teaching/learning materials and help extend elective mathematics teaching periods. Also, proper supervision and monitoring of schools should be intensified in all SHSs in Ghana.

KEY WORDS: learning, Elective mathematics, factors, demography, performance, achievement

Background of Study

Students' performances in Elective Mathematics at the SHSs are of great concern to parents, teachers, corporations and government. Geary & Hamson (2000), are of the view that chances of employability, higher wages and higher achievements on job productivity are some of the reasons why people learn mathematics. SHS students need to possess high quantitative competencies and performances in elective mathematics in order to communicate and use mathematics effectively in their everyday activities. However, SHS students' performances in Elective mathematics are disappointing as the rate of failure is appalling. Some of the prominent factors that contribute to difficulties in learning mathematics include; dislike of the subject, fear due to psychological incidences, learning barriers, inability for mathematics curriculum to relate to real life situations, lack of adequate mathematical knowledge on the part of mathematics teachers and inability to meet individual differences. A number of research works have established that, factors such as gender, parents' educational level, socioeconomic status, school type and location, cognitive and content preferences etc. also affect learning.

Problem Statement

Evidence outside Ghana is replete with literature on certain factors that affect Elective Mathematics performances and achievements. Academic performances and achievements of students are the determining factors that ascertain whether effective learning has taken place in schools. Students have the perception that elective mathematics is a difficult subject and they tend to dislike the subject as elective teachers do not relate to their everyday life experiences. Teachers encounter difficulties with inadequate teaching/learning materials and therefore resort to the teaching of the subject in abstract manner. Senior High School libraries lack modern textbooks and that students rely on pamphlets/handouts and other books which emphasize on treating concepts superficially and with much errors. Lack of qualified professional mathematics teachers contribute to mathematics teachers' inability to use appropriate methodology in delivering lessons. The current study seeks to verify the existence of factors that affect the learning of mathematics in three selected SHSs in Bolgatanga Metropolis.

Purpose of the study

The purpose of the study is to investigate the possible factors affecting students' learning of elective mathematics in SHSs. Studies so far have revealed that demographic, individual and instructional factors have impacts on mathematics achievements of students. Identifying factors that affect the learning of mathematics is important to effectively educate students on what is for many a difficult subject. The study aimed at the perception of students about the:

- demographic factors (gender, parents' educational level, socioeconomic status,) that influence the learning of elective mathematics
- instructional factors (teachers, curriculum (methods, content , learners) techniques and strategies, school context and facilities) that influence the learning of elective mathematics
- individual factors (cognitive, self-directed learning, arithmetic ability and motivation) that influence learning of elective mathematics.

Research questions

The following questions were formulated to guide the study: To what extent do students'

- demographic factors affect their learning of elective mathematics?
- individual factors affect their learning of elective mathematics?
- instructional factors affect their learning of elective mathematics?

Significance of the study

The study provides information regarding the factors affecting students learning of elective mathematics with particular reference to Bolgatanga Metropolis. The findings of the study would contribute towards a clear understanding and knowledge of what is actually happening as regards the performances and achievements of SHS students in Elective Mathematics. Not only the results of the current study be useful to teachers, parents, educators and government in planning elective mathematics curriculum but also make students in Ghana aware of what militate against their performances and achievements in mathematics in general.

Delimitation: This study covered only three schools. This was partly due to difficulty of mobility and limited resources (for example teaching materials) at the disposal of the investigator. The study involved SHS students in Bolgatanga. The researcher purposely chose the schools because previous works on similar topics had been carried out with subjects within the rural setting. The schools chosen were due to their proximity to the investigator's residence and the healthy relationship between most of the teachers in these schools and the investigator.

Limitation: The researcher restricted study due to unavailability of funds and time to carry out the research. The study focussed the sample on three selected schools in the Metropolis.

Assumptions: The following assumptions made were that: all students in the selected schools were of equal ability; no significant difference among the performance of students who answered the questionnaire due to their cognitive understanding and the age differences of subjects in the selected schools.

Review of related literature

Overview

Learning of mathematics is often not tangible and is difficult to measure because it results in the form of transformation of knowledge, life skills and behaviour modifications of learners. The environment and the personal characteristics of learners play an important role in the learning of mathematics. The school personnel, members of the families and communities provide help and support to students in the learning of mathematics. This social assistance has a crucial role for the accomplishment of performance goals of students at school. Many researchers have discussed the relationship between gender and the learning of mathematics . Gender, ethnicity, and parent's occupation are significant contributors to students' learning of mathematics. The review has been considered under the following sub heading;

1. Demographic factors (gender, socio economic status, parents' educational level)
2. Instructional factors (Instructional strategies and techniques, curriculum, school facilities, location and context)
3. Individual factors (cognitive, self-directed learning, arithmetic ability, and motivation)

Demographic factors

Various demographic factors are related to learning of mathematics. Gender, socio economic status, and parents' educational level are variables identified as possible factors influencing the learning of mathematics.

