Original Research Article

The Effect of Students' Background on Students' Interest in Mathematics: The mediation of students' motivation and students' perception in Ghana

Abstract

The dependence of scientific and technological advancement on mathematics requires investigation on what predict students' motivation in mathematics. The present study investigated the influence of students' perception (SP), students' background (SB) and students' motivation (SM) as predictor of students' interest in mathematics (SIM). The study further presented an empirical structural equation model (SEM) that predict students' interest, students' motivation and students' perception in mathematics. Using cohort samples of randomly selected 1,263 participants completed a self-designed validated questionnaires instrument whose a-reliability was 0.74, 0.7, 0.68, 0.82 and 0.94 for SIM, SB, SM, SP and overall instrument reliability respectively. The results from the study at 5% a-level indicated as statistically significant relationship between SP,SB,SM and SIM.SP,SB,SM explains 27.9% of variance in SIM. The study further revealed statistical significance between SB and SP such that SB explains 32.1% of variance in SP. The study finally established statistically significant relationship between SB, SP and SM; the study confirms that SB and SP explain 31.6% of SM. The study concluded that students' interest in mathematics is related to student perception, students' background, and students' motivation. The study further concluded that student motivation is related to students' perceptions and students' background although students' background predicts students' perception about mathematics. It is recommended by this study to educators and educational stakeholders to focus attention on determinants of students' mathematics interest by introducing positive interventions from the very beginning of students' mathematics educational.

Keywords: Students' perception, Students' Motivation, Students' interest, High school, Ghana.

1.0 Introduction

Technological advancement and scientific innovation in the world has always taken its strength from mathematics. Mathematics has been the basis of the technology of the world and for growth and development of every scientific and industrial community the role of mathematics cannot be downplayed. The recognition of mathematics as a pillar of scientific and technological advancement by the developed country has widened the gap between the developed and the developing country. The recognition and further steps to make mathematics a subject liked and interested by most students from elementary through the senior high school require the attention of Africa educational leadership. The examination oriented learning in mathematics cant produced the kind of mathematical innovations and the earlier the focus on examination is shifted to interest the better it will be for student mathematics achievement. Many studies in mathematics education has focused on students achievement and performance, however, students' performance can't be determined without students interest. Students' interest in mathematics is perceived by this study to derive performance and achievement. For this very reasons, for educational leadership to deal holistically with the issues of poor performance in mathematics, students interest in mathematics should first be tackled else the fight against poor performance in mathematics will achieve very little. The problem with limited literature in students' interest in mathematics and the need to contribute to the expanding of literature in mathematics education has provided the needed justification for the study.

1.2 Students' Subject specific Interest

The construct interest is notably prevailed in the educational curriculum and its influence on students' achievement and goal orientation is great. The students' achievement and goal orientation is function of interest and without interest performance and achievement may exist but minimal. The construct interest has been looked at as being intrinsic motivation that propels a students' degree of enjoyment to perform a given task(Katz, Assor, Kanat-Maymon, & Bereby-Meyer, 2006; Levesque, Copeland, Pattie, & Deci, 2010). The students' interest in a particular subject has been defined by many authors and this study presents an integrated definition of interest. Students' interest is an intrinsic and extrinsic force that creates state of enjoyment which promotes students' goal orientation and achievement (Deci & Ryan, 1985; Tapola, Veermans, & Niemivirta, 2013; A Wigfield & Eccles, 1992).The students' interest in a learning process play significant role in students achievement and goal orientation. Students' interest in the classroom setting has some relationship with the mathematics teachers' mode of delivery which meets both the emotional and intellectual needs of the students(Alonzo, Kobarg, & Seidel, 2012; Pantziara & Philippou, 2014).The studies further imply that the school environment and the teachers have strong influence on students interest development in mathematics.

Let extend the discussion on interest further to link crated by (A Wigfield & Eccles, 1992) between motivation and interest makes it important to throw some light on theory of expectation.

