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Exploring the Perceptions and Interest of Senior High School Students' Achievement in Mathematics at Adansi-North, Ghana

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Abstract: **The study aimed to investigate perception and interest on Senior High School student's achievement in mathematics. Three public Senior High Schools in the Adansi North District were selected and analyzed using a quantitative technique. The research study employed Constructivism and Theory of Planned behavior (TPB) frameworks. The study involved three hundred (300) Form three (3) students, with hundred (100) students from each school. Primary data was collected through questionnaires and employed descriptive and inferential statistics. The study found that various factors contribute to students' perceptions in mathematics, including self-confidence, interest, teacher motivation, subject difficulty, myths, and perceived usefulness. Students' perceptions were formed by themselves, peers, and past educational experiences. The majority of students' interest in maths was getting a passing score. The study found a statistically significant negative correlation between students' perception and their interest. It is recommended that teachers build students' confidence, provide more examples, exercises, and assignments for practice. It also called for educators, parents, peers, and society to help students develop positive attitudes towards mathematics from the beginning of their education. There is also the need for educators to be abreast with the Theory of Planned Behavior in order to address students' behavior. The study limited itself to three hundred (300) students, quantitative approach was adopted and the instrument used was a questionnaire. Although, Adansi North and the student's population in the schools are heterogeneous, there is limitation to the degree of generalizability of the findings. Subsequent investigations should priorities the examination of alternative geographical areas in order to augment the applicability and generalizability of the research outcomes. Additionally, it is imperative to incorporate other methodologies, like the mixed methods or qualitative approaches, in order to delve deeper into the correlation between students' mathematical perceptions and interest on their academic achievement in different settings.**

Keywords: **Perception, Interest, Correlation, Attitude, Relationship, Constructivism, Behavior, Achievement.**

1. INTRODUCTION

Mathematics is a fundamental discipline taught globally, with the primary objective of providing students with cognitive abilities for critical thinking and informed judgments (Murugan and Rajoo, 2013; Hagan et al., 2020). The achievement of children in mathematics holds significant implications for their future prospects and the overall welfare of the nation

(Acheampong et al. (2022). Many nations prioritize mathematics education, with a C6 in core mathematics required for university admission in Ghana (Orton et al., 2004; Butakor, 2016; Asamoah, 2022). However, academic achievement in mathematics has consistently fallen behind other subjects. This is often due to students' perceptions of the subject, which can be influenced by their experiences during the initial phases of their educational journey (Asomah, Wilmot, and Ntow, 2018). Factors such as the learning environment, upbringing, and stereotypes about mathematics contribute to students' aversion to the subject. (Koce et al., 2009; Tahar et al., 2010; Tezer & Karasel, 2010; Hagan et al., 2020).

Students' perceptions of mathematics are shaped by factors such as instructors' instructional delivery (Javed et al., 2021), classroom management strategies, students' motivation, and teachers' leadership authority (Zakaria et al., 2010; Aguilar et at., 2012; Mutodi & Hlanganipai, 2014). The use of instructional resources, particularly textbooks, and the effectiveness of teachers also significantly impact students' academic achievement (Kwasi et al., 2015; Arthur et al., 2017). The TIMSS report of 2019 found a significant correlation between a positive attitude towards learning mathematics and a sense of self-assurance in mathematics, leading to greater levels of academic accomplishment in the subject. Therefore, it is crucial to address these factors to improve students' academic performance in mathematics.

Mathematics plays a crucial role in scientific and technical advancement, as well as academic achievement (Kabeera, 2018; Bakker et al., 2021; Rezate et al., 2021, Chand et al., 2021; Nathenson & Chapman, 2023). It is essential for exploring scientific concepts and formulating novel methodologies, leading to the generation of unique ideas and advancements. Students in Adansi North's Senior High School program face challenges in achieving high scores in mathematics, with a significant proportion of candidates showing inadequate performance in Core Mathematics, hindering their ability to pursue further education at the tertiary level (Saritas & Akdemir, 2009; Hakimi et al., 2021; Atoyebi et al., 2022; Acheampong et al., 2022).

Several factors influence students' interest in mathematics, including teacher preparation, emphasis on lower-order cognitive skills, inconsistent homework implementation, lack of active student engagement, and achievement gaps among female students. However, the impact of these factors on students' mathematical learning capacities remains uncertain. Studies have examined students' perceptions of mathematics (Butakor et al., 2017; Hakimi et al., 2021; Atoyebi et al., 2022; Liu et al., 2022), but these studies have not sufficiently investigated the determinants that contribute to the diverse range of perceptions. Salifu and Bakari (2022) investigated the relationship between students' perception, interest, and mathematics achievement in the Savanna Region of Ghana, specifically in the Bole district. They found that students held a predominantly negative perception of mathematics, while their interest in the subject was generally positive.

However, the findings lack generalizability as they only pertain to a distinct metropolitan population. The researchers suggest conducting a comparative study in various regions of Ghana to gain further insights into the impact of students' perception and interest on their mathematics achievement. Adansi North in the Ashanti Region became an appropriate setting to explore this issue.

Objectives of the study

The study aimed to investigate perception and interest on Senior High School Students achievement in Mathematics. Specifically, the study sought to;

1. identify the perceptions of Senior High School student's achievement on mathematics;

2. identify the influencing factors of Senior High School students' perception of mathematics;

3. explore students' interest towards achievement in mathematics

Research Questions

1. What are the various perceptions of SHS student's achievement on mathematics?

2. What are the influencing factors of students' perception of mathematics?

3. What is the interest of students' achievement in Mathematics?

Hypothesis

H_0: There is no statistically significant relationship between students' perception in mathematics achievement and their interest in mathematics.

The study's relevance is evaluated across three domains: practical application, policy formulation, and scholarly discourse. This study serves as a valuable resource for educational practitioners, providing insights into the unfavorable opinions that students have towards mathematics and the many variables that hinder their progress in the subject.

2. LITERATURE REVIEW

Perception and attitude are two distinct constructs (Rathus, 2016; Goldstein, 2019). Perception involves cognitive processes for understanding sensory information (Goldstein, 2019), while attitude refers to emotional reactions elicited by stimuli shaped by an individual's beliefs and past experiences (McLeod, 2019). Perception is crucial for developing attitudes, enabling individuals to form opinions and evaluations. Attitudes can also influence perception by influencing how individuals interpret sensory information. The study uses the term "perception" to encompass attitudes, perspectives, beliefs, and opinions, specifically regarding an individual's attitude or viewpoint about mathematics and its related matters (Carlson (2014; Eysenck and Keane, 2015; Rathus, 2016; Goldstein, 2019; McLeod, 2019).

Mathematics Education in Ghana

Mathematics is a crucial aspect of comprehensive education, particularly in Ghana, where it is widely used by academics and professionals across various disciplines (Bairwa, 2022). The Third Wave Project in 2008 provided a comprehensive investigation into students' priorities in effective mathematics education, emphasizing the need for international comparative educational assessment in mathematics. (Seah and Wong, 2012)

In Ghana, elective mathematics is compulsory for all students in the second cycle but optional in business, scientific, and arts tracks. Mathematics has emerged as a field of inquiry that can be applied across various academic disciplines (Davis et al., 2019). However, there is a limited use of information and communication technologies in mathematics instruction, with calculators being prevalent in secondary school but seldom in primary school settings (Mereku & Mereku, 2015). Elementary teachers possess comprehensive education backgrounds, while junior high school and senior high school teachers often have specialized expertise in their subject areas. Post-secondary mathematics education requires a deeper level of knowledge and experience, often at the doctoral level (Davis et al., 2019). Students engaged in mathematics study at this level delve deeper into the subject matter compared to their previous experiences at the secondary school level.

The educational journey offers students a range of experiences that shape their perception, leading to preferences for certain courses while harboring disinterest towards others. Students' attitudes towards specific subjects can be influenced by factors such as interest generated by the subject or instructor, comprehension ability, subject matter nature, and class timing (Ghasemi et al., 2019). In conclusion, mathematics is a subject with varying perspectives and attitudes towards its study, particularly in Ghana. Addressing these challenges is essential for improving the quality of mathematics education in Ghana.