Gender

Contemporary research studies reflect scholars' maturing view of the complexity of causation of differences between males and females in mathematics education. '*Gender differences*' refers to social or environmental causation of differences observed between the sexes. Many studies had poorly analyzed and/or included sexist interpretations, there was evidence to support the existence of differences between girls' and boys' learning of mathematics, particularly in activities that required complex reasoning; that the differences increased at about the onset of adolescence and were recognized by many leading mathematics educators. Salmon (2001) concurred with the notion that gender differences increase at secondary school level, particularly in situations that require complex reasoning. Some researchers have hypothesized that if females participated in advanced mathematics classes at the same rate that males did, gender differences would disappear. Gender differences in attitudes and perceptions of the usefulness of mathematics for Senior High School students are statistically important in the learning of mathematics (Lockhead, Thorpe, Brooks-Gunn, Casserly, & McAloon 1999). For example, female students show less interest in mathematics and have negative attitudes toward mathematics. Reports indicate that girls tend to learn mathematics concepts by means of rules or cooperative activities, while boys have tendency to be in a competition to master mathematics concepts (Hopkins, McGillicuddy-De Lisi, 1997) . Studies indicate that as students reach higher level in education, gender differences favor increase in the learning of mathematics by males, For instance, the results from some researchers indicate that mathematics achievement Electives of each gender group were close to each other at the primary and middle school years. Campbell (1999) found that girls' lack of confidence in themselves as mathematics learners, their perception of mathematics as difficult, and their view that mathematics is a male activity, all had impact on girls' attitudes, achievement, and participation in advanced courses. In a longitudinal study of sixth, eighth, tenth, and twelfth grades, indicated that, for girls, viewing mathematics as a male domain was correlated to mathematics achievement. Girls in single-sex schools or in out-of-school mathematics projects – who did not see mathematics as an exclusively male domain tended to have higher mathematics success. This dynamic changed to make mathematics accessible

to both girls and boys, girls' interest and involvement then rose up. Since such mathematics gender differences typically do not emerge until high school, some argue that the tests themselves were bias. Others contend that, over time, social forces discourage talented women from studying mathematics. For example, the study of mathematically precocious youth shows that mathematically talented men were likely to go into engineering and the physical sciences, while similarly talented women tended more towards careers in law, medicine, and biology. The literature on gender difference provides evidences that gender issues impact the learning of mathematics. Hence, it is crucial for educators and researchers to pay attention to gender differences in the design of mathematics instruction.

Socio-economic status is determined to be a predictor of learning of mathematics. Studies repeatedly discovered that the parents' annual level of income is correlated with students learning of mathematics (Jeynes, 2002; McNeal, 2001). Students come from various backgrounds. Some are poor while others come from affluent households. They may come from strong family structures in which the parents are professionals or are highly educated, while others students may come from a single parent household and/or have parents with limited educational background. Students from affluent neighborhood will most likely have more educational support and resources to help them through school. Often, these neighborhoods have more tutoring companies, after school activities, and education stores than the working class or poor neighborhoods. Also, an affluent neighborhood will be filled with highly educated people. In many respects, students in these neighborhoods are expected to continue their education at college or university level. In struggling, impoverished neighborhoods, education may be seen more as a way to get a job after high school. Economic survival is more important. Most of the experts argue that the low socio-economic status has negative effect on the academic performance of students because the basic needs of students remain unfulfilled and hence they do not perform better academically. The low socio-economic status causes environmental deficiencies which results in low self-esteem of students. A number of studies showed that parents with higher socio-economic status are more involved in their children's education than parents of lower socio-economic status. This greater involvement results in the development of positive attitude of children toward school, classes and the enhancement of the study of the subject which improve their performances. (Epstein, 2003: Stevenson & Baker 2005). It is believed that low socio-economic status negatively influences the learning of mathematics, in part, because it prevents students from accessing various educational materials and resources and create a distressing atmosphere at home (Jeynes, 2002). For these reasons, socio-economic status of a student is a common factor that determines the learning of mathematics.

Parents' Educational Level

Parent's educational level is a factor in learning of mathematics. Often, the affluent parent will have access to educational resources for his /her child. Parents from this sector of society will most likely educate his /her child directly or indirectly. Parents serve as role models and guide in encouraging their children to pursue high educational goals and desires by establishing the educational resources on hand in the home and holding particular attitudes and values towards their children's learning. In this case, the educational attainment of parents serve as an indicator of attitudes and values which parents use to create a home environment that can affect children's learning and achievement. The home environment also affects the academic performance of students. Educated parents can provide such an environment that suits best for academic success of their children. The school authorities can provide counseling and guidance to parents for creating positive home environment for improvement in students' quality of work. The academic performance of students heavily depends upon the parental involvement in their academic activities to attain the higher level of quality in academic success. A number of studies indicate that student learning and achievement are correlated highly with the educational attainment of parent's educational background (Coleman, 2006). For instance, students whose parents had less than high education obtained lower marks in mathematics than those whose parents had higher levels of education.