1.2.1 Expectancy –Value Model

In recent years, research on the theory of expectation-value in line with motivation has been extended and ongoing. The expectancy value theory which integrates the beliefs, judgments and the value students' place on their capabilities to perform a task successfully was developed by (J. S. Eccles et al., 1983; JS Eccles, Wigfield, & Flanagan, 1989; A Wigfield &

Eccles, 1992).The model refers to expectation as beliefs and judgement of a person to capabilities to perform a task while the value presents the different beliefs that students have about the reasons why they should get involve in a task (Gasco, Goñi, & Villarroel, 2014; Guo, Marsh, Parker, Morin, & Yeung, 2015; Allan Wigfield, 1994). These studies suggested that the students' are rational and active decision makers from the general cognitive perspective. Their studies further suggest that students will actively engage in learning activities in subject like mathematics when it will further their future career.(Asiedu-addo, Assuah, & Arthur, 2016).

1.3 Students' Perception and Attitude on interest

Several studies and research have been done in many countries to find the factors that influence the students' performance in mathematics. Among these factors, students' attitude towards mathematics is one important factor that has been consistently studied. Often, the studies on relationship between students' attitude and the students' academic performance show a positive relationship (Bramlett & Herron, 2005; Mohd, Mahmood, & Ismail, 2011; C Papanastasiou, 2000; Patterson, Decker, Eckert, & Klaus, 2003). Hence students' attitude and perception towards mathematics is a major factor that might influence the performance of the students. Students' interest in mathematics is significantly influenced by the students' perception about mathematics. The study showed that the more positive perception students' have about mathematics the more interest they demonstrate in mathematics, hence positive perception about mathematics results in high interest in mathematics(Y. Arthur, Asiedu-Addo, & Assuah, 2017; Y. D. Arthur, Asiedu-addo, & Assuah, 2017).

1.4 Students Motivation

Students' motivation naturally has to do with students' desire to participate in the learning process for improved interest and achievement. Moreover students motivation to learn mathematics has been noted to improve students' interest in mathematics(Y. D. Arthur et al., 2017; Y. D. Arthur, Oduro, & Boadi, 2014) . Although students may equally be motivated to perform a task, the sources of their motivation may differ (Muenks, Miele, & Wigfield, 2015; Xiang, Chen, & Bruene, 2005). The term motivation to learn has been defined as the meaningfulness, value, and benefits of academic tasks to the learner-regardless of whether or not they are intrinsically interesting (Pintrich, 2000; Zimmer-Gembeck & Collins, 2008).This definition however encompasses both intrinsic and extrinsic characteristics of motivation. The presence of motivation in student learning is characterized by long-term, quality involvement in learning and commitment to the process of learning (Ames, 1992; Sansone & Morgan, 1992).There are studies in motivational construct that suggest that students motivation to learn is a competence acquired through general experience and stimulation directly through modeling, communication of expectations and direct instruction and socialization with significant others(Buck, 1985; Guo et al., 2015; Kuperminc, Darnell, & Alvarez-Jimenez, 2008; Schiefele & Schaffner, 2015). The environment in which teaching and learning takes place as well as the students background environmental factors play significant role in the motivation development of the student in the learning process (Kember, Ho, & Hong, 2010; Silins & Mulford, 2004).These studies clarifies the views that Children's home environment shapes the initial constellation of attitudes they develop toward learning. When parents nurture their children's natural curiosity about the world by welcoming their questions, encouraging exploration, and familiarizing them with resources that can enlarge their world, they are giving their children the message that learning is worthwhile and frequently fun and satisfying (Bhanot & Jovanovic, 2009; J. Eccles, Adler, & Kaczala, 1982; W. Fan & Williams, 2010). When children are raised in a home that nurtures a sense of self-

worth, competence, autonomy, and self-efficacy, they will be more apt to accept the risks and self-motivated in their goal orientations.