Perceptions and Attitude of Students towards Mathematics in Ghana

Attitude towards mathematics is a complex phenomenon that includes an individual's evaluation of their affinity or aversion towards the subject, their inclination to participate in or evade activities associated with the study or application of mathematics, their perception of their proficiency in the subject, and their belief in the utility of mathematics (Lawer et al., 2022). Factors contributing to individuals' unfavorable perceptions of mathematics include beliefs, experiences, motivation, and related aspects (Zcan et al., 2019; Lutovac, 2020). Maths anxiety and maths dread are components of an individual's cognitive and emotional disposition towards the subject (Hansen, 2020). These attitudes according to Aguilar et al. (2012) can be shaped through cognitive, emotional, and behavioral components. Also, exposure to positive experiences within the discipline and positive reinforcement can enhance an individual's disposition towards mathematics (Mutodi, 2014).

Students' perspectives and attitudes towards the study of mathematics are influenced by their previous encounters with cognitive and emotive aspects. The prevailing attitudes and misconceptions around mathematics among students globally tend to be largely unfavorable, with many recognizing that mathematics is challenging, rigid, theoretical, and predominantly associated with masculinity (Kidd, 2003; Mensah et al., 2013). Educators and instructors strive to explain this phenomenon within the context of prevailing principles or narratives in mathematics, which posit that the study of mathematics is contingent upon inherent aptitude rather than exerted diligence. Many students perceive their subpar arithmetic performance as an enduring condition that is outside their sphere of influence (Aguilar et al., 2012). Studies have found that students' views and misconceptions can either enhance or impede the process of acquiring mathematical knowledge. (Farooq and Shah, 2008; Mutodi and Ngirande, 2014; Asiedu-Addo, Assuaha, and Arthur, 2017; Salifu and Bakari, 2022).

The Perceptions of Senior High School Students Achievement on Mathematics

Mathematics is a fundamental competency in various occupational domains and is recognized as a catalyst for economic advancement and global competitiveness (World Economic Forum, 2018). However, there has been a worldwide decrease in students' enthusiasm and achievement in mathematics. The implementation of the Senior High School (SHS) system in Ghana in 2007 aimed to enhance the provision of high-quality education to students, but the attitudes of students towards mathematics within the secondary high school system have exhibited a range of responses.

Agyei and Agyei (2020) found that secondary school students in Ghana had a favorable attitude towards mathematics, with over 60% of participants expressing enjoyment and interest in the subject matter. However, Eshun et al. (2018) revealed that a significant number of students had unfavorable views towards mathematics, attributed to factors such as lack of interest, perceived difficulty, and perceived lack of relevance to everyday life. Kweku and Kwapong (2018) found that 72% of senior high school students held a pessimistic view of mathematics, while only 28% maintained a positive impression, often viewing it as a challenging academic discipline. Comparative research by Owusu-Ansah et al. (2021) found that Ghanaian senior high school students had a comparatively more unfavorable attitude towards mathematics compared to their counterparts from South Africa, Tanzania, and Uganda.

Internationally, research has indicated varying attitudes towards mathematics among students. In Indonesia, Oktaviyanthi et al. (2020) found that students held a favorable impression of mathematics, while Karadeniz and Yavuz (2019) found that students had a positive perception of mathematics. The Organization for Economic Co-operation and Development (OECD, 2019) found that students in OECD nations generally had a neutral disposition towards mathematics, with no notable disparities across genders.

In conclusion, perceptions of Senior High School students towards mathematics can vary depending on factors such as cultural context, pedagogical approaches, and individual student characteristics. Further research was needed to better understand the underlying factors that influence these attitudes, particularly in Adansi North District.

The Influencing Factors of SHS Students' Perception of Mathematics

The perception of mathematics among senior high school students in Ghana and globally is influenced by various factors. These include teaching methods, teacher competency, curriculum content and relevance, gender stereotypes and cultural beliefs, peer influence and social support, and past academic success (Agyei and Dwumah, 2019; Agyei and Agyei, 2020).

Teaching methods and teacher competency are crucial for students' enjoyment and interest in the discipline (Kamarudin et al., 2020). Positive interactions with teachers and enjoyment of the classroom setting have been shown to enhance students' attitudes towards mathematics (Kweku and Kwapong, 2018). In Malaysia, Kamarudin et al. (2020) found that students' unfavorable view of mathematics was attributed to their perception of their professors as lacking expertise and competence. Students in Ghana express challenges in comprehending mathematics due to its perceived abstract nature and lack of applicability to their everyday experiences (Agyei and Dwumah, 2019).

Gender stereotypes and cultural beliefs also influence students' perceptions of mathematics. Hill et al. (2019) concurred that female students in the United Kingdom have a less positive disposition towards mathematics compared to their male peers, attributed to the widespread bias that mathematics is predominantly suitable for guys. In Malaysia, negative perceptions of mathematics among students were influenced by cultural perspectives that see the discipline as difficult and suitable only for persons with exceptional abilities (Kamarudin et al., 2020). Peer influence and social support have been found to significantly influence students' cognitive interpretation of the subject of mathematics (Agyei and Agyei, 2020). Parental involvement and participation in extracurricular activities have been found to be key factors in students' cognitive interpretation of the subject (Kwesi et al., 2015). Additionally, learners who receive assistance and motivation from their parents have a more favorable disposition towards the subject (Wigfield & Eccles, 2000; OECD, 2015; Opoku and Ofori, 2018).

Relationship of Students' Perception of Mathematics and their Interest in Mathematics

Numerous studies have explored the relationship between students' perception of mathematics and their interest and academic achievement. In Ghana, the low academic achievement in this subject has led to a growing concern about students' perception of mathematics. Research by Akyeampong et al. (2013), Owusu-Acheaw and Oduro (2017), Iddrisu and Oduro

(2017), Salifu and Bakari (2022), Adepoju et al. (2020), Diezmann and Watters (2000), Muijs and Reynolds (2011), Hong and Choi (2015), and Wang and Gu (2017) have all found that students with a positive perception of mathematics are more likely to engage in math-related activities, attend supplementary classes, and engage in problem-solving exercises. Adepoju et al. (2020) found a significant positive association between students' perception of mathematics and their academic performance.

Hong and Choi (2015) and Wang and Gu (2017) also found that students with a positive perception of mathematics had a higher inclination towards the subject, allocated more time to studying it, employed more efficient learning techniques, and achieved superior academic performance in the discipline. These findings highlight the importance of educators paying attention to students' perception of mathematics and designing interventions that can improve their interest and performance in the subject.

Theoretical Review

The Constructivism learning theory and the Theory of Planned Behavior are two approaches to education that emphasize the active involvement of learners in the process of developing knowledge and understanding. Constructivism is rooted in the contributions of philosophers like John Dewey and Jean Piaget, who believed that students must actively participate in real-world experiences to construct knowledge effectively. Contemporary scholars have further developed these concepts, emphasizing the importance of social interaction and collaborative processes in the learning experience (Piaget, 1952; Vygotsky, 1978; Gijbels, Dochy, & Bossche, 2015; Jonassen, 2018).

Constructivism is essential in modern teaching and learning pedagogies, as it can be effectively implemented across diverse educational contexts. Perception is an intricate and dynamic process, influenced by external stimuli and internal hypotheses, expectations, and knowledge (Jonassen, 2018). Motivation and emotions also play a significant role in shaping this perceptual process. Pedagogical methodologies rooted in constructivism focus on active participation, hands-on experiences, inquiry-based tasks, and collaborative interactions among peers. The objective of constructivist education is to develop proactive and involved learners capable of applying their knowledge and comprehension to resolve issues and make informed decisions within authentic contexts (Dagar and Yadav, 2016; Jonassen, 2018)

The Theory of Planned behavior (TPB) by Ajzen (2011) proposes three categories of considerations that influence human behavior: behavioral beliefs, normative beliefs, and control beliefs. An individual's perception of their level of control over their actions is influenced by their behavioral beliefs, normative views, and control beliefs (Ajzen & Schmidt, 2020). TPB acknowledges the influence of knowledge, beliefs, values, and norms on conduct and acknowledges that perceptions can be formed without direct experience or information. As students gain a deeper understanding of mathematics, their confidence and clarity in their perspectives and perceptions increase. First-hand experiential knowledge has been shown to have a greater likelihood of influencing behavior in the context of mathematical problems (Ajzen, 2011; Ajzen & Schmidt, 2020).

