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Factors that Contribute to Junior High School Female Students' Negative Attitudes toward the Study of Mathematics in the Fanteakwa District, Ghana

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Abstract: Students negative emotions, beliefs, and behaviours toward the study of mathematics have tremendously contributed to their poor performance in the subject and it is caused by factors emanating from home, socio-cultural background, school, students and teachers. The aim of this study

was to examine factors promoting the negative attitudes of female students toward the study of Mathematics in five selected Junior High Schools within the Fanteakwa District of Ghana. The researchers, therefore, used the sequential explanatory mixed method in order to generate the data from 125 respondents comprising of 120 female students and 5 mathematics teachers using a questionnaire, a semi-structured interview, and a focused group discussion. The result showed that female learners in the district exhibited negative attitudes toward mathematics as a subject; they developed fear and hatred for the subject, lacked self-confidence. The causative factors of these attitudes included sociocultural backgrounds; the lack of female role models, early marriage, and gender stereotypes. Home factors were the lack of parental support, illiterate parents, overburden household chores and poverty. Teacher factors included not creating the enabling environment for teaching and learning, the lack of teaching learning resources during lesson. The lack of reward pages for teachers and students, in-conducive environments were factors relating to school environment. The study concluded that students in the district had negative attitudes toward learning of mathematics; they considered the subject to be difficult and developed hatred for it. These were attributed to factors relating to home, socio-cultural, school, students and mathematics teachers. The study implied that the government of Ghana and policy makers should develop gender-friendly curriculum, sensitise parents to support their children's education, train teachers to handle the subject well. The researchers, therefore, suggest that further studies on the topic should be undertaking using a larger sample or the study can be repeated in other districts and or the entire country so that a more holistic picture can be generated.

Keywords: academic performance, gender stereotypes. negative attitudes, socio-cultural background.

Introduction

In recent times, Ghana has been restructuring its educational system to train a skilled, knowledgeable human resource in the areas of science, technology, engineering, and mathematics (STEM) for them to function well in this contemporary world. Mathematics serves as the foundation on which every economy is built. It is important in the field of financial services, physical sciences, business, Information, Communication and Technology (ICT) and many areas of technology in most countries.

It is also of high demand in social sciences, biology, and many areas of medicine (Yadav, 2019). It forms the basis of many carers including scientific and industrial research and evolution. Davadas and Lay (2020) stated that mathematics was critical for human civilization and development. Henceforth, mathematics is a subject in the school curriculum from primary to secondary levels in most countries including Ghana. It is these indispensable roles of mathematics that is why it serve as an entry requirement into higher institutions in the country.

However, many students in Ghana especially the female counterparts have been reported to performed poorly in the subject due to negative attitudes toward the study of the subject (Ansah et al., 2020). Attitudes can be explained as psychological orientations formed as a result of one's experiences that influence a person's perception of circumstances, objects, and people, as well as how to respond to them positively or negatively, favorably or unfavorably (Mensah et al., 2013). They further explained that learning in any educational environment is related to learners' attitudes hence, attitude plays crucial roles in academic performance (Mensah et al., 2013). Many researchers confirmed that attitudes were important factors that could contributed to student's success in mathematics (Aysun, 2017; Wakhata et al., 2022). However, many students especially their female counterparts thought that mathematics was a complex subject and they were concerned that they could not be successful in

mathematics, which affects their attitudes toward the subject negatively (Chand et al., 2021). Unfortunately, these attitudes occur within the school years. As a result, most female students have negative attitudes toward mathematics and thus they lose their self-confidences in mathematics resulting in poor performance in the subject. Moreover, these students begin thinking that they are not clever enough to learn mathematics and may not regard mathematics as their area of interest.

Other researchers like Arko and Kporyi (2018) conducted a study among senior high students at Ordoben on students' attitudes toward mathematics. It was established that, many of these students cannot do well in mathematics and performed poorly in their final examinations. In Ghana, learners' achievement in mathematics in the first and second cycle institutions has been deteriorating over the years. Candidates for certificate examinations are reported to have shown a lack of understanding of mathematical concepts and were unable to form the exact mathematical models when solving questions that could be tackled with the requisite skills during their Basic Education Certificate Examination (B.E.C.E) and West Africa Senior School Certificate Examination (WASSCE) exams (Chief Examiner's Report, as cited in Arko & Kporyi, 2018). This means that many students in the first and second-cycle institutions in Ghana were lacking the basic skills in mathematics and could not apply the knowledge they have to solve other problems and this was blamed on the various factors including their attitudes toward the study of the subject.

With numerous measures put in place by governments, mathematics achievement in Ghana has not undergone much change; there are consistently low achievement levels in mathematics among students especially junior high schools (JHS) and senior high school (SHS) students (Ansah et al., 2020). These researchers Ansah et al. (2020) claimed that the performance of learners in mathematics has been progressively declining at various levels in JHS and SHS in the country. They provided the evidence that for instance, SHS students had a pass rate of 36.68% in 2013. In 2014, it has decreased to 32.45% and eventually deteriorated to 24.09% in 2015. There was appreciable improvement in the performance (33.12% and 41.66%) in 2016 and 2017 respectively. Although there was no definitive pattern in the performance data, it is important to emphasise that over 50% of the students who sat for the examination each year were not qualify to be admitted in any tertiary institution in Ghana. This is an issue of concern for stakeholders, students and parents in the country.

The attitudes of learners toward the study of mathematics were affected by number of factors including (1) the socio- economic status of parents, involvements of parent in their children's education (home factors). (2) wrong believes of the society about girls in studying mathematics, early marriage, lack of female role model (socio- cultural factors), (3) class size, Teaching Learning Resources, i.e. (TLR), the atmosphere of the school (school factors), (4) the anxiety of students about mathematics as a difficult subject, laziness, truancy, absenteeism (students' factors) and (5) teachers' attitudes, beliefs and instructional strategies (teacher factors). Students who have full financial support and encouragement from their parents tend to develop positive attitudes toward mathematics and had high success in the subject than those with less support and encouragement (Eriksson et al., 2021). Socio-cultural stereotypes concerning boys and girls in studying mathematics that the subject is preserved for boys, male was better than female in STEM-related courses have significant impact on students' attitudes which contributed to the gender gap in STEM related courses (Eble & Hu, 2018). Research conducted in Ghana by Bosson-Amedenu (2018) established the fact that the most contributing factor to mass failure in mathematics during B.E.C.E. every year was attributed to the large class size. Factors relating to students themselves i.e., their anxiety and low self- confidence in studying mathematics also affect their attitudes toward mathematics and mathematics achievement (Fokuo et al., 2022; Karikari et al., 2020). Students who believed that mathematics was difficult and that they cannot understand the subject perform low in mathematics. The recent research works on mathematics showed that there was

a significant correlation between attitudes and success in mathematics (Wakhata et al., 2022). Attitudes toward mathematics played crucial roles in determining learners' performance in mathematics; those with positive attitudes toward the subject will have high success in mathematics and vice versa. In this regard, some other contemporary researches Maamin et al. (2022), Rozgonjuk et al. (2020), and Zakariya et al. (2020) confirmed that there was a positive relationship between learners' attitudes and success toward mathematics. Also, teachers who adopted creative pedagogy such as differentiated learning helped students to exhibit positive attitudes and achieve high success in mathematics (Asempapa, 2022; Wijaya et al., 2022).