Instructional factors

Curriculum

Many concerns have been emphasized in the literature about the existing mathematics curricula that emphasize not so much a form of thinking as a substitute for thinking. The process of calculation or computation only involves the deployment of a set routine with no room for ingenuity or flair, no place for guess work or surprise, no chance for discovery, no need for human being, in fact. The concern here is not that students should never learn to compute, but that students must learn how critically analyze mathematics problems and produce effective solutions. This requires them to learn, how to make sense of complex mathematics concepts and how to think mathematically (Cobb, 2002). Many mathematics curricula overemphasize memorization of facts and underemphasize understanding and application of these facts to discover, make connections, and test mathematics concepts. Memorization must be raised to conceptualization, application and problem solving for students to successfully apply what they learn. An impressive body of research suggests that curriculum that considers students to be incapable of meta-cognitive actions (eg, complex reasoning) should be replaced with the one that sees students who are capable of higher-order thinking and reasoning when supported with necessary and relevant knowledge and activities. Research has revealed evidence that curricula in which student's knowledge and skills grow is significantly connected to their learning, and therefore their achievement (Brown & Campione, 2005; Lehrer & Chazen, 2000).

Instructional Strategies and Methods

Being successful in mathematics involves the ability to understand ones current state of knowledge, build on it, improve it, and make changes or decisions in the face of conflicts. To do this requires where they can develop and apply higher-order operations are critical for the learning of mathematics. A method refers to formal structure of the sequence of account commonly denoted by instruction. Teaching methods and learning methods are two things at the other end of an interaction continuum. Teachers need to have their disposal a number of teaching methods in order to choose those appropriate to the topics being taught and to liven up teaching by the use of variety of approaches. The use of effective teaching methods is of considerable concern to the mathematics teacher who wants to make his teaching very comprehensive and valuable to his students. Method is the procedure by which the teacher meets the learner at his level, starting with his interest and his problems then establishes a condition that enables him to proceed to reach set goals as effective a manner as possible". The definition of method is the application by the teacher uses principles by which learning takes place. Some major teaching methods are; the lecture method, the discussion method, the Dalton plan, the fieldwork method, the problem solving method and the discovery method. Highet (2005) stated that in the lecture method, the teacher delvers verbally a body of knowledge according to a pre-planned scheme. The lecture method is usually suitable for students at the tertiary level recently, it is now being used at the senior high school level. Teachers who wish to complete their mathematic syllabus on time usually use this method to make their work easier. As result, the mathematics syllabus may be completed but the students would not have adsorbed the meaning of the mathematical concepts been taught by the teacher. This hinders proper teaching and learning. The lecture method is not the best way to help students think critically. Also, learning is an active not a passive process; that the learner must be actively engaged in the learning; and the human beings are constitutionally active and want to solve, participant in problem solving Dewey (2000). Thus the teachers merely present mathematics concepts and principles to the disadvantage of the students who lack understandings of those concepts and principles. To teach is to effect a positive change in the cognitive behavior of students, not just the bright ones but most, if not all students. Lecture method has been over used and misused by teachers of all subjects including mathematics teachers. Teaching method such as the role play, discussion and the question and answer methods maybe used to facilitate the teaching of mathematics in the senior high schools, so that, the students can acquire in-depth knowledge and

understanding of the lesson being taught. Carr (2004), stressed that variety in teaching methods is essential in the learning process. Teaching method or instruction method are an organized arrangement of instructional techniques that is interned to achieve a discrete learning outcomes, this means that the teaching method are the means by which the teacher gets ideas, concepts, and skills across to student to achieve predetermined outcome. It can be said that effective teaching methods leads to effective learning and therefore, teachers ought to use effective teaching methods of teaching in order to help students grasp the various concepts and principles in mathematics. In addition, it is emphasizing that instructional strategies where students actively participate in their own learning is critical for success (Bloom & Coleman 2006). Instructional strategies shape the progress of students learning.

School Context and Facilities

Research suggests that student learning is associated with safe and orderly school climate. Learning will best take place when the teacher ensures that the students have adequate experience of reality as a basis for abstraction they form. Teaching materials are the resources which the teacher uses to facilitate the learning, understand and acquire knowledge, concepts, principles or skills by his or her students. A distinction between teaching resources and learning resources has been identified. Learning resources are defined as materials which the teacher uses to facilitate the learning, understanding or acquisition of knowledge, and concepts, principles or skills by student. Thus, teaching resource is what the teacher prepares or uses to make learning easier than it would have been without it. On contrary, a learning material is that which the student prepares himself to make learning easier than it would have been if he had not prepared and use it. Drayer (2003), sees the use of teaching learning resources as important approach to teaching. He maintains that teachers should use audio-visual aids judiciously. Teaching learning materials are essentials in promoting learning. He stressed that the use of audio, visuals, and audio-visuals such as charts, diagrams, motion pictures, filmstrips; radio presentation, among others, arouse the interest and curiosity of students which motivates them to learn. The provision of teaching and library facilities equipped with standard textbooks are very important in the implementation of modern curriculum. Most of what you learn depends on you, the teacher and the textbook. One can therefore say that the availability of teaching learning resources needed to ensure effective teaching can help to improve the performance of mathematics students and this helps them to show a positive attitude towards the study of the subject at the senior high school level. Burton (2004), states that the first and all inclusive principles in determining the use of instructional aids is to give pupils vicarious experiences useful to their purposes when the real experiences are outside the pupils immediate environment. This means the instructional aids and materials are not useful merely because they are “interesting”, “real”, “concrete”, but because they explain or classify a needed understanding contributing to the development of an attitude or explain a motor or machine process. The environment particularly the community in which a school is established can serve as a useful resource for teaching and learning. This is supported by the statement “since pupils immediate environment is involved in drawing on the community the chances of stimulating interest by it are good”. The community could be explored and exploited by the teachers and students to their benefits. The teacher can invite several personalities from the community to deliver lectures or talks in mathematics. Researchers also found a negative impact on student learning where deficiencies of school feature or components such as temperature, and lighting exist. In a study by Harner (1998), temperature above 23^0C (74^0F) adversely affected mathematics learning. In terms of condition of school buildings, Cash (2003), found student learning in standard buildings to be lower than students learning above standard buildings. A multiple regression statistical analysis to examine the relationship between overcrowded school building and student learning was conducted. It indicated that a high population of students had a negative effect on students learning.