3. METHODOLOGY

This work was influenced by the positivist philosophy, which posits that reality is stable and can be objectively seen and characterized (Levin, 1988; Saunders et al., 2019). Collins (2010) asserts that positivism espouses the perspective that alone empirical information acquired by sensory observation, including measurement, is deemed reliable (Kuwornu-Adjaottor, 2020). The utilization of a quantitative research technique was required. Creswell and Creswell (2017) posit that quantitative research methods aim to establish the association between two variables, often known as the dependent and independent variables, via the use of statistical models and formulas. Similarly, Saunders et al. (2019) argued that quantitative research studies contribute to the enhancement of accuracy, dependability, and generalizability of research findings by formulating testable hypotheses and theories that may be applied to a broader context (Adedoyin, 2020)

The research employed a descriptive correlational survey methodology, which aligns with the viewpoints of Wasike, Ndurumo, and Kisilu (2013) who argue that descriptive survey methods are effective in gathering descriptive data on demographic characteristics, prevailing practices, and existing circumstances or requirements. According to Queirós et al. (2017), surveys are a research methodology that facilitates the direct gathering of data from individuals engaged in the study through a structured series of questions presented in a predetermined sequence. According to Emaikwu (2012, as referenced in Salifu & Bukari, 2022), a correlation survey aims to identify a link between two or more variables. Therefore, this particular design was deemed suitable considering the interplay between perception and interest in the field of mathematics.

The research design employed in this study was cross-sectional in nature, since it entailed the simultaneous collection of views from various respondents at a certain point in time, rather than over an extended period (longitudinal). Additionally, it is worth noting that the problem under investigation in this study could not be directly seen, as supported by the works of Best and Kahn (1993), Yin (1994), and Creswell and Creswell (2017). In the work of Saunders et al. (2019), positivist philosophers are commonly associated with deductive reasoning. The study utilized the deductive research method as it aimed to examine an established theory, in contrast to the inductive reasoning approach.

The primary focus of scholarly investigations pertaining to students in Ghana has predominantly centered around urban areas. As a result, the researchers considered it crucial to examine this research problem within the context of mixed-ability schools situated in a socioeconomically challenged area characterized by diversity. The selection of the study area was also influenced by the researchers' extensive experience within the district, which allowed for the identification of the research topic over the course of teaching experience. The research was conducted in the Adansi North District, located in the Ashanti region. The Adansi North District is among the 254 districts of Ghana, which encompasses the 38 recently established districts in the year 2018. This particular district is classified as one of the 43 administrative districts under the Ashanti Region.

The study focused on the form three students enrolled in three senior high schools located in Adansi North, specifically Dompoase, Fomena TI Ahmadiyya, and Asare Bediako SHS. The Form three students were intentionally selected as the focus group due to their extensive exposure to the Mathematics Curriculum, their participation in several performance assessments, and the development of a certain mathematical viewpoint. The enrollment statistics obtained from the three chosen Senior High Schools (SHS) revealed that the average number of students in Form 3 was 1000. Consequently, a total of 300 students made up of 52.0% (N=156) males and 48.0% (N=144) females with an average age of 18 years were selected as the sample size for this study, based on the sample size calculation method proposed by Krejcie and Morgan (1970). Given that the schools operated on structured programming, a purposive sample approach was employed to meticulously choose 100 participants from each school, so ensuring equitable representation. The researchers utilized the simple random sampling method to select participants from the various academic programs, including General Arts, General Science, Home Economics, Agricultural Science, Business, and Visual Arts. This technique was chosen because it provides an equal opportunity for all potential respondents within the target population to be selected (Saunders et al., 2019).

The primary data was collected through the administration of questionnaires dubbed "Perceptions and Interest in Mathematics Questionnaire" (PIMQ). As stated by Salkind (2010), research instruments refer to the tools or methods employed by researchers to quantify variables or items of significance throughout the process of data collection. According to Salkind (2010), it is essential for researchers to ensure that the development of research instruments is congruent with their awareness of addressing concerns related to internal validity. The Perceptions and Interest in Mathematics Questionnaire" (PIMQ) was also adapted Hagan et al. (2020), Fekumo & Omeka (2022), Salifu & Bakari (2022) and Edo et al. (2023) proposed perception and interest items. There were 51 items; reflecting students' perception and interest towards mathematics. The participants were asked to rate the items using a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), to indicate their opinion.

To ensure validity and reliability, the Perceptions and Interest in Mathematics Questionnaire" (PIMQ) was adapted. The instruments were given to experts with requisite expertise and experience in Mathematics Education and have taught mathematics over 10 years for scrutiny and vetting. Their recommendations were enough basis for its validity. A pilot survey was also carried out in Bekwai SDA SHS in the Bekwai Municipality of Ashanti Region with similar characteristics as the Adansi North District. This helped to determine; how straightforward the questions were; the average time needed to answer the items, and typographical errors or issues. In addition, the Cronbach alpha coefficient was employed to assess the reliability of the questionnaires. The resultant coefficient of 0.84 indicated that the questions exhibited a high level of accuracy, thus confirming their suitability for use in the primary investigation.

Prior permission and approval were sought from the Adansi North District Director of Education and the Headmasters of the Senior High Schools (SHS) that participated in the study. Approval was given by these bodies of concern before data collection began. Data collection was done by the researchers, supported by the Head of Mathematics Departments for the various schools and two mathematics teachers from each school. The field assistants however, were oriented on the purpose of the study and how the research instruments administration was to be carried out. Measures such as not allowing

respondents to write their names on the items were put in place to protect their confidentiality, consent of respondents were sought and not coerced against their will in order to respond to the issues raised in the research tools. Also, all other ethical guidelines were dully followed. As a cross-sectional study, a day (maximum of 3 hours) each was used to collect the data from the three schools.

Data analysis followed the data collection process. All inconsistency in the answering of the PIMQ were addressed, accurate sorting and coding process were followed and the results were entered into the Statistical Package for Social Sciences application software (SPSS, version 27.0) for analysis. The nature of the study been quantitative gave way to the use of both descriptive and inferential statistics. Descriptive statistics comprising of means and standard deviations [using the criterion mean score of 3.0 on a 5-point rating system for decision making; Kumi & Wonu (2021)] were used to analyses objective one, two and three which looked into identifying the various perceptions of Senior High School students on mathematics, identifying the influencing factors of Senior High School students' perception of mathematics and exploring students' interest towards mathematics respectively. The research hypothesis required an inferential statistics analysis hence the Pearson moment correlation was employed to examine the relationship of students' perception of mathematics on their interest in Mathematics.

4. RESULTS

Perceptions of Senior High School Students on Mathematics

The various perception constructs of respondents were categorized under Self Confidence, Teachers' Motivation, Teacher Competence/Quality, Difficulties or Challenges in Learning Mathematics, Myths and Beliefs and Usefulness of Mathematics. The results are presented in Table 1.