1.5 Students' background, interest and achievement

The socioeconomic status of the student, the parental educational background and the basic school attended are some of the characteristics this study looked at as the measure of students' background as studied in (W. Fan & Williams, 2010; Van Matre JC, Valentine, & Cooper, 2000). The students' with strong parental educational background turns to perform better in mathematics even though students from other background exhibits some level of interest in mathematics (Gonida & Cortina, 2014; Teodorović, 2012). The type of basic school attended does not significantly affect students' interest in mathematics which suggests that students from both private and public junior high school can develop strong interest in mathematics. This suggest that when students are given the needed opportunity and access to quality instructors, mathematics facility and motivated teachers the student will perform in the high school irrespective of the type of basic school attended (Agnihotri Anil Kumar, 2015; Y. D. Arthur, Aseidu-Addo, & Annan, 2015; Y. D. Arthur et al., 2014). The students background in terms of parents parental educational background as well as parents interest in mathematics have positive influence on students interest in mathematics, hence the achievement and performance(Y. D. Arthur et al., 2017; Constantinos Papanastasiou, 2002). These results makes in worthwhile to further investigate the influence of students' background on other constructs as they influence students interest and achievement in mathematics. The problem of students' background and its influence on students interest in mathematics has received very little attentions especially in Africa and Ghana. The study justifiably needs to be undertaken to build upon the existing literature.

2.1 Research Objectives

The present study models the influence of students' motivation, students' perception and students' background on students' interest in mathematics. Specifics to the study purpose are:

i. To predict students interest in mathematics based on students perception, students' background and students' motivation
ii. To predict the influence of student motivation based on students perception and students background.
iii. To estimate the influence of students' background on students perception of mathematics.

2.2 Research Questions

The study formulated the following research question:

i. To what extent does students' interest in mathematics is being predicted by students' perception, students' background and students' motivation?
ii. To what extent does students perception and students' background predicts student motivation to learn mathematics?
iii. To what extent does students' background influence students' perception of about learning mathematics?

2.3 Research Hypotheses

The study tested these hypotheses below:

i. H1: Students' interest in mathematics is significantly influenced by students' perception, students' background and students' motivation.
ii. H2: Students' motivation to learn mathematics is affected significantly by students' perception and students' background.
iii. H3: Students' background significantly influences students' perception of mathematics.

2.0 MATERIALS AND METHODS

2.1 Research Subject and Sampling Method

The study used questionnaires instruments to collect research data and each variable is measured using the five point Likert scale. The respondent was Ghanaian senior high students randomly selected from the list of secondary schools. This study used stratified sampling techniques to randomly select an average of 150 students from 10 senior high schools to respond to structure questionnaires. The questionnaires were administered during first thirty minutes of the student's mathematics lesson which resulted in a very high response rate of 84.2%. The consent of the students' was sought and every student interviewed agreed to be interviewed surety of anonymity. The students were first taking through the various sections in the questionnaires and what is expected of them to do. They were then left to respond to the various sections of the questionnaires and collected after the stipulated time given. The enumerators together with mathematics teacher offered assistances to students when they have any misunderstanding with the variables in the constructs. The questionnaires were tested for reliability and validity with Cronbach's alpha of 0.939 hence the questionnaire items were found to be reliable.

3.0 Data Analysis, Results and Findings

The study applied Structural Equation Modeling and used Smart PLS version 3.0 as analytical software tool, and uses Maximum Likelihood Estimation for data parameter estimation. This study also attempts Smart PLS confirmatory factor analysis method to examine the measurement model's reliability and the validity of the scale using Cronbach's alpha. In order to assess the models internal structural fit, the average variance extracted (AVE) as well as convergent and discriminant validity test were conducted to assess the significant level of the estimation parameters. The study presented a conceptual framework in Fig 1.The study evaluated reliability and validity of the constructs based composite reliability for the internal consistency as suggested by (J. Hair, Ringle, & Sarstedt, 2011; Henseler, Ringle, & Sinkovics, 2009).The result presented in Table 1 shows that the composite reliability values for the constructs are greater than 0.7 which is acceptable of affirming the