Individual factors

Self –directed learning

Mathematics learning requires a deep understanding of mathematical concepts, the ability to make connection between them, and produce effective solutions to ill-structured domains. There is no perfect, well-structured, planned or prescribed system that the students think and act mathematically. This can be done if, students play their assigned roles in their learning process. Self-directed students can take the initiative in their learning by diagnosing their needs, formulating goals, identifying resources for learning, and evaluating or monitoring learning outcomes in mathematics (Knowles 2000). The teacher's role is to engage students by helping to organize and assist them as they take the initiative in their own self-directed exploration, instead of directing their learning automatically.

Arithmetic Ability

Arithmetic ability includes the skills such as manipulating mathematical knowledge and concepts in ways that transform their meanings and implications. It allows students to interpret, analyze, synthesize, generalize, or hypothesize the facts and ideas of mathematics. Students with high arithmetic ability or mathematical reasoning can engage in task such as solving complex problems, discovering new meanings and understanding, and arriving at logical conclusions. Arithmetic ability was determined by various studies as a critical factor on student learning of mathematics. In a study by Kaeley (2006), arithmetic ability gave the highest correlation coefficient with learning of mathematics meaning arithmetic ability is the major factor that influences the learning of mathematics.

Motivation or Concentration

Motivation is at the heart of learning. It arouses, sustains, directs and determines the intensity of learning effort. Mathematics education requires highly motivated students because it requires reasoning, making interpretation, and solving problems, mathematical issues, and concepts. The challenges of mathematics learning for today's education are that it requires disciplined learning, concentration motivation. To meet these challenges, learners must be focused and motivated to progress in their learning. The relationship between classroom motivation and academic achievement was examined. Consistent with previous studies, they found that for a higher level of mastery, motivation was related to higher mathematics grades. The teacher's role in students' motivation to learn should not be underestimated. In helping students become motivated learners and producers of mathematical knowledge successfully, the teachers main instructional task is to create a learning environment where students can engage in mathematical thinking activities and see mathematics as something requiring "exploration, conjecture, representation, generalization, verification, and reflection" (Carr, 2004). Motivation leads to increased effort and energy. Motivation increases the amount of effort and energy that the learners expend in activities directly related to their needs and goals. It determines whether they pursue a task enthusiastically and wholeheartedly or apathetically and lackadaisically. Motivation increases initiation and persistence in activities. Learners are more likely to begin a task they actually want to do. They are also more likely to continue working at it until they have completed it, even if they are occasionally interrupted or frustrated in the process (Larson, 2000). In general, then, motivation increases student's time on task, an important factor affecting learning of mathematics (Larson, 2000). Motivation affects cognitive processes. Motivation affects what learners pay attention to and how effectively they process it (Pintrich & Schunk, 2002). For instance, motivated learners often make concerted effort to truly understand classroom materials, to learn it meaningfully, and consider how they might use it in their own lives.

Methodology

The aspects captured here included the research design, population of study, sample size and sampling technique, instrumentation, data collection and data analysis procedures.

Research design

Descriptive survey was used as the researcher intended to assess the factors that affect students learning of Elective Mathematics within Bolgatanga metropolis. Eventhough this design may produce unworthy results, it was chosen because it elicits a very good amount of responses from a wide range of people. It helps to completely and accurately describe the variables in the research work. Descriptive survey is easily influenced by distortions through the introduction of biases in the measuring of instruments, it was found most suitable for the current study as it aided the researcher to draw meaningful conclusions from the data obtained.

Population

The population was all SHS students in Ghana. The target population was all SHS students in Upper East Region of Ghana. The accessible population was the three SHSs in the Bolgatanga municipality.

Sample size and Sampling procedure

Simple random sample was used to select three schools. Intact classes were used. A sample size of 300 was used in the study.

Research instrument

Questionnaire was used to collect data.

RESULT AND DISCUSSION

The main purpose of the study was to find out the factors that affect students' learning of mathematics in some selected Senior High Schools in the Bolgatanga Metropolis. In analyzing and interpreting the responses, frequencies and percentages were used to generate answers to the three research questions involving the demographic, instructional and individual factors that affect students' learning of mathematics.

Demographic characteristics of respondents.

In all 300 S.H.S students took part in the study. Their personal characteristics were presented in Tables 1 and 2

Table 1: Gender of students

Gender	frequency	Percentage
Male	200	66.7
Female	100	33.3
Total	**300**	**100**

Table 1 show that 200 (66.7%) of the respondents were males whiles 100 (33.3%) were females. This finding suggests that there are more males than females in the schools where the study was conducted. This gives credence to Salmon's (2001) assumption that gender differences increase at secondary school level, particularly in situations that require complex reasoning.