Table 1: Descriptive statistical analyses of Various perceptions of SHS students on mathematics

Variables	SD N(%)	D N(%)	U N(%)	A N(%)	SA N(%)	Mean (Std Dev)
Students' Self Confidence						
No matter how I prepare, I am still not confident taking a maths test	49(16.3)	99(33.0)	17(5.7)	79 (26.3)	56(18.7)	2.98 (1.41)
I am always not confident answering mathematics questions in class	69(23.0)	101(33.7)	0(0.0)	96(32.0)	34(11.3)	2.75 (1.41)
Even if the concepts in maths class are hard, I can learn them	76(25.3)	57(19.0)	47(15.7)	80(26.7)	40(13.3)	2.84 (1.41)
I avoid solving maths problems when possible	83(27.7)	52(17.3)	21(7.0)	107(35.7)	37(12.3)	2.88 (1.46)
Perceived Teachers' Motivation						
My maths teacher(s) makes me believe I can study maths and do well	10(3.3)	28(9.3)	5(1.7)	119 (39.7)	138(46.0)	4.16 (1.06)
My maths teacher(s) motivates the class in various ways to make us learn maths	15(5.0)	44(14.7)	0(0.0)	94(31.3)	147(49.0)	4.05 (1.23)
Perceived Teacher Competence/Quality						
My maths teacher(s) have been unsuccessful with helping me learn maths	128(42.7)	77(25.7)	11(3.6)	41(13.7)	43(14.3)	2.31 (1.49)
I like maths because my teacher is able to articulate maths contents very well	51(17.0)	63(21.0)	40(13.3)	82(27.3)	64(21.3)	3.15 (1.41)
I do not like maths because my maths teacher is unable to articulate its content well	88(29.3)	62(20.7)	31(10.3)	47(15.7)	72(24.0)	2.84 (1.58)

Difficulties or Challenges in Learning Mathematics						
I often have difficulty organizing my thoughts during a mathematics test	35(11.7)	35(11.7)	15(5.0)	125(41.7)	90(30.0)	3.67 (1.33)
I feel I am not involved in the teaching and learning process	81(27.0)	116(38.7)	8(2.7)	52(17.3)	43(14.3)	2.53 (1.42)
I have difficulty understanding certain topics in maths	10(3.3)	9(3.0)	0(0.0)	140(46.7)	141(47.0)	4.37 (0.70)
I have difficulty understanding all topics in mathematics	62(20.7)	88(29.3)	19(6.3)	78(26.0)	53(17.7)	2.91 (1.44)
After I study a topic in maths and feel I understand it, I have difficulty solving problems on the same topic	9(3.0)	64(21.3)	0(0.0)	98(32.7)	129(43.0)	3.91 (1.25)
If I am stuck on a maths problem for more than ten minutes, I give up or get help from someone else	20(6.7)	12(4.0)	6(2.0)	145(48.3)	117(39.0)	4.09 (1.08)
Myths and Beliefs						
Being good at maths requires natural (i.e., innate, inborn) intelligence in maths	91(30.3)	35(11.7)	23(7.7)	70(23.3)	81(27.0)	3.05 (1.63)
For each person, there are maths concepts that would never be able to understand, even if they tried	49(16.3)	61(20.3)	16(5.3)	92(30.7)	82(27.3)	3.32 (1.47)
Maths is mainly about having a good memory	57(19.0)	27(9.0)	14(4.7)	124(41.3)	78(26.0)	3.46 (1.45)
Only very intelligent students can understand maths.	154(51.3)	59(19.7)	4(1.3)	28(9.3)	55(18.3)	2.24 (1.58)
I believe I can get better at maths	13(4.3)	4(1.3)	22(7.3)	114(38.0)	147(49.0)	4.26 (0.97)
Mathematics is for boys and not girls	194(64.7)	39(13.0)	5(1.7)	19(6.3)	43(14.3)	1.93 (1.49)
Boys do better in maths than girls.	163(54.3)	42(14.0)	17(5.7)	34(11.3)	44(14.7)	2.18 (1.53)
Usefulness of Mathematics						
Maths has no use outside of school	186(62.0)	55(18.3)	0(0.0)	38(12.7)	21(7.0)	1.84 (1.31)
Maths has no relevance in my life	155(51.7)	72(24.0)	21(7.0)	38(12.7)	14(4.7)	1.95 (1.23)
Doing well in maths can help me get a good job after school	31(10.3)	26(8.7)	17(5.7)	120(40.0)	106(35.3)	3.81 (1.29)
I can use what I learn in maths class in other subjects	51(17.0)	40(13.3)	10(3.3)	143(47.7)	56(18.7)	3.38 (1.38)

**** SD=Strongly Disagree, D=Disagree, U=Undecided, A=Agree, SA=Strongly Agree***

On self-confidence, 45.0% of the respondents agreed that no matter how they prepare, they were still not confident taking a maths test. More than 43% of the Senior High School students agreed to lack self-confidence in taking a maths test or answering a maths question in class. Also, more than 44% of respondents disagreed that even if the concepts in maths class are hard, they could learn them. Consequently, 48.0% agreed that they avoid solving mathematics problems when possible. Irrespective, majority of the respondents' responses affirmed that they possessed the self-confidence in Mathematics.

In terms of teacher motivation, more than 85% of the students agreed that their mathematics teacher(s) made them believe they could study Mathematics and do well, 80.3% agreed that their mathematics teacher(s) motivated the class in various ways to make them learn the subject. The study further ascertained students' perception on mathematics teacher(s)' competence or quality and realized that more than 68% disagreed to the assertion that their maths teacher(s) have been unsuccessful with helping them learn maths and about 49% agreed that they liked maths because their teacher was able to articulate maths contents very well, whiles 50.0% disagreed that they do not like maths because their maths teacher was unable to articulate its content well. The results indicated that mathematics teachers possess the competence and also motivate students to learn the subject.

On perceived challenges/difficulties in learning mathematics, 71.7% of the respondents agreed that they often have difficulties organizing their thoughts during a mathematics test whereas 93.7%, of the respondents agreed that they have difficulty understanding certain topics but half of the respondents (50.0%) disagreed to having difficulty in understanding all topics in mathematics. Majority of the respondents (75.7%) were of the perception that after they study a topic in maths and feel they understood it, they have difficulty solving problems on the same topic. Also, majority of the students (87.3%) agreed that if they get stuck on a maths problem for more than ten minutes, they give up or get help from someone else. Irrespective of these challenges, mathematics teachers were not blamed on the teaching process and learning as 66% disagreed that they feel they are not involved in the teaching and learning process.

The results on the myths/beliefs perceived by students showed that 50.3% of the respondents agreed to the myth that being good at maths required natural (i.e., innate, inborn) intelligence in maths. Also, 58% of the respondents agreed to the myth that for each person, there are maths concepts that they would never be able to understand, even if they tried. The belief that Maths is mainly about having a good memory was agreed to by 67.3% of the respondents. However, majority of the respondents disagreed (71.0%) to the belief that only very intelligent students can understand maths and 87% were of believe that they can get better at maths.

On the myth that Mathematics is for boys and not girls (77.7%) and boys do better in maths than girls (68.3%), majority of the respondents disagreed. In terms of usefulness, the study ascertained that majority of the respondents strongly agreed (75.3%) that doing well in maths could help them get a good job after school and they could use what they learn in maths class in other subjects whereas, Maths has no use outside of school and Maths has no relevance in their life, were strongly disagreed by 80.3% and 75.7% respectively.

Research question two was on the influencing factors of senior high school students' perception of mathematics. Descriptive Statistics Table 2 delved into the factors that might have contributed to the perceptions formed by students about mathematics.

Table 2: Influencing Factors of Senior High School Students' Perception of Mathematics

Statements	Mean	Std Dev.
The experiences I went through at the early stages of my educational life made me form these perceptions about maths	3.24	1.39
My parents contribute(d) to these perceptions I have about maths	2.60	1.39
My teachers make(de) me form these perceptions about maths	2.86	1.39
The society in general contribute greatly to the perceptions I have about maths	2.70	1.33
My peers influence(d) me to form perceptions about maths	3.00	1.46
I formed these perceptions about maths myself	3.28	1.44
Age plays a major role in how one perceives maths	2.31	1.33
When I was younger, my perceptions about maths were positive than now	3.56	1.40
When I was younger, my perceptions about maths were negative than now	2.03	1.23
My performance in maths was better when I was younger than now	3.22	1.48
Gender plays a role in how people perceive maths	2.03	1.16
Boys generally have positive perception towards maths than girls	2.43	1.44
Girls have positive perceptions towards maths than boys	1.98	1.07

The study realized that the experiences students went through at the early stages of their educational life made them form the perceptions about maths ($Mean = 3.24, Std\ Dev. = 1.39$). Parents of students did not contribute(d) to the perceptions they had about maths ($Mean = 2.60, Std\ Dev. = 1.39$) whereas teachers do not make(de) the students to form the various perceptions about maths ($Mean = 2.86, Std\ Dev. = 1.39$). The society in general did not contribute(d) to the perception's students have about maths ($Mean = 2.70, Std\ Dev. = 1.33$). It was further ascertained that peers influence(d) students to form(ed) the perceptions about maths ($Mean = 3.00, Std\ Dev. = 1.46$) whiles the students themselves also formed these perceptions about maths ($Mean = 3.28, Std\ Dev. = 1.44$).