presence of internal consistency in the constructs of the model of student interest in mathematics using students perception, students motivation and students background. The results shown in Fig 3 and Fig 5 were run using the PLS bootstrapping algorithms with smart PLS 3.0. The results from the bootstrapping are presented in Table 3 and Table 4 indicating the significant testing of path coefficient in to ascertain their level of significance at 5% alpha level. To also confirm that the indicators of the measurement model has conform to the reliability criteria, their standardized loads should also be greater than 0.7 according to (J. Hair et al., 2011; Henseler, Ringle, & Sarstedt, 2011).The results from the Fig 2 that greater majority of the constructs indicators had values greater than 0.7.The study further updated the model by removing the indicator whose standardized loading was below 0.6 which is the minimum requirement for exploratory purposes as shown in Fig 4 (J. F. Hair, Hult, Ringle, & Sarstedt, 2014; J. Hair et al., 2011; Henseler et al., 2011).The study further assessed convergent and discriminant validity using the average variance extracted (AVE) should be greater than 0.50 for all construct as shown in Table 1.The constructs presented in the study did not indicate sufficient degree of convergent validity except for student interest construct which had AVE value greater than 0.50.

3.1 Assessment and Results of the structural model of PLS-SEM.

The assessment of the structural model using SMART PLS 3.0 through the bootstrapping algorithm for the 1,263 samples are shown in Fig 2, Fig 3, and Fig 4.The values of the students T test of the interrelations within latent variables are the quantities presented on the arrows of both the measurement model and the latent variables. Using the primary criteria for evaluating the structural model thus the R^2 for the endogenous latent variables (student perception, students interest and student motivation).The structural model indicated the R^2 value for student perception ,student motivation and students interest were 0.327,0.306,and 0.262 respectively which are considered moderate for student perception and student motivation but weak for student interest. In assessing the level of significance of the path coefficient through the bootstrapping algorithm. The results of the study showed statistical significance for all the structural paths as shown in Fig 3 and Fig 5.

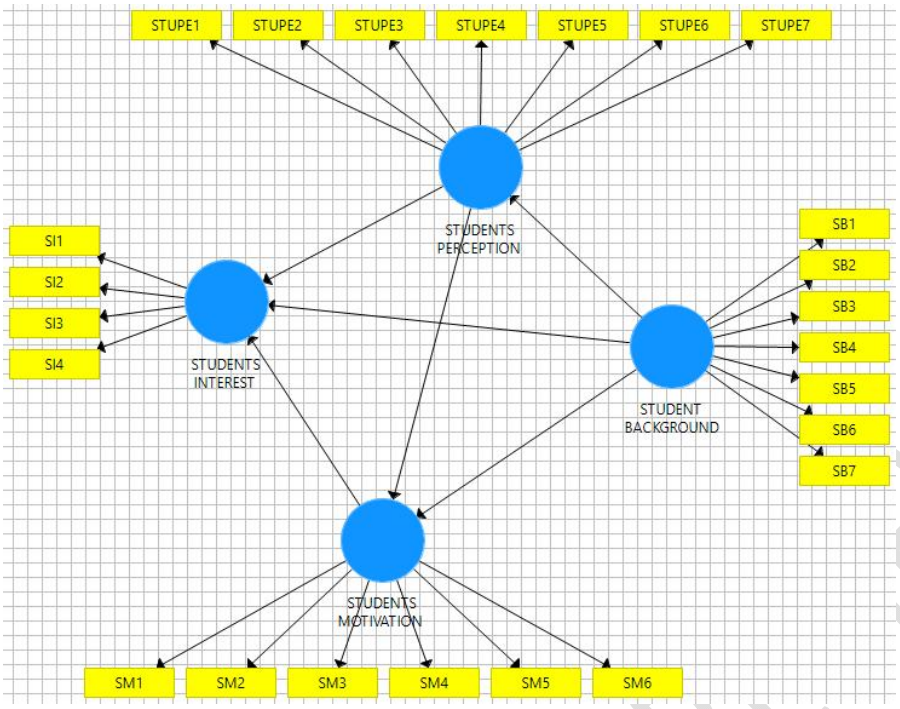

Fig 1 Conceptual students oriented model.