It is obvious that students' negative attitudes toward mathematics is crucial, and needs to be probe to comprehend factors that tend to negatively promote learners' attitudes towards the study of mathematics which resulted in their poor performance.

Research Problem

The continuous feeling reluctant of Girls to pursue and excel in education, especially in the area of science, mathematics, and technology (SMT) is an issue of concern to many policy makers in general (Jones, 2016). Despite expected increasing demand for human resource, opportunities and returns to the study in the STEM fields, women remain under-represented in STEM fields (Anaya et al., 2022). As explained by Rodriguez et al. (2020), even though there are no significant gender differences in academic performance, as expected, the positive attitudes toward mathematics were clearly more significant in boys than in girls. Research on gender gap in USA, Organisation for Economic Cooperation and Development (OECD) countries and Europe indicated that boys were better performing in mathematics than girls, especially at the top of the performance distribution (Bahar, 2021).

Ghana took part in the Trend in International Mathematics and Science Study (TIMSS) three occasions (i.e., 2003, 2007, & 2011) and obtained the rankings of 45th out of 46 countries in 2003, 47th out of 48 in 2007 and 42nd out of 42 countries in 2011 (Mullis et al., 2012). The consecutive poor performance of Ghanaian students in the TIMSS indicated that the country has challenges in these subject areas and need to be investigated.

As explained by Rodriguez et al. (2020) that, in Spain, whereas both boys and girls had similar levels of negative feelings toward mathematics, the girls exhibited higher rates of math anxiety than did their male counterparts. Most girls fail to participate in science and mathematics related subjects due to the lack of confidence in performance in these subject areas. The issue in the Fanteakwa district is no different. Many learners in the district have negative attitudes toward the subject, considering mathematics and Science as not only a field for male but also, a course meant for the students with high intellectual abilities. This perceptions about the subject resulted in debilitating interest of female learners in its study. Continuous failure of women to pursue Mathematics at higher level of education, led to their underrepresented in mathematics careers and which further resulted in income disparity between male and female (Ganley & Lubienski, 2016). It was these reasons why the study into factors contributing to negative attitudes of learners toward mathematics is worth investigating.

Research Focus

This study focused on factors that contributed to negative attitudes of learners toward the study of mathematics in the five chosen JHS within the Fanteakwa district of Ghana.

Despite the numerous efforts put in place by the Fanteakwa district education directorate to enhance female participation in mathematics and science education, the majority of the female students continued to poorly perform in these subject areas. The analysis of B. E. C. E results in almost every through school performance appraisal meetings (SPAM) by circuit supervisors in Fanteakwa district revealed that the majority of students performed abysmally in mathematics, especially female students. It was prudent to resolve this problem by first identifying the factors accounting for these negative attitudes among female learners. It was this reason why a study into the factors that contribute to the attitudes of JHS female students in the Fanteakwa district of the Eastern region of Ghana needs to be taken as a very serious issue.

Research Aim

The aim of this research was to examine the factors influencing the negative attitudes of female students toward the study of Mathematics in selected JHS within the Fanteakwa District of Ghana.

Specific Objectives

1. To find out the JHS female students' negative attitudes toward the study of mathematics in the Fanteakwa district.
2. To find out the home, students, school, teacher, and socio-cultural factors that contribute to JHS female students' attitudes toward mathematics in the Fanteakwa district of Ghana.

Research Questions

This study answered the following questions:

1. What were Fanteakwa District Junior High School female students' negative attitudes toward mathematics?
2. Which home, socio-cultural, school, teacher, and student factors contributed to JHS female students' negative attitudes toward mathematics in the Fanteakwa District of Ghana?

Research Methodology

General background

The researchers deemed it important to examine factors influencing the negative attitudes of female students toward the study of mathematics in selected JHS within the Fanteakwa district of Ghana. The district is located in the Eastern region of Ghana which contains forty-nine (49) junior and three (3) senior high schools at the time of the study.

Because the researchers base on pragmatic philosophy, the sequential explanatory mixed method design was adopted for the study; a single study containing quantitative data collection followed by qualitative data was used (Creswell, 2012). The choice of this method was very important because it helped the researchers to probe the factors influencing the attitudes of JHS female students toward the study of mathematics in the Fanteakwa district such that the findings were validated by the evidence generated by each method.

Population

The targeted population comprised all females of the five (5) selected JHS in the Fanteakwa district of the Eastern region of Ghana, as well as the mathematics teachers in these schools. The schools were;

Ahomam JHS, consist of 84 students, 3 mathematics teachers, Darko JHS had 81 students, 2 mathematics teachers, Nteso JHS had 63 students, 2 mathematics teachers, Akoradako JHS had 95 students, 3 mathematics teachers, Oboaho JHS had 76 students, 2 mathematics teachers.

Sample

In this study, the researchers through the use of purposive sampling procedure, selected the sample size of 125 participants (24 female students and 1 mathematics teacher from each school), from the five chosen junior high schools out of the forty-nine. The schools were selected by using simple random sampling procedure. The sample selected (125) truly represents the population (399 female students and 12 mathematics teachers), since it was more than the minimum required 10% of the population (Andrade, 2020). Also, the researchers chose these types of samples because the female students were the groups in which the issue of negative attitudes toward the study of mathematics were concerned; mathematics teachers were also sampled because they directly involved in teaching and learning of the subject. The researchers chose to effectuate a focus- group discussion and interview because of lack of enough time and resources, they employed a relatively manageable sample size of twenty (20) student respondents from the already chosen 125 respondents or participants in addition to the five (5) mathematics teachers (one from each of the five schools).

Instruments and procedures

In all, a questionnaire with forty-three (43) items were also designed using five points Likert scale ranging from strongly agree to disagree. 21 of the items measured students' self-confidence, emotion or anxiety, motivation, mathematics enjoyment and how students value mathematics. 22 items measured home, socio-cultural, students, teacher and school factors that impact students' attitudes toward the study of mathematics. Seven (7) interview and focused group guides were also designed to collect the qualitative data on students' negative attitudes and its causative factors from the participants.

The researchers ensured the validity by employing the following strategies: one, the drafted questionnaire and the interview guides were foremost discussed among the researchers for comments, suggestions, and corrections. The questionnaire was piloted at Ahomahomasu JHS. Two, the researchers did not only use "rich and thick" descriptions of participants responses during the interview and focus group but also, they captured the exact responses from the participants to buttress some points as deemed necessary.

Also, researchers used different research instruments (questionnaire, face-to-face one-on-one interview and focus group discussion) to collect the data from the same participant and compared the results of the various method to ensure consistency.

Data analysis

The data from the questionnaires were analysed using descriptive statistics with the aid of IBM Statistical Package for Social Sciences (IBMSPSS) version 25. The qualitative data gathered from the respondents were analysed manually or by the content analysis.

Research Results

Demographic Characteristics of Respondents

There were twenty-four (24) participating students from each of the five schools for the quantitative data. Sixteen (16) of them were between the ages of eleven to twelve years, ninety-seven

(97) of them were between the ages of thirteen to fourteen years and seven (7) of them were within fifteen to sixteen years. The information is presented in Table 1.

Table 1

Ages of the students involved in the study

Age Group	Frequency	Percent	Valid Percent	Cumulative Percent
11 to 12 years	16	13.3	13.3	13.3
13 to 14 years	97	80.8	80.8	94.1
15 to 16 years	7	5.8	5.8	99.9
Total	120	100.0	100.0	

From the Table 1, 13.3% of the students were between the age group of 11-12 years, 80.8% of them were between the age group of 13-14 years and lastly, and 5.8 percent of them were 15 years and above. From the analysis of this data the majority of the respondents of the study were between the ages of 13-14 years.