Other factors such age did not play a major role in how one perceived maths ($Mean = 2.31, Std\ Dev. = 1.33$). However, when students were younger, their perceptions about maths were positive than now ($Mean = 3.56, Std\ Dev. = 1.40$). On the other hand, when students were younger, their perceptions about maths were not negative than now ($Mean = 2.03, Std\ Dev. = 1.23$). As a result, students' performance in maths was better when they were younger than now ($Mean = 3.22, Std\ Dev. = 1.48$). On whether gender plays a role in how students perceived maths, the study realized that gender was not a factor ($Mean = 2.03, Std\ Dev. = 1.16$), boys did not generally have a positive perception towards maths than girls ($Mean = 2.43, Std\ Dev. = 1.44$), whereas girls did not have a positive perceptions towards maths than boys ($Mean = 1.98, Std\ Dev. = 1.07$).

Table 3 shows the responses concerning their interest towards mathematics.

Table 3: Students' Interest towards Mathematics

Statements	Mean	Std Dev.
My only interest in maths is getting a passing score	3.95	1.20
I like doing mathematics	3.16	1.37
I enjoy solving mathematics problems	3.24	1.40
My interest in attending maths class is high	3.57	1.29
I have high interest in maths calculations	3.37	1.35
My interest in maths makes me try other maths problems after the main class	2.74	1.40
I only learn maths when it is required	3.17	1.34
Mathematics is a very interesting subject	3.43	1.40
I like mathematics because I don't have to memorize it, it could all be figured out	2.77	1.43
I will like to avoid mathematics if an option is given	3.11	1.50
Mathematics makes students feel uncomfortable	3.20	1.38
I dislike mathematics due to its complex nature	3.34	1.51

The study found that majority of the students' only interest in maths was getting a passing score ($Mean = 3.95, Std\ Dev = 1.37$), lack of interest in maths did not make them try other maths problems after the main class ($Mean = 2.74, Std\ Dev = 1.40$), students only learned maths when it was required ($Mean = 3.17, Std\ Dev = 1.34$) and students did not like mathematics because they had to memorize it, since they could not figure it out ($Mean = 2.77, Std\ Dev = 1.43$). As a result, students would like to avoid mathematics if an option is given ($Mean = 3.11, Std\ Dev = 1.50$) since Mathematics made students feel uncomfortable ($Mean = 3.20, Std\ Dev = 1.38$) due to its complex nature ($Mean = 3.34, Std\ Dev = 1.51$).

However, majority of the students agreed to like doing mathematics ($Mean = 3.16, Std\ Dev = 1.37$) because they enjoyed solving mathematics problems ($Mean = 3.24, Std\ Dev = 1.40$), students had high interest in attending maths class ($Mean = 3.57, Std\ Dev = 1.29$) and high interest in maths calculations ($Mean = 3.37, Std\ Dev = 1.35$). Mathematics was also seen as a very interesting subject ($Mean = 3.43, Std\ Dev = 1.40$).

Table 4 answers research hypothesis 4 on the Relationship of Students' Perception of Mathematics and their Interest in Mathematics.

Table 4: Pearson Moment Correlation Relationship of Students' Perception of Mathematics and their Interest and Performance in Mathematics

		Perception constructs	Interest constructs
Interest constructs	Pearson Correlation	-.263**	1
	Sig. (2-tailed)	.000	

From Table 4, between Perception Constructs and Interest Constructs, the Pearson Correlation was -0.263 with a Sig. (2-tailed) value of 0.000 ($p < 0.01$). This correlation is statistically significant at the 0.01 level (2-tailed) and is negative, indicating a moderate negative relationship between Perception constructs and Interest constructs. The inferential statistics analysis indicates that Higher Perception constructs are associated with lower Interest constructs and are statistically significant ($p < 0.01$).

5. DISCUSSION

The study found less than half of the respondents to lack self-confidence, in terms of taking a maths test or answering a maths question in class learning hard and solving mathematics problems when possible. The findings of Addae and Agyei (2018) align with the notion that secondary school students exhibit a sense of self-confidence in their mathematical abilities. Furthermore, Cofie (2020) discovered that the lack of confidence among Senior High School students in mathematics is not a prevalent issue. However, Kunwar (2021) revealed that the students' responses regarding their self-confidence in mathematics were characterized by a low or negative perception.

The study's results indicate that mathematics teachers in the study area possessed the competence and also motivated students to learn the subject. In a study conducted by Kumi and Wonu (2021), it was determined that students had a favorable and optimistic view of the pedagogical content understanding of their Mathematics teachers. This indicates that the students' evaluations of the teaching abilities and motivation of the teachers were positive. Previous research has demonstrated that educators with a strong sense of self-efficacy may effectively use their pedagogical material knowledge, resulting in a favorable view among students (Ball et al., 2008; Ampadu, 2012). Kabeera (2018), corroborated that there exists a strong correlation between instructors, learning materials, and the support provided by school administration, which enhances the self-confidence of learners across various age groups, genders, beliefs, and attitudes. Consequently, this correlation has a significant impact on fostering favorable attitudes towards the subject of mathematics.

On perceived challenges/difficulties in learning mathematics, Majority of the respondents had difficulties organizing their thoughts during a mathematics, difficulty understanding certain topics, difficulty solving problems on the same topic such that they give up if they get stuck on a maths problem for more than ten minutes. Arthur, Asiedu-Addo, and Assuah (2017) found that students' assessment of the abundance of formulae in Mathematics had an influence on their level of interest in the subject. Hagan, Amoaddai, Lawer, and Atteh (2020) also found that students had the perception that the subject matter in Mathematics was more challenging than initially perceived, leading to a lack of interest in pursuing future academic endeavors in the field.

The results on the myths/beliefs and usefulness of Mathematics perceived by students showed that more than half of the respondents agreed to the myth that being good at maths requires natural (i.e., innate, inborn) intelligence in maths, for each person, there are maths concepts that they would never be able to understand, even if they tried, and Maths is mainly about having a good memory. However, majority of the respondents strongly disagreed to the belief that only very intelligent students can understand maths and were of believe that they can get better at maths. On the myth that Mathematics is for boys and not girls and boys do better in maths than girls, majority of the respondents strongly disagreed. According to Arthur et al. (2017), students' view of mathematics learning is largely influenced by the belief that only high-achieving students are capable of excelling in the subject. According to Salifu and Bakari's (2022) study, a significant proportion of the participants expressed the belief that mathematics is primarily intended for students who possess innate talent and demonstrate high levels of academic achievement. In contrast, Kabeera (2018) found that there exists a notable disparity in the conceptions of mathematics between girls and boys. Male students tend to exhibit a greater affinity for mathematics compared to their female counterparts. Additionally, guys generally hold more positive perceptions of mathematics in comparison to girls (Forgasz and Murimo, 2011; Kabeera, 2018).

In terms of usefulness, the study ascertained that majority of the respondents strongly agreed that doing well in maths could help them get a good job after school and they could use what they learn in maths class in other subjects whereas, Maths has no use outside of school and Maths has no relevance in their life, were strongly disagreed. In contrast to the results obtained in this study, Salifu and Bakari (2022) reported that students expressed agreement with the claims that mathematics is an abstract subject, lacks excitement, and does not offer any practical benefits in their lives. This viewpoint is consistent with the findings of previous studies conducted by Arthur et al. (2017) and Mariam et al. (2016). The present study, however, corroborates the findings of Hagan et al. (2020), which shown that students consistently ranked Mathematics as very significant in comparison to other core topics. This rating might be attributed to the perceived relevance of Mathematics in their daily interactions.