From Table 2, a total of 211 (70.3%) of the students indicated that they were aged between 15 – 19 years. Also, 89 (29.7%) of them indicated their ages were between 20 – 24 years. The result in Table 2 points out two main issues.

Table 2: Age distribution of students

AGE	frequency	percentage
15- 19 years	211	70.3
20 – 24 years	89	29.7
Total	**300**	**100**

Firstly, a sizable number of the students are teenagers. Such students are generally said to be in their reformation stages as far as learning is concerned. It thus behaves on elective mathematics teachers to adopt teaching strategies and techniques that will make the learning of the subject very interesting and to develop in students interest in the subject by involving them in lessons using activity method.

The research question was to find out the demographic factors that affect students learning of mathematics at the SHS level in Bolgatanga Metropolis. With low means of 3.31, 2.92, 2.45, 3.25, 2.53, 2.55 and the mean of means 2.83, show that the students to a large extent do not consider the demographic factor as a serious challenge on their learning of elective mathematics . To them, lack of assistance at home in doing mathematics and their parents' inability to provide them with things to learn elective mathematics largely affect their study with means 3.25 and 3.31 respectively. Students' response to the statement that their parents do not provide their learning needs is an affirmation of the general assumption that most students lack basic necessities in their learning processes. As indicated in Table 3, a total of 202 (67.3%) of the respondents agreed with the statement that their parents do not provide them with things they need to learn mathematics. The result goes to support Epstein (2003) and Jeynes' (2002) conclusion that low social-economic status of parents negatively affect the learning of mathematics because it prevents students from obtaining various educational materials and resources. As indicated in Table 3, 103 (34.3%) of the students disagreed with the statement that their parents do not encourage them to study mathematics. 178 (59.3%) of the students agreed with this claim. According to Stevenson and Baker (2005), low economic status of parents creates distressful atmosphere at home and such condition does not permit parents to have time to encourage their wards and this results in difficulties in learning mathematics because their morale for studying is low.

Table 3, again, indicates that members in communities where students stay do not encourage them to study mathematics. This is because majority 113 (37.7%) of the students agreed with the statement which said "members of my community do not encourage me to study mathematics. However, a total of 163 (54.3%) of the students agreed with the statement. This means that students do not generally get the needed attention and encouragement from the house or family and or their community. In this situation, the study of elective mathematics will be difficult for such students because they may not get any external assistance to drive them to study. Added to this problem is the lack of assistance students' face. from Table 3, a total of 46 (15.3%) of the students indicated that they always receive assistance from people whenever they are given assignments or home work. 128 (71%) of the students sharply disagreed with this position. This finding explains why McNeal (2001) argues that students who do not get appropriate assistance at home in their learning process tend to have low enthusiasm to learn.

It could therefore be said that because of lack of assistance and guidance, students feel uneasy to learn mathematics. Table 3, further shows that gender stereo typing is another demographic factor that affects students leaning of elective mathematics. As indicated in the Table, 92 (30.7%) of the students agreed that their parents complain that mathematics is for specific gender whereas 197 (65.7%) of the respondents disagreed with this statement.

Table 3: Demographic factors that affects the learning of Elective mathematics

	SD	D	SA	A	NA	Standard Deviation	Mean
My parents do not provide the things I need to learn mathematics	20	48	82	120	30	1.066	3.31
My parents do not encourage me to learn mathematics	30	72	110	68	20	1.063	2.92
Members in my community always encourage me to study mathematics	100	63	63	50	24	1.317	2.45
I am always unable to get people who will aid me to do my mathematics assignment at home	20	46	93	120	21	1.019	3.25

My parents often complain that mathematics is for a specific gender	52	127	59	33	29	1.183	2.53
Because of my parents' education background and training they often demand I concentrate on other subject than mathematics	76	70	82	48	14	1.194	2.55
Means of Means	2.83						
Mean of Standard Deviations	1.140						

Perhaps this explains why most of the respondents intimidated that their parents do not encourage them to study mathematics. Finally as indicated in Table 3, a total of 146 (48.7%) of the students disagreed with the statement "Because of my parents' educational background and training they often demand I concentrate on other subjects than mathematics. 130 (43.3%) of them, however, agreed with this statement. The result is in consonance with Campbell et al (2000) conclusion that parents' educational level play important role in the learning of mathematics. The result implies that parents who per their training and educational background are not mathematically oriented tend to discourage their wards from learning mathematics. Students from such homes are likely to develop negative attitude toward the study of elective mathematics. Again, with a mean of means of 2.50, the demographic factor does not actually affect learning of elective mathematics.

Table 4 depicts that certain instructional factors generally affect students learning of mathematics negatively. Responses indicate that periods allocated for mathematics was not enough; the schools also lack appropriate teaching and learning resources with students' responses recording high means of 3.36 and 3.16 for insufficient time allocation and teachers failure to use teaching learning aids during mathematics lessons. Though students response to the use of audio-visual had a mean of 3.51, it demonstrates that student feel comfortable when audiovisual are used to teach them. Students' response to teachers teaching elective mathematics concepts in abstract also showed a high mean of 3.1 and this implies that students do not often understand mathematical concepts because they are taught in abstract. With a mean of means 3.06 indicate that instructional factors positively affect students learning of mathematics hence it is a factor. Table 4 again shows that most students hold the view that their elective mathematics periods are not enough for the completion of the syllabus. This is because 238 (79.3%) of the respondents agreed with the statement and 38 (12.7%) of the respondents disagreed with this position. The negligible number indicates that the bulk of the students shared the view that time for the teaching of mathematics in the school was woefully insufficient.