Research Question 1

What is Fanteakwa District Junior High School Female Students' negative attitudes toward Mathematics? In order to answer the first research question relating to students' attitudes toward mathematics, the respondents were asked to indicate their agreement to twenty-one (21) statements concerning the various dimensions of attitude such as students' self-confidence, students' emotion/anxiety, students' mathematics enjoyment, students' mathematics motivation and value of mathematics. The responses of students on their self-confidence in mathematics which is a sub-scale of their attitude are presented in Table 2.

Table 2

Rating students' self-confidence in mathematics

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) Girls who are brilliant in maths are extraordinary.	70.8	85	7.5	9	0		8.3	10	13.4	16
b) Girls have the same maths ability as boys.	7.5	9	11.7	14	0		75	90	5.8	7
c) I can solve mathematics problems quite easily; it does not scare me at all.	10	12	10.8	13	0		50	60	29.2	35

d) I am comfortable when answering maths problem.	12.5	15	6.7	8	1.7	2	48.3	58	30.8	37
e) Girls certainly are brilliant enough to do well in difficult maths topics.	13.4	16	5.8	7	0		43.3	52	37.5	45

From Table 2, SA means strongly agree; A = agree, U = uncertain, D = disagree and SD = strongly disagree. The majority 78.3% of the respondents agreed that Girls who were brilliant in maths were extraordinary whilst the remaining 21.7 % indicated otherwise. In the second statement, 19.2 % of the respondents agreed that girls had the same maths ability as boys. But 80.8 % of the respondents were of the contrary view. The responses from the third statement indicated that 20.8 % of the respondents agreed they could solve mathematics problems quite easily and it doesn't scare them whilst 79.2 % of them were of opposite view. This means that most of the participants disagreed that they can solve mathematics problems with ease. In the fourth statement 19.2 % of the respondents agreed that they were comfortable when solving mathematics problems, 1.7 percent were uncertain that they could solve mathematics problems with ease. But the remaining 79.1 % disagreed to this statement. It means that the majority of the respondents disagreed that they were comfortable when answering mathematics questions. The response from the last statement showed that 80.8 % of the participants disagreed that girls certainly were brilliant enough to do well in difficult maths topics. Moreover, 19.2 % of the participants were of opposite view.

In addition to the results above, when the participants were asked concerning students' attitudes toward mathematics during the focus group and the interview (interview guides for teachers, item one), the findings from the focus group and interview results, therefore, showed that students generally had low self-confidence for mathematics, especially their female counterparts. *Compared with boys, females did not have enough confidence and were anxious about Mathematics in the district* (2 mathematics teacher participants).

With regards to students' emotion or anxiety about mathematics as a subscale of attitude dimension, four statements were provided concerning the subscale (emotion/anxiety) for the respondents to provide their responses and the results were displayed in Table 3.

Table 3

Rating students' emotion/ anxiety about mathematics

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) I feel hopeless when taking maths exams.	65.8	79	12.5	15	0		8.3	10	13.3	16
b) I feel panic in maths classes.	75	90	5.8	7	0		11.7	14	7.5	9
c) I worry that I get low grades in maths.	45.8	55	29.2	35	0		14.2	17	10.8	13

d) Compared with other subjects, I worry more about maths.	46.7	56	37.5	45	0	7.5	9	8.3	10
e) I feel anxious when solving maths problem.	35.8	43	42.5	51	0	10	12	11.7	14

From Table 3, 78.3 % of the respondents agreed that they feel hopeless when taking maths exams, whilst the remaining 21.7 % were of contrary view. When the participants were asked whether they felt panic in maths classes, 80.8 % of them agreed to this statement. Moreover, 19.2 % of the participants disagreed to this statement. This means that the majority of respondents agreed that they were panicking in maths classes. When participants were probed concerning getting low grade in maths, 75 % of them were of the view that, they worried whenever they get low grade, but 25 % of them disagreed. 84.2 % of the participants agreed that they worry more about mathematics when compare to other subjects. But the other 15.8 % were of the contrary view. The response from the last statement showed that 78.3 % of the participants agreed that they felt anxious when solving maths problems. However, 21.7 disagreed.

After the interview analysis on students' anxiety toward the study of mathematics (interview and focus group guides for teachers, instrument one), students perceived mathematics as problematic and a barricade for future development. *In my view, most students consider mathematics as problem and barrier that prevent future development.* (Claimed by mathematics teacher participant).

Concerning the students' enjoyment of mathematics as a subscale of attitude dimension, they were provided with three statements concerning how they enjoy mathematics to indicate their agreement and the results were presented in Table 4.

Table 4

Rating how students enjoy mathematics

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) Studying mathematics in school is full of fun.	10.8	13	6.7	8	3.3	4	57.5	69	21.7	26
b) I enjoy sharing my mathematical knowledge with the rest of the class.	15.8	19	9.2	11	0		48.3	58	26.7	32
c) I like studying mathematics in school.	12.5	15	16.7	20	0		38.3	46	32.5	39

From Table 4, 17.5 of the respondents agreed that studying mathematics in school was full of fun, 3.3 percent were uncertain. However, the majority 79.2 % disagreed to this statement. 75 % the majority of respondents disagreed that they enjoyed sharing their mathematical knowledge with the rest of the class, whilst 25 % agreed to this assertion. In addition, 29.2 % of the respondents confirmed that they

liked studying mathematics in school. However, 70.8 % of them disagreed that they liked studying mathematics in school.

As to whether pupils enjoyed studying mathematics, they were asked to provide their responses to this research question during the interview “What are your experiences, views, and opinions concerning the study of mathematics?” (Teachers and students interview guides, question one). The result from their responses indicated that the majority of them considered the subject to be bored and un motivating which is an indication that they had no zeal to in learning the subject. *To me mathematics is very boring and un motivating* (affirmed by female participant).

In order to understand how well students are motivated to study mathematics, five statements were provided for the respondents to indicate their responses and the results were displayed in Table 5.

Table 5

Students' mathematics motivation rating

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) My school rewards me for brilliant performance in mathematics	10.8	13	6.7	8	0		60.9	73	21.7	26
b) As a student, my teacher encourages me to study mathematics even if I get answers wrong during lessons.	14.2	17	9.2	11	0		48.3	58	28.3	34
c) As a girl, I get support from the family and school to study mathematics	12.5	15	14.2	17	0		40.8	49	32.5	39
d) My parents provide opportunity for me to study maths	5.8	7	9.2	11	0		54.2	65	30.8	37
e) Our district organizes inter-school science and maths quiz for us.	10.8	13	7.7	9	0		49.2	59	32.5	39

From Table 5, 82.5 % the majority of the respondents disagreed that they were rewarded for brilliant performance in mathematics. Moreover, 17.5 % were of contrary view. 23.4 % of the participants confirmed that they were encouraged by their teachers to study mathematics even if they had answers wrong during lessons. This means that 76.6 majority of the respondents were of opposite view. As whether the students got support from the society to study mathematics, 73.3 % of the participants disagreed that they got support from society to study mathematics while 26.7 % of the participants agreed to this. It can be observed that the majority of the respondents disagreed that their

parents provided equal opportunities for them to study mathematics (85 %) as against the 15 % who agreed. The response from the last statement had a percent of 81.5 indicating that most participants disagreed that their district organises inter-school science and maths quiz for them compared to 18.5 % of the participant who agreed to this statement.