The study further realized that the experiences students went through at the early stages of their educational life, peers and the students themselves influenced students to form the perceptions about maths. Parents of students, teachers and the society in general did not greatly contribute to the perception's students have about maths. Other factors such age and gender

did not playing a major role in how one perceives maths. However, when students were younger, their perceptions about maths were positive than now and students' performance in maths was better when they were younger than now. According to Salifu and Bakari (2022), it has been shown that students who possess a genuine interest in the instruction and acquisition of mathematical knowledge tend to exhibit enhanced proficiency in mathematical topics, as well as an increased level of self-assurance. Hwang's (2019) study found that students' attitudes towards mathematics are influenced by their personal experiences and judgements of instructors' instructional practices, resulting in both positive and negative attitudes. Agyei & Agyei (2020) argued that students who were provided with support and encouragement by their parents had a higher likelihood of developing a favorable view towards the subject matter. According to Kwesi et al. (2015), it was posited that the substandard academic performance observed in the Kassena-Nankana Municipality in Ghana might be attributed to factors such as parental involvement and participation in extracurricular activities, perhaps including activities conducted inside the home environment.

The findings of this study align with the Constructivism learning theory that forms the foundation of the study. This theory highlights the significance of the learner's active involvement in the process of generating knowledge and developing understanding (Jonassen, 2018). Based on the constructivist perspective, individuals are not passive recipients of information from their surroundings; rather, they actively engage in the process of constructing meaning by drawing upon their experiences and interactions with the external world (Jonassen, 2018). Dewey (1916) placed significant emphasis on the role of experience in the process of learning, asserting that students must actively participate in their surroundings to effectively create knowledge and develop comprehension. This perspective aligns with the viewpoint expressed by Jonassen (2018). The results of the study are consistent with the application of Icek Ajzen's (1991) Theory of Planned behavior, as utilized in this particular study. The Theory of Planned behavior (TPB) acknowledges that behavior is influenced by knowledge, beliefs, values, and norms. However, it also admits that perceptions may be formed without relying solely on personal experiences and information.

The study found that majority of the students only interest in maths was getting a passing score, they failed to try other maths problems after the main class and they only learned maths when it was required. Also, majority disagreed that they like mathematics because they don't have to memorize it, it could all be figured out whiles almost half of the respondents agreed that they will like to avoid mathematics if an option is given. Majority of the students strongly agreed that Mathematics makes students feel uncomfortable and they dislike mathematics due to its complex nature.

The study finds a significant number of students having a positive and negative interest in mathematics respectively. Salifu and Bakari (2022) found students' interest towards mathematics to be positive on the basis that students agreed to the responses that mathematics is very easy, enjoyable in senior high school than other subjects and disagreed that when they hear the word "mathematics" they dislike. This finding corroborates with the findings of Leonard (2016) and Rimma (2017) who reported that students had positive interest towards mathematics. The results of a study by Addae and Agyei (2018) showed that the students had high interest in doing mathematics.

Notwithstanding, Kunwar (2021) stipulated that low-performing students in mathematics did not like or prefer mathematics since interest was found to be low. Awanta (2009 cited in Addae and Agyei, 2018), revealed that students' interest in solving mathematical problems, performing mathematical calculations and attending mathematics classes all dropped substantially when students moved from Junior to Senior High School. Hagan et al. (2020) found students' responses on "I have interest in studying Mathematics" to be below the required criterion of 3.0 for a five-point Likert scale. The lack of interest in Mathematics observed by studies tallies with this study's findings where 79.0% of the students expressed their only interest in maths as getting a passing score. This means, such students see maths as an obligation to study and not out of interest (Cofie, 2020).

In ascertaining the relationship between Perception and Interest, a statistically significant value was observed. A negative correlation meant that as scores on the Perception constructs increase, scores on the Interest constructs tend to decrease. This shows a moderate inverse relationship, indicating that students who have a more favorable perception of certain constructs tend to have lower interest in those same constructs. In simpler terms, a positive perception of constructs measured is associated with lower interest. Hence, positive perception of mathematics, ultimately lead to a higher interest in mathematics, whiles a negative perception lowers mathematical interest. This observation aligns with the research conducted by Asiedu-Addo, Assuaha, and Arthur (2017) as well as Mutodi and Ngirande (2014), who also discovered that

students who demonstrate a favorable opinion of mathematics are more likely to display an increased interest in the subject. A stronger inclination towards mathematics among students might be attributed to a more favorable impression of the teaching and learning processes associated with the subject.

According to the findings of Arthur et al. (2017) and Arthur, Oduro, and Boadi (2014), it has been proposed that providing students with academic counselling can lead to a positive shift in their perception of mathematics. This, in turn, can enhance their interest in the subject and subsequently have a significant impact on their achievement and performance in mathematics. Salifu and Bakari's (2022) study also demonstrated that students who possess a favorable perception of mathematics are more likely to develop a heightened interest in the subject. This conclusion was drawn from the analysis of the study, which revealed a positive and statistically significant correlation between students' interest in mathematics and their perception of the subject as a valuable learning experience. The findings further indicated that there is a positive correlation between students' level of interest in mathematics and their perspective of learning mathematics (Salifu and Bakari, 2022).

6. CONCLUSION

The study was purposed to explore the Senior High School Students' Mathematical perception and their interest in the subject. The study realized that students' perceptions are both positive and negative. There exists a perception that various factors contribute to students' performance in mathematics, such as self-confidence, interest in the subject, motivation from the teacher, competence of the teacher, difficulty of the subject, myths and beliefs, as well as the usefulness of subject. Whereas some students have good perceptions of these constructs, others have formed a negative perception.

The study shed light on how the various perceptions of students were formed. The study found that the perceptions were formed by students themselves, from their peers and from past experiences of their educational lives. Parents of students, teachers and the society in general did not greatly contribute to the perceptions. Other factors such age and gender did not play a major role in how one perceived maths.

The study further found that majority of the students' only interest in maths was getting a passing score. Significant proportion of the respondents disagreed that their interest in maths makes them try other maths problems after the main class and more than half of the respondents agreed that they only learn maths when it is required. Also, majority of the students agreed that Mathematics makes students feel uncomfortable and dislike mathematics due to its complex nature. On the Relationship of Students' Perception of Mathematics and their Interest, the study found a negative statistically significant correlation between students' Perception and Interest.

7. RECOMMENDATION

Based on the findings, the study recommends that Mathematics teachers must build the confidence level of students towards the subject, Teachers should give students more examples, exercises and assignments for students to practice more. Prompt feedback must also be provided to enable students know their progress. It is incumbent upon educators, parents, peers, and society at large to assume the responsibility of assisting students in mitigating unfavorable attitudes towards mathematics, commencing from the earliest stages of their educational journey.

The study finds that there is a correlation between students' mathematical perceptions and interest. Curriculum developers, implementors and all stakeholders must ensure that students' needs in this dynamic and technological advancing world are captured in the curriculum and modern pedagogical strategies are used in teaching the subject to sustain the interest of learners. There is also the need for educators to be abreast with the Theory of Planned Behavior in order to address students' behavior. This in effect will boost their interest in the subject and ultimately maximize performance.

Suggestions for Future Research

The study limited itself to three hundred (300) students, quantitative approach was adopted and the instrument used was a questionnaire. Although, Adansi North and the student's population in the schools are heterogeneous, there is limitation to the degree of generalizability of the findings. Subsequent investigations should priorities the examination of alternative geographical areas in order to augment the applicability and generalizability of the research outcomes. Additionally, it is imperative to incorporate other methodologies, like the mixed methods or qualitative approaches, in order to delve deeper into the correlation between students' mathematical views, interest, and academic achievement in different settings.

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Conflict of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

REFERENCES

[1] Addae, B. D., & Agyei, D. D. (2018). High School Students' attitudes Towards the Study of Mathematics and their Perceived Teachers Teaching Practices. *European Journal of Educational and Development Psychology*, 6(2), 1-14.