The result brings to question whether or not the intended time allotted for the teaching of elective mathematics by the Ghana education service (GES) is enough or not. Table 4 also shows that there are inadequate instructional materials for the teaching of mathematics in the school. 260 (86.7%) of the students disagreed with the statement "Our school has enough instructional or learning materials for the study of mathematics. 36 (12%) of the students agreed with this statement. The result seems to suggest that due to lack of instructional materials in the schools, most elective mathematics teachers teach the course in abstract.

Probably, it this situation that made 226 (75.3%) respondents intimate that their teachers rarely use appropriate teaching learning materials when teaching elective mathematics. 62 (20.7%) of them disagreed. The result actually explains why most students do not enjoy Elective mathematics. Once teachers do not get the requisite teaching learning materials to teach they are likely to teach mathematics concepts in abstract.

Instructional factors that affects learning of Elective Mathematics

Question two sought to find the instructional factors that affect students learning of mathematics.

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Table 4: Students' Responses.

	SD	D	SA	A	NA	Standard Deviation	Mean
Periods allocated for the teaching and learning of mathematics is not enough, hence we are often unable to complete our mathematics course outline	12	26	128	110	24	0.898	3.36
Our school has enough learning materials for the study of mathematics	144	116	26	10	4	0.86	1.71
Teachers rarely use appropriate teaching learning materials	42	20	98	128	12	1.092	3.16
Teachers often teach us in abstract hence we often do not understand certain maths concepts	24	34	142	88	12	0.938	3.10
When our mathematics teacher engages us in a lot of activities we tend to understand the concept being taught well	38	56	95	96	17	1.103	2.98
The use of audiovisual materials by my mathematics teacher makes learning more interesting	0	1	144	138	13	0.652	3.51
Because my teachers do not have time for my individual learning needs, I always tend to dislike the study of mathematics	1	13	120	136	30	0.74	3.60
Mean of Means	3.06						
Mean of Standard Deviations	0.9						

When this happens students may not enjoy the teaching and learning of mathematics. The finding gives credence to Highet's (2005) position that whenever a teacher delivers verbally a body of knowledge without the use of concrete materials to support such verbal explanations, the recipient's (learner) usually becomes confused. 191 (63.7%) of the students claim that whenever their teachers engage them in activities during mathematics lessons, they tend to understand concepts well. A total of 94 (31.3%) of the respondents disagreed with this claim. This explains why Dewey (2000) argues that learning is an active process and not a passive exercise so the learner must actively be engaged in the learning process. The use of audio –visual materials in teaching mathematics is proven to be key factor in the learning of elective mathematics. As indicated in Table 4, 282 (94%) of the students were of the view that when their teachers use audio-visual materials to teach them, they find such lessons more interesting and lively. This finding justifies Drayer's (2003) assertion that teachers should use audio, visual and audio – visuals such as charts, diagram, motion pictures, filmstrips among others, to arouse the interest and curiosity of students. This shows that students find lessons more interesting when appropriate teaching learning aids are used. Table 4 finally shows that maximum attention to students learning needs serious attention. Table 4 indicate that 256 (85.3%) of the students indicated that they dislike mathematics because their teachers do not pay attention to their individual learning needs. However, according to Johnson and Lewis (2002), not all learners are intrinsically motivated to learn so when teachers fail to address the learning needs of individual students they create room

that no matter what a teacher does, his or her work would not be complete and effective unless individual learners' needs are addressed.

Individual Factors that affect learning of Elective Mathematics

The study, sought to find out individual or personal factors that affect students learning of Elective mathematics at the SHS level in Bolgatanga Metropolis. The focus of research question three (3) is to determine the extent to which students' individual or personal factors affect their learning of elective mathematics.

Table 5: Respondents' responses

	SD	D	SA	A	N	Standard Deviation	Mean
Personally, I have difficulty in understanding elective mathematics concept taught in the class	104	128	30	31	7	1.036	2.03
I have a lot of fear for some Mathematics concepts	54	61	86	78	21	1.201	2.84
I do not have much interest for the study of elective mathematics	44	48	84	106	18	1.189	3.02
I perceive elective mathematics to be a difficult subjects	26	14	128	104	8	0.915	3.21
I do not have enough time to study at home	24	28	78	168	2	0.949	3.32
I prefer the study of other subjects to mathematics	94	98	50	47	11	1.169	2.28
I do not think I will study mathematics in the future career I want to pursue	108	106	45	32	8	1.096	2.09
I have physical or biological disability that does not help me in my study of mathematics	150	121	20	8	1	0.754	1.63
Mean of Means	2.55						
Mean of Standard Deviation	1.08						