The responses from the interview result also supported the above findings. In relation to how well students were motivated to study maths (interview guide for teachers and students, instrument 6), it is very debilitating that most pupils considered mathematics as uninteresting and failed to put in the maximum efforts possible to achieve their set goals in life. From the responses, most learners were not prepared to attempt any difficult mathematical problems. They perceived mathematics as problematic and a barricade for future development. *Most students consider mathematics as problem and barrier that prevent future development.* (Claimed by 3 mathematics teacher participants).

With regard to how much value students placed on mathematics, respondents were to indicate their agreements to three statements with respect to values of mathematics and the results were presented in Table 6.

Table 6

Rating how students value mathematics

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) I want to study mathematics because I will need it in everyday life	9.2	11	6.7	8	0		62.5	75	21.6	26
b) Mathematics is needed to keep the world in business	13.3	16	9.2	11	0		48.3	58	29.2	35
c) I want to study mathematics in school just to pass my B.E.C. E	38.3	46	29.2	35	3.3	4	16.7	20	12.5	15

From Table 6, 84.1% of the respondents disagreed that they wanted to study mathematics because it will be useful in everyday life as compared to 15.9 % who agreed to this statement. In the second statement, 77.5 % of the respondents disagreed that Mathematics was needed to keep the world in business. But 22.5 % were with contrary view. The third statement had a percent score of 67.5 indicating that most of the respondents agreed that they wanted to study mathematics in school just to pass their B. E. C. E. with 32.5 % holding contrary view.

Respondents were interviewed to enquire about their attitudes toward mathematics (interview guide 4). From the responses, students thought that mathematics was very difficult to study, felt anxious, and lacked self-confidence in studying the subject. *mathematics is very difficult subject to study, we feel anxious when studying mathematics, we don't have confidence in studying it* (explained by 4 female participants). From the responses, students considered mathematics as irrelevant, they complained that they study the subject for nothing, and would not pursue any mathematics-related course in future. *I think mathematics is not needed, we study the subject for nothing, I will not pursue any mathematics-related course in future* (explained by 3 female student participants).

Research Question 2

Which home, socio-cultural, school, teacher and student factors that contribute to Fanteakwa District Junior High School female students' attitudes toward mathematics in Ghana?

To solicit information on the factors that contributed to the Fanteakwa district junior school female learners' negative attitudes to the study of mathematics, the female participants were given twenty-two questionnaires concerning home, socio-cultural, school, teacher and the students' factors to provide their responses.

Home Factors. The researchers solicited information from the participants on home factors that impacted learners' attitudes toward the study of mathematics. They provided four statements concerning home factors that could have influenced the students' attitudes toward the subject and the data were presented in Table 7.

Table 7

Rating home factors that contribute to students' attitudes

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) As a girl, my parents support me financially to study mathematics.	9.1	11	10	12	0		59.2	71	21.7	26
b) In my house, there is electricity to study at night.	13.3	16	5.8	7	0		47.5	57	33.4	40
c) Peer pressure and household chores prevent me from studying maths.	38.3	46	32.5	39	0		16.7	20	12.5	15
d) My parents make sure that I study at night.	5	6	7.5	9	0		55.8	67	31.7	38

The findings from Table 7 revealed that 80.9 % of girls disagreed that they were supported by their parents financially to study mathematics. However, 19.1 % agreed to this assertion. 80.9 % of the participants disagreed that they have electricity at home to study at night. Other 19.1 % of the participants have agreed to this statement. From the analysis of the data, respondents lacked support from their peers and overburden with household chores which made it difficult for them to study mathematics (70.8 of the respondents agreed to this) as against 29.2 %. The analysis also indicated that most of the learners established that their parents failed to check on them to learn at night as 87.5 % of them provided affirmative answers as against 12.5 % who stated otherwise.

Socio-Cultural Factors. The participants were asked to respond to statements concerning sociocultural practice and the result is presented in Table 8.

Table 8

Rating socio-cultural factors that contribute to students' attitudes

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) As a girl, I am encouraged by family, school and the state to study mathematics	9.2	11	7.5	9	0		64.1	77	19.2	23
b) As a girl, my parents prioritise sending me to a school than for marriage	10.8	13	5.8	7	0		48.4	58	35	42
c) My society believed that girls were to be engage in household chores	55.8	67	31.7	38	0		5	6	7.5	9
d) My parent's educational background and peer pressure negatively impact my studying of maths	51.7	62	18.3	22	0		16.7	20	13.3	16

The data analysis from Table 8 established that girls were not encouraged by the society to study mathematics as 83.3 % of responses confirmed that. The other 16.7 % opposed the statement. Also, from the data, parents prioritised giving girls for marriage than sending them to school (83.4 % the majority of the participants agreed to this) as against 16.6 %. From the participants, there was a belief in their society that boys normally pursued mathematics and girls occupied the kitchen (87.5 % of the participants were in this direction) as against 12.5 %. 70 % of respondents agreed that parental educational background and peer group impacted students' attitudes to study mathematics as compared to 30 % who disagreed.

In order to be certain about the report of the quantitative data, the twenty female student participants and the five mathematics teacher participants were interviewed on some socio-cultural factors that contributed to students' attitudes toward mathematics (interview and focus group guides for teachers and students, instrument 2), followed up with focused- group discussion and they listed the following as socio-cultural factors that influence female students negatively to the study of mathematics:

- peer influence: *Our friends advised us not to study mathematics.*
- a lot of household chores: *in the house we do a lot of work because of that we don't have time for our home works.*
- Gender stereotypes: *the adults always say mathematics is for boys.*
- The lack of female role model: *we don't have literate people to assist us do our home works.*

Other provided responses were (1) the lack of electricity to study at home. *The students have no electricity in their homes to study at night* (mathematics teacher participant 1), (2) students lacked

mathematics literate people to assist and encourage them to do their assignments. *Some of them have nobody to assist them to do their assignments* (mathematics teacher participant 2), (3) the majority of female learners were residing in polygamous home that were financially handicap and therefore lacked support from home. *Many of these learners were coming from polygamous homes that were financially strained and cannot provide for their children's needs such as exercise books, textbooks, tables and chairs to study at home* (mathematics teacher participants 3).

The result from the focused group discussion appeared as, some of the parents did not help the students to do homework, some of the female end up given themselves to men for money.

Female students are allowed to do a lot of work in the home so they do not have enough time for their books. Some of the female students have to walk for kilometres to school without taking vehicles because of that they may already be tired before lesson commence. (Explained by 2 mathematics teacher participants).

School Factors. Better still, the information from the participants on school factors that affect learners' attitudes toward the study of mathematics was solicited. Five statements concerning school factors that could have influenced the students' attitudes toward the subject and the data were provided and displayed in Table 9.