[2] Adepoju, O. T., Akerele, O. E., & Tijani, B. A. (2020). Mathematics perception and academic achievement of senior secondary school students in Nigeria. *Journal of Education and Practice,* 11(8), 136-144.

[3] Aguilar, M. S., Rosas, A., & Zavaleta, J. G. M. (2012). Mexican students‟ images of mathematicians: *Research report presented in the TSG27 of the 12th International Congress on Mathematical Education* (ICME-12), Seoul, Korea.

[4] Agyei, D. D., & Agyei, M. A. (2020). Senior high school students' perception of mathematics and its relationship with academic performance. *Journal of Education and Learning*, 9(4), 218-225.

[5] Agyei, D. D., & Dwumah, P. (2019). Senior high school students' perceptions of mathematics in Ghana: A case study of Kumasi Metropolis. *International Journal of Research in Education and Science*, 5(1), 100-107.

[6] Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections [Editorial]. *Psychology & Health*, 26(9), 1113-1127.

[7] Ajzen, I., and Schmidt, P. (2020). Changing Behavior Using the Theory of Planned Behavior. In M. Hagger, L. Cameron, K. Hamilton, N. Hankonen, & T. Lintunen (Eds.), *The Handbook of Behavior Change* (Cambridge Handbooks in Psychology, pp. 17-31). Cambridge: *Cambridge University Press.* doi:10.1017/9781108677318.002

[8] Akyeampong, K., Amidu, A. R., & Osman, R. (2013). Secondary Education in Ghana: Key Issues and Challenges. *CREATE Pathways to Access Research Monograph* No. 90. [pdf] http://www.create-rpc.org/pdf_documents/PTA90.pdf

[9] Akyeampong, K., Lussier, K., Pryor, J., & Westbrook, J. (2013). Improving mathematics and science in Ghanaian schools: A partnership approach. *International Journal of Educational Development*, 33(5), 426-436.

[10] Ampadu, E. (2012). Students' Perceptions of their Teachers' Teaching of Mathematics: The Case of Ghana. *International Online Journal of Educational Sciences, 2012*, 4(2), 351-358.

[11] Arthur, Y. D., Asiedu-Addo, S., & Assuah, C. (2017). Students' perception and its impact on Ghanaian students‟ interest in Mathematics: Multivariate Statistical Analytical Approach. *Asian Research Journal of Mathematics*, 4(2), 1-12.

[12] Arthur, Y. D., Oduro, F. T., & Boadi, R. K. (2014). Statistical analysis of Ghanaian students' attitude and interest towards learning mathematics. *International Journal of Education and Research* 2(6), 661-670.

[13] Aryeetey, E., & Oduro, A. D. (2020). Free Senior High School policy in Ghana: Challenges and opportunities. *African Review of Economics and Finance*, 12(1), 35-57.

[14] Asiedu-Addo, S. K., J. Apawu, and N. A. Owusu-Ansah. "The usage of ICTs in the teaching and learning of mathematics; Tracer study of mathematics educators." *Journal of Science Education and Research* 2, no. 1 (2016): 43-56.

[15] Asomah K. R., Wilmot E.M & Ntow, F. D (2018) What is happening in Ghanaian Junior High School mathematics classrooms: A look at students' perception. *The Oguaa Educator* Vol. 12 (1), June 2018, 69-87

[16] Ataa Asantewaa Cofie (2020). Students' Perceptions of Mathematics and the Impact on their Achievement among Selected Senior High Students in Ghana [Unpublished MPhil thesis] *University of Ghana http://ugspace.ug.edu.gh*

[17] Atoyebi, O. M., & Atoyebi, S. B. (2022). The Causes of Anxiety in Mathematics Among Private Secondary School Students: A Case Study of Students in Egbedore Local Government, Osun State, Nigeria. *Adeleke University Journal of Science*, *1*(1), 267-280.

[18] Bairwa, S. L. (2022). Strategies of Effective Teaching with Special Reference to the Higher Education. *EPRA International Journal of Economic and Business Review (JEBR)*, *10*(4), 1-8.

[19] Bakker, A., Biehler, R., & Konings, J. (2014). Students' mathematics-related beliefs and their influence on mathematics performance: A meta-analytic review. *Educational Psychology Review*, 26(2), 365-388.

[20] Bright Dapaah Addae and Douglas Darko Agyei (2018). High School Students' Attitudes towards the Study of Mathematics and their Perceived Teachers' Teaching Practices. *European Journal of Educational and Development Psychology* Vol.6

[21] Butakor, P. K. (2016). The role of formative feedback in promoting higher order thinking skills in classrooms: A theoretical model. *African Research Review*, *10*(5), 147-160.

[22] Carlson, N. R. (2014). Physiology of behavior (11th ed.). *Upper Saddle River, NJ*: Pearson.

[23] Chand, S., Chaudhary, K., Prasad, A., & Chand, V. (2021). Perceived causes of students' poor performance in mathematics: A case study at Ba and Tavua secondary schools. *Frontiers in Applied Mathematics and Statistics*, *7*, 614408.

[24] Check, J., & Schutt, R. K. (2012). Research design and data collection. Research methods in education, *University of Massachusetts Boston,* 159-185.

[25] Code, W., Merchant, S., Maciejewski, W., Thomas, M., & Lo, J. (2016). The Mathematics Attitudes and Perceptions Survey: an instrument to assess expert-like views and dispositions among undergraduate mathematics students. *International Journal of Mathematical Education in Science and Technology,* 47(6), 917-937.

[26] Creswell, J. W., & Creswell, J. D. (2017). Research design: qualitative, quantitative, and mixed methods approach. *Sage publications*.

[27] Dagar, V., & Yadav, A. (2016). Constructivism: A paradigm for teaching and learning. *Arts and Social Sciences Journal*, 7(4), 1-4.

[28] Davis, E. K., Carr, M. E., & Ernest, A. (2019). Valuing in Mathematics Learning Amongst Ghanaian Students: What Does It Look Like Across Grade Levels? In P. Clarkson, W. Seah, & J. Pang, *Values and Valuing in Mathematics Education* (pp. 89-102).

[29] Eshun, I., Nyarko, K., & Amankwah, R. (2018). Senior High School Students' Perception towards Mathematics: A Ghanaian Perspective. *Journal of Education and Practice,* 9(27), 1-10.

[30] Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics,* 5(1), 1-4. Farooq, M. S., & Shah, S. Z. U. (2008). Students' attitude Towards Mathematics. Pakistan Economic and Social Review, 75-83.

[31] Gravetter, F. J., & Forzano, L. A. B. (2011). Research Methods for the Behavioral Sciences. *Cengage Learning. Stamford*, CT, 147-148.

[32] Hakimi, M. F., Tutakhail, K. H. S., Ghafare, M., & Azizi, W. M. (2021). Factors Associated with Secondary School Learners' Mathematical Poor Performance in Kandahar City. *Psychology and Education*, *58*(3), 3408-3415.

[33] Hill, F., Mammarella, I. C., Devine, A., Caviola, S., Passolunghi, M. C., & Szucs, D. (2019). Maths anxiety in primary and secondary school students: Gender differences, developmental changes and anxiety specificity. *Learning and Individual Differences*, 69, 160-169.

[34] Hill, J. L., & Seah, W. T. (2022). Student values and wellbeing in mathematics education: perspectives of Chinese primary students. *ZDM–Mathematics Education,* 1-14.

[35] Hong, E., & Choi, K. (2015). The impact of high school students' math self-concepts on math achievement: Comparing three countries. *International Journal of Educational Research,* 73, 1-9.

[36] Hwang, Sunghwan (2019). The Relationship Between Students' Perception Toward Mathematics Teachers' Instructional Practices and Attitude toward Mathematics: A Mediation Role of Self-Efficacy Beliefs. *Journal of Elementary Mathematics Education in Korea* 23 (4) 383-403. 2019

[37] John Ekow Hagan, Solomon Amoaddai, Vincentia Terkwor Lawer and Evans Atteh (2020) Students' Perception towards Mathematics and Its Effects on Academic Performance. *Asian Journal of Education and Social Studies* 8(1): 8-14, 2020; Article no. AJESS.57132 ISSN: 2581-6268

[38] Jonassen, D. H. (2018). Learning theories: An educational perspective. *Routledge*.