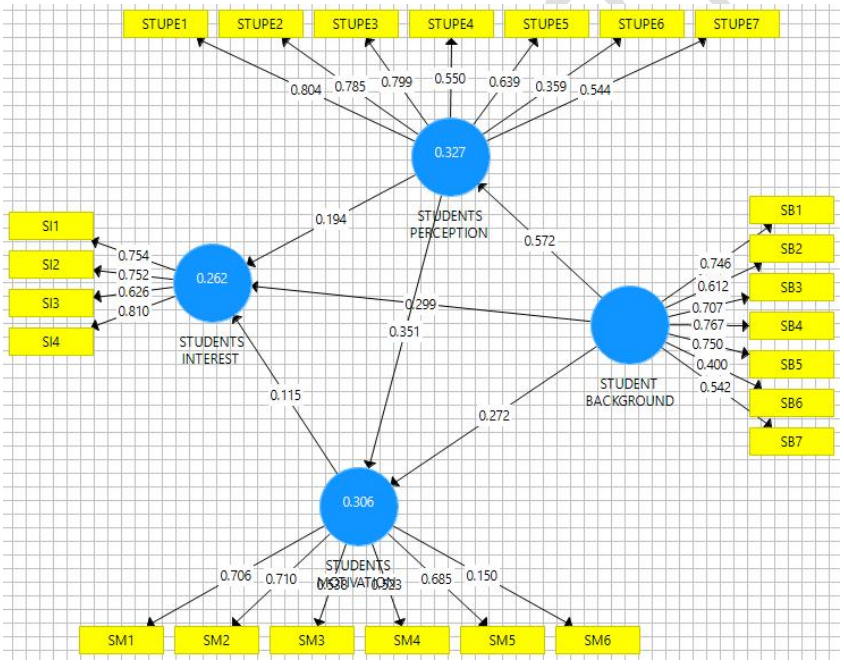

Fig 2 Empirical Model of Students Interest in Mathematics

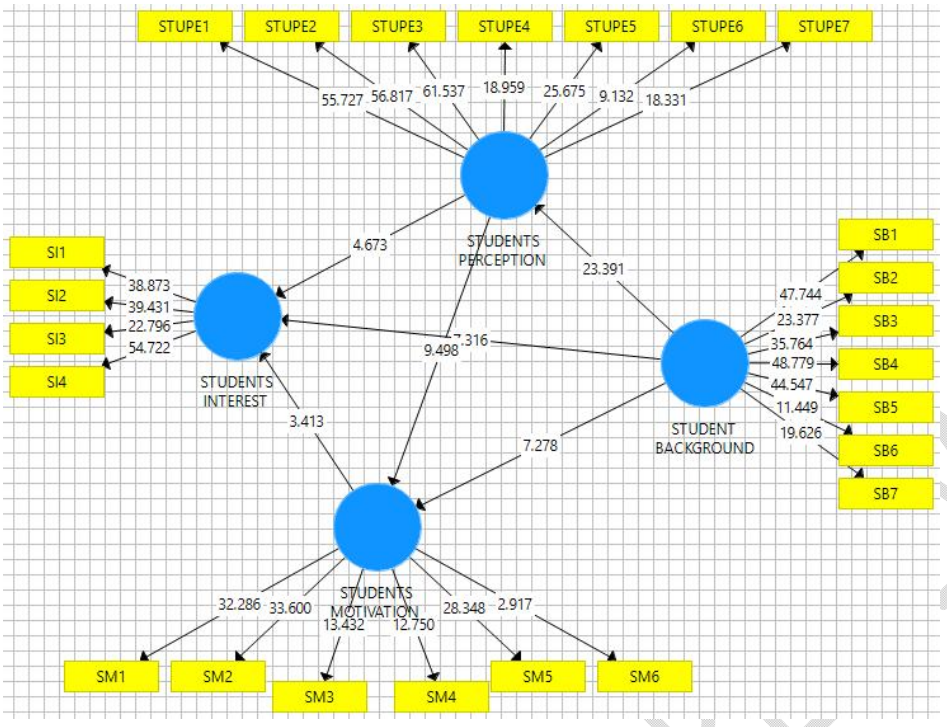

Fig 3 Empirical Bootstrap Model

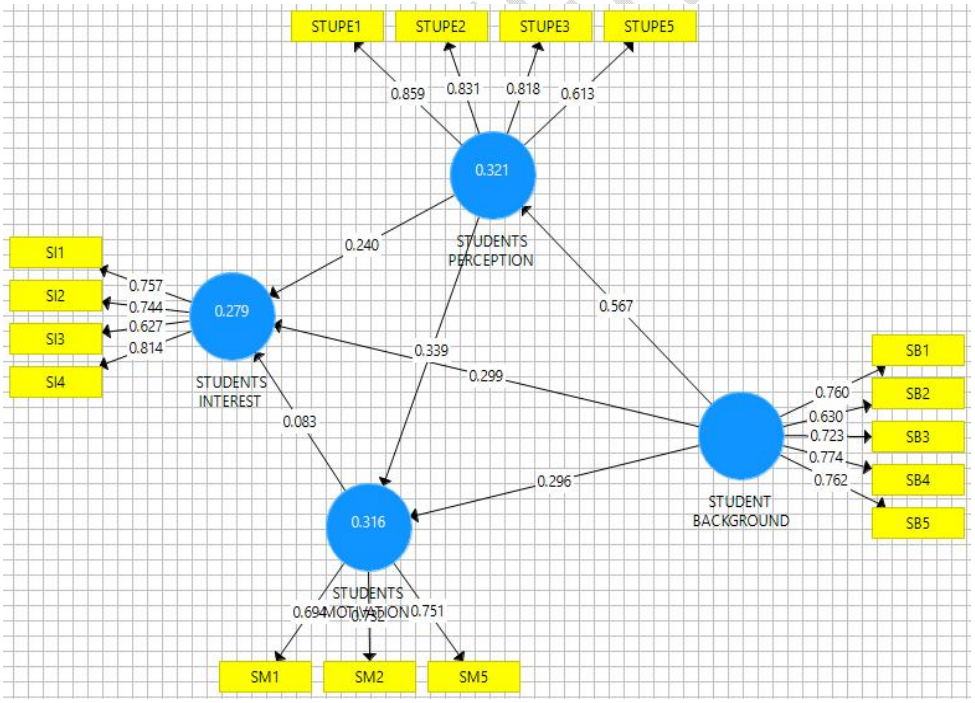

Fig 4 Empirical Modified Model

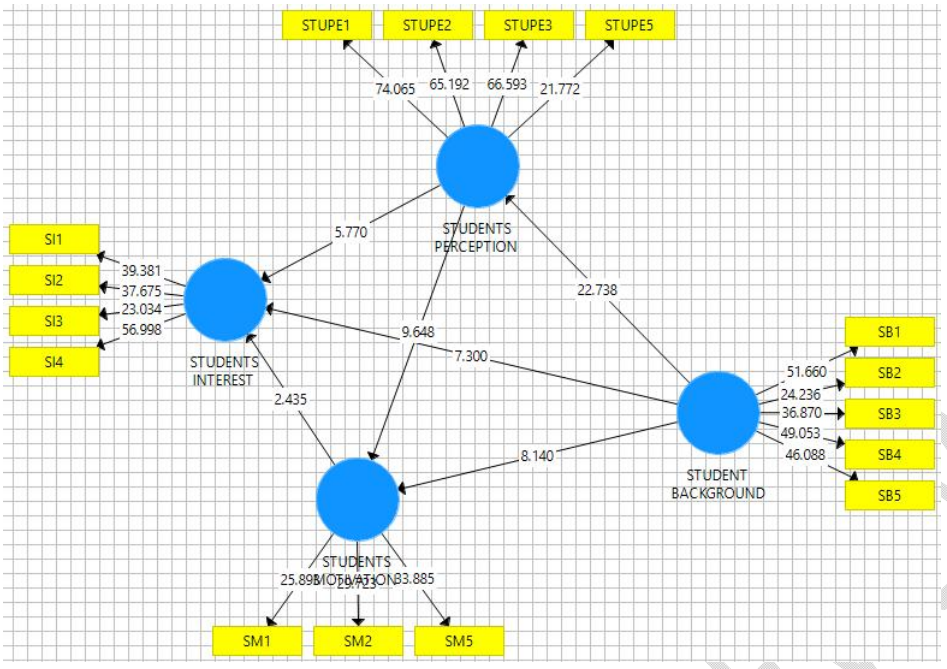

Fig 5 Empirical Modified Bootstrap Model

Table 1 Discriminant Validity using Fornell-Larcker Criterion

CONSTRUCT	STUDENT BACKGROUND	STUDENTS INTEREST	STUDENTS MOTIVATION	STUDENTS PERCEPTION
STUDENT BACKGROUND	0.658			
STUDENTS INTEREST	0.465	0.739		
STUDENTS MOTIVATION	0.473	0.355	0.586	
STUDENTS PERCEPTION	0.572	0.424	0.506	0.659

Table 2 Test of Construct Reliability and Validity

CONSTRUCTS	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
STUDENT BACKGROUND	**0.775**	**0.808**	**0.838**	**0.434**
STUDENTS INTEREST	**0.724**	**0.753**	**0.827**	**0.546**
STUDENTS MOTIVATION	**0.592**	**0.670**	**0.736**	**0.343**
STUDENTS PERCEPTION	**0.773**	**0.821**	**0.835**	**0.434**

Table 3 Average Variance Extracted (AVE) Mean, STDEV, T-Values, P-Values

CONSTRUCTS	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P- Values
STUDENT BACKGROUND	0.536	0.536	0.013	40.664	0.000
STUDENTS INTEREST	0.545	0.545	0.013	42.087	0.000
STUDENTS MOTIVATION	0.527	0.528	0.016	32.070	0.000