Table 9

Rating school factors that influence students' attitudes

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) The school environment is walled and conducive for learning Mathematics.	9.2	11	13.3	16	0		41.7	50	35.8	43
b) The school provides teaching learning resources to support lesson.	13.3	16	8.3	10	0		48.4	58	30	36
c) The lack of reward package for teachers and students affect the study of mathematics.	38.3	46	30.6	37	0		18.3	22	12.5	15
d) We have enough tables and chairs in the Classrooms	8.3	10	7.5	9	0		52.5	63	31.7	38
e) Motor bikes, vehicles and people do pass by during lessons	40.8	49	36.7	44	0		7.5	9	15	18

From Table 9, 77.5 % of the respondents disagreed that schools in the district had wall around them with conducive environment. However, 22.5 % had contrary view. Most of the respondents disagreed that the school provides teaching learning resources to support lesson with a whopping 78.4 % as against 21.6 % who agreed to this. For the statement that lack of reward package for teachers and students affect the study of mathematics 68.9 % of participant affirmed to this as against 31.1 %. With regard to whether there were enough tables and chairs in the classroom to support lesson, 84.2 % of the participants disagreed to this as against the 15.8 % who agreed. 77.5 % of the respondents agreed that motor bikes, vehicles and people passed by during lessons. However, 22.5 % of the participants disagreed to this statement.

The interview and group discussion (the interview and focus group guides for teachers and students, instrument 3) with the twenty female students and five mathematics teacher participants supported the findings above. After gathering the responses from the participants, the following were outlined as factors emanating from the school environment that impacted female learners' attitudes negatively to learn mathematics in the district:

The students are too many in the class because of that, individual differences are not taking care of. The school lack enough teaching learning resources to support mathematics lesson, there are no fans in the classrooms so students learn mathematics in hot environments, most of the Junior High Schools do not have wall around their compounds so community members move up and down in the school creating unnecessary noise pollution in the environment which make the environment uncomfortable for learning. Adding to that, most Junior High Schools do not have enough technological tools to support mathematics lesson (3 mathematics teacher participants).

Teacher Factors. To probe teacher factors that impacted learners' attitudes toward the study of mathematics, the respondents or participants were asked to indicate their agreement with the statements provided and the findings are displayed in Table 10.

Table 10

Teacher factors ratings

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) The teacher creates the enabling environment for teaching and learning.	9.2	11	15	18	0		41.7	50	34.1	41
b) The teacher uses teaching learning resources during maths lessons	10.8	13	8.4	10	0		50.8	61	30	36
c) The teacher adjusts the pace of the class to students' level of understanding.	12.5	15	18.3	22	2.5	3	28.3	34	38.4	46
d) The facilitator is well prepared.	8.3	10	10.8	13	0		49.2	59	31.7	38
e) The teacher makes mathematics lesson	7.5	9	8.3	10	0		38.4	46	45.8	55

From Table 10, it is clear that 75.8 % of the participants disagreed to the fact that the facilitator created the enabling environment for teaching and learning of mathematics whilst the remaining 24.2 % were of opposite view. 80.8 % of the respondents disagreed that the facilitator utilised TLRs during lesson delivery. But 19.2 % agreed to this statement. 30.8 % indicated that the facilitator adjusted the pace of the class to students' level of understanding during lesson with whopping the majority of 66.6 % in opposite direction, but 2.5 percent were uncertain. From the analysis of the data from respondents, most of the facilitators did not prepare well before going to class (80.9 % affirmed the statement as against 19.1 % who said otherwise). Some of the teachers failed to promote effective learning that explain mathematics concepts clearer to the student by adopting practical approach when handling the subject (84.2 % of the participants were with this view, but 15.8 % hold opposite view). The interview and the group discussion result below confirmed these claims.

During the interview and focus group discussion, the respondents were asked to state some of the things their mathematics teachers did that made them have negative feeling towards the study of Mathematics (interview guide 5). After gathering the responses from the 5 student respondents during the interview and focus group discussion, these were outlined as factors relating to mathematics teachers that have contributed to the negative attitudes of girls to the study of mathematics:

- Lateness. *the teacher does not come to school early.*
- Inappropriate teaching strategies. *when he comes too, he will be rushing us through the lesson.*
- Teachers negative attitudes toward learners. *some of them insult us for not understanding difficult topics during mathematics lessons.*
- The lack of individual differences during lesson delivery. *Mathematics teachers neglect individual differences during teaching; they even punish us when we failed in the subject and even discourage us.*

Teachers rushing female students through mathematics lessons, humiliating slow learners especially female students, insulting students for not understanding difficult topics during mathematics lessons, sometimes in a rush to cover a lot of topics they neglect the individual differences, sometimes they will not come to class early and punishing students when they failed exams, class tests or exercises were the provided responses. Some of the responses from mathematics teacher participants were as follows:

Some of our teachers do not master their subject area let alone to use technology in teaching mathematics. The learners do not have female mathematics teachers as role model. The mathematics teachers we have in our school are all male so the students think only men can do mathematics because of that they do not have the zeal for the subject. The male teachers do not have patience for learners, they rush them through the subject, some of them engage students in unnecessary conversation to kill time- (4 Emphasised by mathematics teacher participants).

Our teachers shout and use harsh words on us, not drilling the students in Mathematics topic. Failure to give enough exercises after Mathematics lessons by some teachers. Undesirable teaching strategies mostly employed by some teachers; students are not motivated at the early stage to develop interest in the subject, Students perceived mathematics to be very cumbersome and have debilitating interest in the subject (2 Mathematics Teacher participants).

Students Factors. In regard to students' factors that contributed to their attitudes toward mathematics, the responses from the questionnaire, interview and focus group discussion, were presented below.

Table 11

Students' factor ratings

Statement	SA		A		U		D		SD	
	%	N	%	N	%	N	%	N	%	N
a) I think questions given are within our range	9.1	11	7.5	9	0		46.7	56	36.7	44
b) I can cope with harder maths courses	10.8	13	8.4	10	0		50.8	61	30	36
c) When it comes to maths, I'm motivated, have interest and study hard	12.5	15	15.8	19	4.2	5	29.2	35	38.3	46
d) I feel that I will fail in maths, it is problematic	52.5	63	35	42	0		5	6	7.5	9

It has been indicated from Table 11 that students complained that mathematics questions were more difficult than they could understand and any question given to them were not within their range. 83.4 % of the respondents agreed to this statement as against 16.6 % who disagreed. With regard to whether students coped with harder maths topic, 80.8 % disagreed with the remaining 19.2 % stating otherwise. Furthermore, when it comes to studying maths, students feel lazy, lack interest and are unmotivated to study the subject (67.5 % of the respondents confirmed this, 4.2 percent were uncertain, but 28.3 % hold opposite view). Learners considered mathematics as problematic and saw themselves as a failure when they hear of mathematics as confirmed by 87.5 % of the respondents with a few 12.5 % who disagreed to this statement. Also, some female students view the subject as a very complex concept that was a problematic and less feminine advantage. The responses from the interview and focus group discussions resulted below buttress the findings.

The respondents were asked to state other factors they thought were responsible for the poor achievement of the JHS in Mathematics (interview guide for students and teachers, instrument 7). From the participants the following issues were reported as factors emanating from students that influenced their achievement in mathematics; (1) most students thought they were not good in mathematics, the subject was too complex to learn, don't understand most of the concept, *feel anxious about mathematics and feared that they will get low grade* in the subject and it can only be learn by talented students. *I feel anxious about mathematics and feared that I will get low grade, it is problematic and don't favour us; as for me, am not good in mathematics, I don't understand most of the concept, it too complex, I think maths is for only the gifted, I feel anxious about mathematics and feared that I will get low grade, it is problematic and don't favour us.* (Emphasized by 4 female student participants). (1) Inattentiveness in class, laziness on the part of students, students failed to manage their time well, consider mathematics as difficult and

boring. *Majority of the learners are lazy to study mathematics and failed to manage their time well and are inattentive in class, consider mathematics to be difficult and boring, absent themselves from class* (affirmed by 2 mathematics teacher participants).