Data on students' responses from Table 5 indicates that the students generally are of the view that their inability to learn mathematics has virtually nothing to do with their individual factors as learners with a mean of means of 2.55. However, student's responses in the data showed that, interest for the study of mathematics, perceiving mathematics as a difficult subject and not having enough time to study at home with their means of 3.02, 3.21 and 3.32 respectively show that they really affect their learning of mathematics. As indicated in Table five, 61 (20.3%) of the students held the view that they do not have difficulty in understanding mathematical concepts taught in class while 232 (77.3%) disagreed with this position. It is against this backdrop that Larson (2000) advises all stakeholders in education to work hard to bring out the best in students as far as the study of mathematics is concerned. Table 5 also shows that some students harbor fear for the study of mathematics. This is because, a total of 115 (38.3%) of the students disagreed with the statement; I have a lot of fear for the study of mathematics, 164 (54.7%) of them agreed with the statement. The number who affirmed their fear for the study of mathematics is worrying because it implies such students may not develop positive attitudes towards the study of mathematics. According to Knowles (2001), fear for some subjects normally result from several factors. Harner (2004) identifies adoption of ineffective teaching methods, lack of encouragement and lack of will as some of the major cause of students

fear for certain subjects. This implies that mathematics teachers and other stakeholders in education need to put in place measures that will help students manage their fear for some subjects. Students' response to whether or not they have an interest in the study of mathematics showed that most 190 (63.3%) of them had interest for the study of mathematics. 92 (30.7%) of them indicated they do not have interest in the study of mathematics. This may be attributed to the fact that they face challenges as indicated in Tables 3 and 4 hence their low interest in the study of mathematics. In the view of 232 (77.3%) of the respondents, elective mathematics is a difficult subject. However, 40 (13.3%) of them disagreed with that assertion. This finding agrees with Pintrich and Schunck's (2002) argument that negative perceptions of students about certain subjects usually affect their performance. Thus most of the students will not perform well in mathematics because they perceive mathematics to be difficult. 246 (82%) of the students affirmed that, they personally did not get enough time to study mathematics at home. though 52 (17.3%) of them disagreed with this position. The result still brings to light two things. Firstly, either students are engaged in domestic chores that do not permit them to study at home or work load on them from school is too much for them. When any of these happens, students will not find time to study at home Secondly, the result suggests that teachers and parents need to work together to resolve students' learning impediments. Lack of attention for learners needs, lack of teaching learning resources, students fear for the study of mathematics as identified in Tables 3 and 4 may probably account for 194 (64.7%) respondents' preference for the study of subjects other than mathematics. Though 97 (32.3%) of them disagreed with the claim that they prefer other subjects to mathematics. The result actually shows that some students at the SHS level do not like studying mathematics for varied reasons. Table 5 also shows that 214 (71.3%) of the respondents had a notion that mathematics will be needed in the future careers they would like to pursue. 77 (25.7%) of the respondents indicated they may not need elective mathematics. The result clearly shows that generally students know the relevance of mathematics in their academic pursuit. What is left is for teachers and other stakeholders to encourage students to study mathematics well. Finally, in Table 5, 271 (90.3%) of the students indicated they do not have any physical or biological defects that prevent them from studying mathematics. 28 (9.3%) of them indicated that they have biological or personal defects and that prevents them from studying mathematics. According to Car (2004) physical defects such as sight problem, hearing impairment, chronic sicknesses or diseases to mention a few usually make learning more difficult for students. This means that all students who indicated that they have some physical challenges are likely to find the study of mathematics and other subjects very difficult.

Table 6: Factors affecting the learning of Elective Mathematics

	Demographic Factors	Instructional Factors	Individual Factors
MEAN	**2.84**	**3.06**	**2.64**
STANDARD DEVIATION	**1.204**	**1.083**	**1.182**

As indicated in Table 6, instructional factors are the major factors affecting the learning of Elective Mathematics with mean 3.06. This revelation goes to confirm that the duration for SHS programme should be increased as periods allotted for various subjects and Elective mathematics in particular are woefully inadequate. All the factors discussed under instruction give clear indication that all stakeholders in education have important roles to play if SHS education is the country's priority.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Main Findings

Students at the SHS level in Upper East Region are generally in their reformatory stages because majority of them are teenagers. There is however certain demographic, instructional and individual factors that negatively affect their learning of elective mathematics. Lack of people who will aid them to do their assignments at home, insufficient periods allocated for the teaching of elective mathematics subject , lack of use of audio-visual materials by elective mathematics teachers, mathematics teachers not having enough time for individual learning needs and large class size militate against students learning of elective mathematics.

Inadequate instructional time is one of the key instructional challenges that hinder student learning of elective mathematics. Due to this factor teachers and students are usually unable to complete their elective mathematics syllabus. Most schools in the Bolgatanga Municipality do not have requisite teaching learning resources. Teachers teach elective mathematics concepts in abstract manner. This practice does not only make students lack proper understanding of mathematics concepts but also creates in them a burning desire to distaste the study of mathematics. Contrary, the use of activity method and audio-visual for the teaching of mathematics make the subject more interesting and understandable to students. Teachers' inability to address students' individual learning needs often dissuades them form studying mathematics. Other factors include individual or personal: fear for the subject results into dislike for elective mathematics, students perception about mathematics as a difficult subject and lack of time to learn at home. These factors in addition to students' preferences for other subjects and physical or biological defects on students tend to negatively affect students learning of mathematics.