[39] Kabeera Pontian (2018). Examining the influence of student's perception on mathematics performance: Case of three selected Rwandan secondary schools. *International Journal of Research Studies in Education* 2019 Volume

[40] Kamarudin, N. A., Baharun, N., & Omar, Z. (2020). Factors influencing mathematics achievement among Malaysian secondary school students. *International Journal of Academic Research in Business and Social Sciences,* 10(2), 310-324.

[41] Kan, M. P., & Fabrigar, L. R. (2017). Theory of Planned Behaviour. (V. Zeigler-Hill, & T. K. Shackelford, Eds.) *Encyclopedia of Personality and Individual Differences*.

[42] Kidd, J. S. (2003). The Effects of Relational Teaching and Attitudes on Mathematics Anxiety.

[43] Kimball, M., & Smith, N. (2013). The Myth of 'I'm Bad at Maths'. *The Atlantic*.

[44] Kiwanuka, H. N., Van Damme, J., Van Den Noortgate, W., Anumendem, D. K., & Namusisi, S. (2015). Factors affecting Mathematics achievement of first-year secondary school students in Central Uganda. *South African Journal of Education, 35(3).*

[45] Kumi, E. M., & Wonu, N. (2021). Senior high school student perception of mathematics teacher pedagogical content knowledge. *FNAS Journal of Mathematics and Science Education,* 3(1), 1-10.

[46] Kunhertanti, K., & Santosa, R. H. (2018, September). The influence of students" self-confidence on mathematics learning achievement. *In Journal of Physics*: Conference Series (Vol. 1097, No. 1, p. 012126). IOP Publishing.

[47] Kweku, B. A., & Kwapong, O. A. (2018). Senior high school students' perception of mathematics: a case study of some selected schools in the Tarkwa-Nsuaem Municipality. *Journal of Education and Practice*, 9(11), 35-42.

[48] Kwesi Amanyi Churcher, Lloyd Asiedu-Owuba and Michael Adjabui (2015) Assessment of students' performance in mathematics at the second cycle schools in the Kassena–Nankana Municipality. *Global Educational Research Journal,* 3(1), 247-257.

[49] LaMorte, W. W. (2019). The theory of planned behavior, 2019.

[50] Lee, R. (2018). Educational Reform in Ghana Providing Opportunities for Children. Retrieved April 24, 2023, from *The Borgen Project website*: https://borgenproject.org/educational-reform-in-ghana/

[51] Liu, T. C. (2022). A Case Study of the Adaptive Learning Platform in a Taiwanese Elementary School: Precision Education from Teachers' Perspectives. *Education and Information Technologies*, *27*(5), 6295-6316.

[52] Lutovac, S. (2020). How failure shapes teacher identities: Pre-service elementary school and mathematics teachers narrated possible selves. *Teaching and Teacher education*, *94*, 103120.

[53] Mereku, D. K., & Mereku, C. W. K. (2015). Congruence between the intended, implemented, and attained ICT curricula in Sub-Saharan Africa. *Canadian Journal of Science, Mathematics and Technology Education*, 15(1), 1-14.

[54] Michelli, M. P. (2013). The relationship between attitudes and achievement in mathematics among fifth grade students.

[55] Murugan, A., & Rajoo, L. (2013). Students' perceptions of mathematics classroom environment and mathematics achievement: A study in Sipitang, Sabah, Malaysia. In *International Conference on Social Science Research, Penang, Malaysia*.

[56] Mutai, J. K. (2010). Attitudes Towards Learning and Performance in Mathematics among Students in Selected Secondary Schools in Bureti District, Kenya. *(Master"s Thesis, Kenyatta University).*

[57] Mutodi, P. (2014). The influence of students` perceptions on mathematics performance. A case of a selected high school in South Africa. *Mediterranean Journal of Social Sciences,* 5(3),431.

[58] Oduro, G. K. T., Asiedu-Addo, S. K., & Adentwi, K. I. (2017). Challenges Faced by Senior High School Students in the Study of Mathematics in Ghana. *Journal of Education and Practice,* 8(10), 68-75. [pdf] https://www.iiste.org/Journals/index.php/JEP/article/viewFile/37624/38841

[59] OECD (2019). PISA 2018 Results (Volume II): Where All Students Can Succeed. *PISA, OECD Publishing, Paris*. https://doi.org/10.1787/b5fd1b8f-en

[60] Oner, D., Alacaci, C., & Sahin, I. (2016). High school students' attitudes toward mathematics: a survey study. *International Journal of Research in Education and Science (IJRES)*, 2(1), 119-128.

[61] Owusu-Acheaw, M., & Oduro, G. K. (2017). Students' perception of mathematics and its impact on their performance in senior high schools in Ghana. *International Journal of Research in Education and Science,* 3(2), 233-241.

[62] Piaget, J. (1952). The origins of intelligence in children. *International Universities Press.*

[63] R. K. Asomah, S. Crankson, K. J. Asiedu and A. B. Dapaah (2022) A Correlation Analysis of Ghanaian Junior High School Pupils' Perception and Attitude Towards Mathematics. *African Journal of Educational Studies in Mathematics and Sciences* Vol. 18, No. 1. 2022 DOI: https://dx.doi.org/10.4314/ajesms.v18i1.4 37

[64] Rajendra Kunwar (2021). A Study on Low Performing Students Perception towards Mathematics: A Case of Secondary Level Community School Students of Nepal

[65] Rezat, S., Fan, L., & Pepin, B. (2021). Mathematics textbooks and curriculum resources as instruments for change. *ZDM–Mathematics Education*, *53*, 1189-1206.

[66] Salifu, A. S., & Bakari, A. (2022). Exploring the Relationship Between Students' Perception, Interest and Mathematics Achievement. *Mediterranean Journal of Social & Behavioral Research,* 6(1), 13-20. https://doi.org/10.30935/mjosbr/11491

[67] Salifu, S. K. (2017). Factors Contributing to the Negative Attitudes of Female Students Towards the Study of Mathematics in Selected Junior High Schools in the Tolon District, Ghana *(Doctoral dissertation)*

[68] Salkind, N. J. (Ed.). (2010). Encyclopaedia of research design (Vol. 1). *sage.*

[69] Samuel Asiedu-Addo, Charles K. Assuaha and Yarhands Dissou Arthur (2017). Triangular law of students' Mathematics Interest in Ghana: A Model with motivation and perception as predictor *International Electronic Journal of Mathematics Education* e-ISSN: 1306-3030. 2017, VOL. 12, NO. 3, 539-548

[70] Saunders, M.N.K., Lewis, P. and Thornhill, A. (2019) Research Methods for Business Students. 8th Edition, *Pearson, New York*.

[71] Seah, W. T., & Wong, N. Y. (2012). What students value in effective mathematics learning: a "Third Wave Project" research study. *The International Journal of Mathematics Education*, 44, 33-43.

[72] Streefkerk, R. (2019). Qualitative vs. Quantitative Research Differences & Methods. *Scribbr. April 12, 2019.*

[73] Thomson, S., Wernert, N., O'Grady, E., & Rodrigues, S. (2017). TIMSS 2015: *Reporting Australia's results.*

[74] Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. *Harvard University Press*.

[75] Wang, M. T., & Gu, X. (2017). A longitudinal examination of the link between students' academic emotionality and their academic achievement in STEM subjects. *Journal of Educational Psychology*, 109(3), 372-385.

[76] Wilson, J. (2010) "Essentials of Business Research: A Guide to Doing Your Research Project" *SAGE Publications*

[77] Yarhands Dissou Arthur, Samuel Asiedu-Addo and Charles Assuah (2017). Students' Perception and Its Impact on Ghanaian Students' Interest in Mathematics: Multivariate Statistical Analytical Approach. *Asian Research Journal of Mathematics* 4(2): 1-12, 2017; Article no. ARJOM.33023 ISSN: 2456-477X