Discussion

The discussions of the findings were accomplished in light of research questions and the corresponding literature. The responses from the, interview, focus group discussion, and questionnaire in Table 2 – Table 6 showed that many female students in Fanteakwa district have a negative attitude toward mathematics. They lacked self-confidence (from Table 2, 80.9 % of the participants disagreed that girls are also brilliant enough to do well in difficult maths topics), and felt panic when solving mathematics problem (80.8% of participants from Table 3), were emotional/ anxious (78.3% of participants from Table 3), lacked interest in the subject (79.2% of participants from Table 4), were not motivated and they were neutral about whether mathematics was useful in everyday life which negatively affected their attitudes toward mathematics.

The findings above confirmed the research conducted by Wakhata et al. (2022) on the relationship between students' attitudes and mathematics performance, it appeared that despite the crucial role of mathematics in development of human resource, many learners in the first and second cycle institutions are not very much enthused over mathematics due to their poor attitudes toward the study of the subject at various level of education. It also corroborated the work by other researchers like Arko and Kporyi (2018) in senior high school at Ordoben on students' attitudes toward mathematics and the result showed that, in this modern world, many of these learners found it difficult to solve mathematics problems and hence perform very poorly in their final examinations. Learners' achievement in mathematics at the basic education certificate examination has been deteriorating over the years, the reports about the candidates were that they lacked understanding of mathematical concepts and find it difficult to form the appropriate mathematical equations which could be tackled with the fundamental knowledge (Chief Examiner's Report, as cited in Arko & Kporyi, 2018). All of these are blamed on students' attitudes toward the subject.

Although the data analysis from Table 6 shown that 15.9% of learners concede that mathematics has important uses in everyday life, the majority 84.1% of them considered the subject to be irrelevant and simply a barrier that prevents future development. The expression of this feelings happens at their school times. consequently, most female learners demonstrate negative attitudes toward mathematics and tend to lack self-confidences in mathematics. Moreover, these students perceived themselves as subservient to boy and may not consider mathematics as their area of interest, many of them perceived mathematics as a field for boys and were worried about the subject. Majority of the participants were of the view that most female learners feel reluctant to make any effort to comprehend the concepts, so they always blamed their mathematics teachers and perceived the subject as difficult. The excerpt below from the interviewees confirmed these assertions. *I think mathematics is very difficult subject to study, mathematics is a male dominated field, our teachers do not help us* (explained by female participants).

These students' attitudes are linked with many factors, including mathematics teachers' instructional approaches, roles, teaching methods, cultural stereotypes, lack of parental support, inconducive school environment and their attitudes toward mathematics play vital part in this problem (Table 7 – Table 10 support this findings). As to whether pupils enjoy studying mathematics, their responses from Table 4 indicated that the 79.2% the majority of them considered the subject to be boring and that they didn't make any fun out of it, which is an indication that they had no interest in studying the subject. The responses from the interviewees also confirmed this report. *To me*

mathematics is very boring and unmotivating (affirmed by female participants). Thus, it is very debilitating that most pupils consider mathematics uninteresting and failed to put in the maximum effort to attain their set targets in life. From the responses, most pupils were not prepared to attempt any difficult mathematics problems. They perceived the subject as problematic and a barricade for future development. *In my view, many students consider mathematics as a problem and barrier that prevent future development* (claimed by mathematics teacher participants). To add to this, learners absent themselves from mathematics class; thinking that studying the subject is irrelevant and worrying.

As appears from Table 6, the participants did not understand and value the usefulness of mathematics in everyday life and the contemporary world. And therefore, plan not to pursue any mathematics-related course in future. *I think mathematics is not needed; we study the subject for nothing* (explained by female student interviewees).

In this regard, it is clear that learners don't appreciate the usefulness of mathematics in all aspect of their lives. The results from this work support the research carried out by Kiwanuka et al. (2020) which shown that there is a reciprocal effect between attitude and performance in mathematics. That is, high talented students tend to develop positive attitude. In other words, students with positive attitude tend to achieve high success on mathematics tasks. The above findings also confirmed the research study carried out in Spain by Rodriguez et al. (2020) on gender differences in mathematics motivation and its differential effects on performance in education; which pointed out that comparing female learners with boys, females lack the zeal, always demonstrate weak performance, thought that mathematics is only meant for males; and were anxious about mathematics. Research conducted by Armah et al. (2021) in Ghana on sex differences in mathematics achievement among male and female distance learners revealed that both male and female learners' performance in mathematics were below average grades. I.e., D+, D and E. However, the performance of male distance learners outweighed their female counterparts. The findings above affirmed the report of this study that female students generally exhibit negative attitudes toward mathematics and performed poorly in the subject. Based on the findings and my analysis, female students in Fanteakwa district perceived the study of mathematics as a 'witch-hunt and therefore needs tough skin individuals' to study the subject, although there were a few individual students who are intrinsically motivated. In addition, the finding also confirmed the empirical studies Geng et al. (2022), Ata-Aktürk and Demircan (2021) that there exists relationship between teacher and parent support and student well-being. These scholars pointed out that teacher and parent support have numerous benefits that significantly affect student achievement and emotions. Therefore, if mathematics teachers and other stakeholders want to motivate students, they have to use self-regulatory strategies to challenge the learners to develop interest and persevere in studying of the subject. They can motivate learners to utilize self-regulatory actions and plans (Farhana et al., 2020), put in more effort and persevere longer when they are being challenged (De Smedt et al., 2020).

With regards to the second research question, the findings unravelled several factors that promoted the negative attitudes of JHS female learners to the study of mathematics in the Fanteakwa district. The socio-cultural factors include; lack of societal support and encouragement to study mathematics, parent prioritise given their girls into marriage than sending them to school, gender stereotypes, parental educational background. Home factors include; peer pressure, lack of financial support from home, lack of electricity to study at home, household chores. The above finding is in line with Eriksson et al. (2021) that students who had support and encouragement from their parents achieve high success in mathematics. Filade et al. (2019) explained that the influence of peer groups can affect learner's academic performance positively or negatively depending on the subculture of the group. Thus, if the subculture of the group cherished early marriage most students will end up in

marriage and will not make any effort to achieve high success in mathematics and vice versa. Others lack female role models to emulate at homes, learners walking so many Kilometres before getting to their schools, among others. The finding was in line with Schunk and Usher (2019) who pointed out that students who perceive the role model to be similar to themselves are more likely to be influenced by the model. This means that, for students to excel in mathematics, there must be mathematics role models for students to emulate. This is because when students associated themselves to role models and share their values, it encouraged and give them insight of their own chances of succeeding in future (Schunk & DiBenedetto, 2020).

As appeared from the findings, many students see no value in mathematics and are only in the mathematics class because they are expected to be there. Others include students not attentive in class, being truant, playing and conversing during mathematics lessons, refusing to take part in exercises and assignments, not coping mathematics notes and performing poorly in the subject which in turn lead to developing a negative attitude towards mathematics.