CONCLUSION

From the findings of the study, the following conclusions were drawn:

1. SHS students in the Bolgatanga municipality are faced with numerous challenges in their quest to study Elective mathematics. They normally lack adequate parental advice and support and lack of learning resources. Elective mathematics teachers use abstract instructional approaches for teaching.
2. Most students have developed some form of dislike for elective mathematics for various reasons. Teachers inabilities to use appropriate teaching methods, and the perception of students' parents that mathematics is for a specific gender hinder students performances.

Recommendations

The following recommendations were made by the researcher.

1. The Ghana education service and other stakeholders in education should provide Senior High Schools in the region with adequate and appropriate teaching learning resources for the teaching of all subjects.
2. The Ghana Education Service and the government should conduct more public education on gender issues so as to sensitize parents and their wards on the negative effects of gender stereotyping in the development of students.
3. Counseling units of various SHS should be strengthened to counsel students on the need to develop positive attitudes toward the study of elective mathematics.
4. Parents must always communicate with their wards and teachers so that they may be abreast with the learning challenges of their wards and find appropriate support and advice.

Areas for further research

The following areas were suggested for further research:

1. Further research should look at the factors that positively affect students learning of mathematics. This will help stakeholders to uncover appropriate ways that can be used to teach students mathematics at the SHS level.
2. There could also be a replication of the current study on national wide basis by the Ghana Education Service or any interested organization. This will help provide a more in-depth study into issues relating to students learning of mathematics.

REFERENCES

Bloom, B. & Coleman (2006). *Human Characteristics and School Learning*. New York: McGraw Hill, Inc.

Brown, A. L., and Campione, J.C. (2005). *Guided Discovery in a Community of Learners in Classroom Lessons*: Integrating Cognitive Theory and Classroom Practice, K. McGilly, ed. Cambridge, MA: MIT Press.

Burton, L. (2004). *Mathematics as enquirers; Learning about Learning Mathematics.* N.Y: Kluver

Carr, M. (2004). *Motivation in Mathematics.* New York: Hampton Press, Inc.

Campbell, P. B. (1999). *Redefining The "Girl problem" In Mathematics*. In W. G. Secada, E. Fennema, & L. B. Adjian (Eds.), New directions for equity in mathematics education Cambridge: Cambridge University Press.

Cob, P., (2002). *A Constructivist Alternative to the Representational View of Mind in Mathematics Education.* Journal for Research in Mathematics Education

Coleman, J. S. (2006). *Equality of Educational Opportunity*. Washington, DC: U.S. Government Printing Office.

Dewey, (2000). *Teachers' sources and uses of assessment information*. In D. F. Robitaille & A. E. Beaton (Eds.), Secondary analysis of the TIMSS data. Boston, MA: Kluwer Academie Publishers.

Drayer, (2003). *Human Characteristics and School Learning*. New York: McGraw Hill, Inc.

Epstein, J. L. (2003). *Effects on student achievement of teachers' practices of parent Involvement.* In S.B. Silvern (Ed.), Advances in readings/language research (5th ed., pp. 276). Greenwich, CT: JAI Press.

Geary & Haneson (2000). *Improving Mathematics and Sex achievement of American Children.* Psychology Roles Education Directorate.

Harner, D. P. (1998). *Effects of Thermal Environment on Learning Skills*. CEFP Journal (12).

Highet, J. (2005). *Socioeconomic Status and Native Education*. Canadian Journal of Native Education.

Hopkins, K. B., McGillicuddy –De Lisi, A. V., & De Lisi, R. (1997). Student *Gender And Teaching Methods as Sources of Variability in Children's Computational Arithmetic Performance*. The Journal of Genetic Psychology, 158, 333-345.

Jeynes, W. H. (2002). *Examining the Effects of Parental Absence on the Academic Achievement of Adolescents:* The Challenge of Controlling for Family Income. Journal of Family and Economic Issues, 23 (2), 189-210.

Knowles, M. (2001). *Self-Directed Learning:* A Guide for Learners and Teachers. New York: Association Press.

Larson, A. (2000). *Social class differences in family-school relationships:* The importance of Cultural capital. Sociology of Education, 60,73-85.

Lehrer, R., and Chazan, D. (2000). *Designing learning environments for developing understanding of geometry and space.* Mahwah, NJ: Erlbaum.

Lockheed, M.E., Thorpe, M., Brooks- Gunn, J., Casserly, P., & McAloon, A. (2002). *Sex and Ethnic Differences in Middle School Mathematics, Science and Computer Science:* What Do We Know? Princeton, NJ: Educational Testing Service.

McNeal, (2001). *Predictors of math anxiety and its influence on young adolescent's course enrollment intentions and performance in mathematics*. Journal of Educational Psychology

Pintrich, & Schunch (2002). *Bridging the Gaps in Perspectives on Equity in Mathematics Education.* Journal for Research in Mathematics Education

Salmon, (2001). *Bridging the Gaps in Perspectives on Equity in Mathematics Education.* Journal for Research in Mathematics Education.

Stevenson & Baker, (2005). *Mathematics achievement in the primary school year:* IEAs Third International and Mathematics and Science Study. Chestnut Hill, MA: Boston College.