Other factors include the following: Many girls in Fanteakwa district have been conditioned by society to see themselves as inferior to boys when it comes to learning of mathematics. The expectations of many families of girls are to be equipped with some basic literacy and arithmetic skills to enable them to manage their daily life well, and also preserve their culture. Boys on the other hand are expected to be hardworking and breadwinners in society. With these expectations, many parents and families will like to spend much of their resources on boys' education than girls. The excerpt below from the interviewees confirmed the report: *our parents always say that girl's education is not important because they would get pregnant along the way and misuse the resources spent on them but for boys, they would work hard to bring back any resource spent on them.* To confirm this report, research conducted by Jin (2023) in China revealed that gender stereotypes impact female students and pointed out negative influences from family, schools and society would lead to lower confidence in girls. Consequently, girls exhibit lower grades in specific subjects, and got fewer academic achievements. The findings highlight that educators, parents and public media need to encourage both male and female development in all fields.

Some factors emanating from the mathematics teachers that contribute to the negative attitude of female students in the Fanteakwa district are: teachers' attitudes, mathematics teaching beliefs and instructional strategies. Many teachers believe mathematics is difficult and could only be effectively learnt by certain categories of students. So, during teaching, these teachers discourage the girls that they are not capable of studying mathematics and failed to adopt appropriate instructional strategies to cater for individual differences. *Mathematics teachers neglect individual differences during teaching; they even punish us when we failed in the subject and even discourage us.* (Female student participants) This is in line with Ngeche (2017, p. 2) that learner draws from his teacher's disposition to form his own attitude which may likely affect his learning outcome. In addition to that, teachers' instructional practices have also contributed to the negative attitude of female students in the district. It was shown that many teachers don't use appropriate teaching strategies, teaching and learning resources during mathematics lessons. Some teachers still teach the subject in an abstract way without any teaching aid to arouse the students' interest. concerning the teaching pedagogical strategies employed by teachers during mathematics lessons, the study revealed that some mathematics teachers were not competent in handling the subject and for that matter do not allow learners to ask questions to get clarifications in class. And this was in contrary to Asempapa (2022) that the teachers' instructional strategies which make the use of differentiated learning by considering individual students' differences may change learners' attitudes, thereby providing them with support academically and socially. Some students complained that their teachers use insults and other offensive languages on them any time they try to

ask questions in class. Some teachers are not only using inappropriate teaching methods but also, teaching in abstraction without the use of teaching and learning materials.

Again, the lack of excitement during mathematics lessons was mentioned as another cause for the dislike for the subject.

Limitations of the Study

The research work was characterised by some shortcomings. Some of these challenges included (1) the time; the researcher has to spend more time than expected explaining the questions to individual respondents mostly in their local language to enable them to provide the needed and accurate information. (2) the use of five schools out of a total of forty- nine Junior High Schools in the District as a result of time and resource constraints affect the generalizability of the research findings.

Conclusion

The study revealed that junior high schools' learners demonstrated negative attitudes toward the study of mathematics in the Fanteakwa district due to their perceptions and beliefs about mathematics as a difficult subject to understand.

It further found out what home, students', school, teacher and socio-cultural factors that contribute to Junior High School female students' attitudes toward mathematics in the Fanteakwa District of Ghana. These include but not all: poor and illiterate parents, laziness and absenteeism on the part of students, large class size, early marriage and lack of appropriate teaching methods and beliefs about the subject on the part of mathematics teachers, lack of electricity for learners to study at home, and lack of role models.

The researchers made the following ***recommendations*** from the findings:

Firstly, the findings in this thesis (the majority of students don't value mathematics, from Table 6) suggest that attempts can be made to reframe mathematics as a social endeavour. Girls need to understand the role of people in mathematics as a discipline both historically and in the present day.

Secondly, the study revealed that most teachers handling mathematics were not enough competent. The government can set up a national mathematics centres where all stakeholders in mathematics education can research and share ideas on the best way to teach and learn mathematics which will promote mathematics education in the country.

And finally, government can set up district counselling teams in various education directorates who would periodically visit schools in the district to sensitise and educate parents on the need to support the wards in school and also, the government should develop gender friendly curriculum to provide equal opportunity for girl child.

Suggestions for Future Research

The gender-based research on attitudes toward mathematics education still has a long way to go and requires more investigation. Even for nations such as Chile and Jordan, which have achieved a high level of gender equity in mathematics education (Dodee & Innabi, 2018, Mejias et al., 2021), gender disparity favouring boys and the pattern of lower interest in mathematics among girls in various level of education is still persisting. Despite the highly demanded and recognized importance of mathematics and the fact that it is the basic requirement for most of the courses in tertiary institutions, poor performance and lack of interest in mathematics among students remains as an issue of concern

in junior and senior high schools and even universities in developed and developing countries alike. The report of this study revealed that there is a countless factor that contribute to the negative attitudes of female students towards the study of Mathematics in the study area. In view of the adverse effects of these negative attitudes not only on the female student, but also, it may have consequential effects on the country at larger or even beyond. In other to get clear understanding and the gravity of the problem of this nature among the junior high school female students in Ghana, the researchers, therefore, advise that further studies on the topic should be undertaking using a larger sample or we think the study can be repeated in other districts and or the entire country so that a more holistic picture can be generated. This will go a long way to enable the governments, headteachers, various education directorates, and other stakeholders in education to provide a lasting solution to the problem.

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References

- Anaya, L., Stafford, F., & Zamarro, G. (2022). Gender gaps in math performance, perceived mathematical ability and college STEM education: The role of parental occupation. *Education Economics*, 30(2), 113–128. <https://doi.org/10.1080/09645292.2021.1974344>
- Andrade, C. (2020). Multiple testing and protection against a type one error using the Bonferroni and Hochberg corrections. *Indian Journal of Psychological Medicine*, 41(1), 99–100. https://doi.org/10.4103/IJPSYM.IJPSYM_499_18
- Ansah, J. K., Quansah, F., & Nugbe, R. (2020). 'Mathematics achievement in crisis': Modelling the influence of teacher knowledge and experience in Senior high schools in Ghana. *Open Education Studies*, 2(1), 265–276. <https://doi.org/10.1515/edu-2020-0129>
- Arko, A. D., & Kporyi, E. (2018). Attitude of students toward the study of mathematics in Odoben senior high school, Ghana: Implications for curriculum implementation. *Journal of Education and Practice*, 9(35), 15–23. <https://core.ac.uk/download/pdf/234642291.pdf>
- Armah, S. E., Akayure, P., & Armah, R. B (2021). A comparative study of male and female distance learners in mathematics achievement. *Contemporary Mathematics and Science Education*, 2(1), Article ep21001. <https://doi.org/10.30935/conmaths/9288>
- Asempapa, R. S. (2022). Examining practicing teachers' knowledge and attitudes toward mathematical modeling. *International Journal of Education in Mathematics, Science, and Technology (IJEMST)*, 10(2), 272–292. <https://doi.org/10.46328/ijemst.2136>
- Ata-Aktürk, A., & Demircan, H. (2021). Supporting preschool children's STEM learning with parent-involved early engineering education. *Early Childhood Education Journal*, 49, 607–621. <https://doi.org/10.1007/s10643-020-01100-1>
- Aysun, N. E. (2017). Students' attitudes toward mathematics and the teachers' approaches on it. *Acta Didactica Napocensia*, 10(2), 99–108. <https://eric.ed.gov/?id=EJ1156708>

- Bahar, A. K. (2021). Trends in gender disparities among high-achieving students in mathematics: An analysis of the American Mathematics Competition (AMC). *Gifted Child Quarterly*, 65(2), 167–184. <https://doi.org/10.1177/0016986220960453>
- Bosson-Amedenu, S. (2018). Effect of use of WAEC syllabus on the mathematical achievement of WASSCE candidates in Ghana. *Asian Research Journal of Arts & Social Sciences*, 6(4), 1–8. <https://doi.org/10.9734/ARJASS/2018/34695>
- 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, Article 614408. <https://doi.org/10.3389/fams.2021.614408>
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson Education, Inc.
- Davadas, S. D., & Lay, Y. F. (2020). Contributing factors of secondary students' attitude towards mathematics. *European Journal of Educational Research*, 9(2), 489–498.
- De Smedt, F., Rogiers, A., Heirweg, S., Merchie, E., & Van Keer, H. (2020). Assessing and mapping reading and writing motivation in third to eight graders: A self-determination theory perspective. *Frontiers in Psychology*, 11, Article 1678. <https://doi.org/10.3389/fpsyg.2020.01678>
- Eble, A., & Hu, F. (2018). *The sins of the parents: Persistence of gender bias across generations and the gender gap in math performance* [Working paper no. 53]. Center for Development Economics Policy. <http://economics.rutgers.edu/images/jevents/5bbc9edd0afb18.95230941.pdf>
- Eriksson, K., Lindvall, J., Helenius, O., & Ryve, A. (2021). Socioeconomic status as a multidimensional predictor of student achievement in 77 societies. *Frontiers in Education*, 6, Article 731634. <https://doi.org/10.3389/educ.2021.731634>
- Farhana, E., Rutherford, T., & Lynch, C. F. (2020). Investigating relations between self-regulated reading behaviors and science question difficulty. In A. N. Rafferty, J. Whitehill, V. Cavalli-Sforza, & C. Romero (Eds.), *Proceedings of the 13th International conference on educational data mining* (pp. 395–402). https://educationaldatamining.org/files/conferences/EDM2020/papers/paper_160.pdf
- Filade, B. A., Bello, A. A., Uwaoma, C. O., Anwanane, B. B., & Nwangburka, K. (2019). Peer group influence on academic performance of undergraduate students in Babcock University, Ogun State. *African Educational Research Journal*, 7(2), 81–87. <https://doi.org/10.30918/AERJ.72.19.010>
- Fokuo, S. M., Lassong, S. B., & Sarfo, F. K. (2022). Students' poor mathematics performance in Ghana: Are there contributing factors?. *Asian Journal of Education and Social Studies*, 30(4), 16–21. <https://doi.org/10.9734/AJESS/2022/v30i430729>
- Ganley, C. M., & Lubieniski, S. T. (2016). Mathematics confidence, interest, and performance: Examining gender patterns and reciprocal relations. *Learning and Individual Differences*, 47, 182–193. <https://doi.org/10.1016/j.lindif.2016.01.002>
- Geng, Y., Fei, W., Tang, Z., Wang, S., Yu, J., Zhang, M., & Zhang, T. (2022). Parental care and depressive symptoms among Chinese medical students: Roles of empathy and gender. *BMC Medical Education*, 22, Article 451. <https://doi.org/10.1186/s12909-022-03524-2>

- Jin, X. (2023). How gender stereotype in education impact female students' development in secondary school. *Journal of Education, Humanities and Social Sciences*, 12, 229–234. <https://doi.org/10.54097/ehss.v12i.7644>
- Jones, S. (2016). *Gender issues in mathematics education in Tanzania*. Royal Road University.
- Karikari, A., Achiaa, E. A., Adu, J., & Opoku, E. K. (2020). Causes of students poor performance in mathematics. A case of Sefwi Bonwire D/A junior high school in the Western region of Ghana. *International Journal of Advanced Research (IJAR)*, 8(9), 904–912. <http://dx.doi.org/10.21474/IJAR01/11740>
- Kiwanuka, H. N., Van Damme, J., Van den Noortgate, W., & Reynolds, C. (2020). Temporal relationship between attitude toward mathematics and mathematics achievement. *International Journal of Mathematical Education in Science and Technology*, 53(6), 1546–1570. <https://doi.org/10.1080/0020739x.2020.1832268>
- Maamin, M., Maat, S. M., & Iksan, Z. H. (2022). The influence of student engagement on mathematical achievement among secondary school students. *Mathematics*, 10(1), Article 41. <https://doi.org/10.3390/math10010041>
- Mejias, P. P., McAllister, D. E., Diaz, K. G., & Ravest, J. (2021). A longitudinal study of the gender gap in mathematics achievement: Evidence from Chile. *Educational Studies in Mathematics*, 107, 583–605. <https://doi.org/10.1007/s10649-021-10052-1>
- Mensah, J., Okyere, M., & Kuranchie, A. (2013). Student attitude towards mathematics and performance: Does the teacher attitude matter?. *Journal of Education and Practice*, 4(3), 131–139.
- Mullis, I. V. S., Martin, M. O., Foy, P., & Arora, A. (2012). *TIMSS 2011 international mathematics report: Findings from IEA's trends in international mathematics and science study at the fourth and eighth grades*. Chestnut Hill, TIMSS & PIRLS International Study Center.
- Ngeche, T. M. N. (2017). Student and teacher attitudes as correlates of performance in mathematics in Cameroon secondary schools. *International Journal of Humanities Social Sciences and Education*, 4(12), 1–10. <https://dx.doi.org/10.20431/2349-0381.0412001>
- Rodriguez, S., Regueiro, B., Piñeiro, I., Estévez, I., & Valle, A. (2020). Gender differences in mathematics motivation: Differential effects on performance in primary education. *Frontiers in Psychology*, 10, Article 3050. <https://doi.org/10.3389/fpsyg.2019.03050>
- Rozgonjuk, D., Kraav, T., Mikkor, K., Orav-Puurand, K., & Täht, K. (2020). Mathematics anxiety among STEM and social sciences students: The roles of mathematics self-efficacy, and deep and surface approach to learning. *International Journal of STEM Education*, 7(1), Article 46. <https://doi.org/10.1186/s40594-020-00246-z>
- Schunk, D. H., & DiBenedetto, M. K. (2020). Motivation and social cognitive theory. *Contemporary Educational Psychology*, 60, Article 101832. <https://doi.org/10.1016/j.cedpsych.2019.101832>
- Schunk, D. H., & Usher, E. L. (2019). Social cognitive theory and motivation. In R. M. Ryan (Ed.), *The Oxford handbook of human motivation* (2nd ed., pp. 11–26). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780190666453.013.2>

- Wakhata, R., Balimuttajjo, S., & Mutarutinya, V. (2022). *Relationship between students' attitude towards, and performance in mathematics word problems.* bioRxiv. <https://doi.org/10.1101/2022.11.21.517411>
- Wijaya, T. T., Rahmadi, I. F., Chotimah, S., Jailani, J., & Wutsqa, D. U. (2022) A case study of factors that affect secondary school mathematics achievement: Teacher-parent support, stress levels, and students' well-being. *International Journal of Environment Research and Public Health*, 19(23), Article 16247. <https://doi.org/10.3390/ijerph192316247>
- Yadav, S. (2019). Role of mathematics in the development of society. *International Journal of Research and Analytical Reviews (IJRAR)*, 6(4), 295–298. <https://ssrn.com/abstract=3677993>
- Zakariya, Y. F., Nilsen, H. K., Goodchild, S., & Bjørkestøl, K. (2020). Self-efficacy and approaches to learning mathematics among engineering students: Empirical evidence for potential causal relations. *International Journal of Mathematical Education in Science and Technology*, 53(4), 827–841. <https://doi.org/10.1080/0020739X.2020.1783006>