STUDENTS PERCEPTION	0.619	0.619	0.012	52.016	0.000

Table 4 Heterotrait-Monotrait Ratio (HTMT) Mean, STDEV, T-Values, P-Values

CONSTRUCT PATH	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P- Values
STUDENTS INTEREST -> STUDENT BACKGROUND	0.599	0.600	0.034	17.465	0.000
STUDENTS MOTIVATION -> STUDENT BACKGROUND	0.715	0.716	0.046	15.526	0.000
STUDENTS MOTIVATION -> STUDENTS INTEREST	0.519	0.519	0.045	11.434	0.000
STUDENTS PERCEPTION -> STUDENT BACKGROUND	0.702	0.702	0.032	22.228	0.000
STUDENTS PERCEPTION -> STUDENTS INTEREST	0.581	0.581	0.037	15.782	0.000
STUDENTS PERCEPTION -> STUDENTS MOTIVATION	0.723	0.725	0.040	17.952	0.000

Table 5 SRMR Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P- Values
Saturated Model	0.079	0.051	0.001	66.923	0.000
Estimated Model	0.079	0.051	0.001	66.830	0.000

4.0 Discussion of results

The influence of students' background on students' perception, students motivation and student interest in mathematics was assessed. The study established empirical evidence that, there exist a direct relationship between students' background and students' interest in mathematics, students' perception about mathematics and students motivation to study mathematics this result is consistent with earlier study by (Arthur et al., 2015, 2014). The results explains further that as student background impact positively and statistically significant in predicting student motivation for learning mathematics, students interest in mathematics as well as students perception about mathematics. The results is consistent with the with the findings in (Fan & Williams, 2010; Fan, 2001; Van Matre et al., 2000)that students with strong background in terms of parental involvement and socioeconomic status positively influence student achievement in mathematics. The study suggest that student with very good socioeconomic background where parents educational and financial capacity is moderately strong are likely to have motivation and good perception about mathematics. Student from school where mathematics are taught in more friendly manner with the more student cantered approach were likely to be interested in mathematics and exhibit good perception as well as motivated to learn mathematics.

The influence of students' motivation and students' perception on students' interest in mathematics was also examined to ascertain their impact and further expand the frontiers of mathematics education literature. The constructs exhibited direct and significant relationship between student motivations on student interest in mathematics as well as student perception about mathematics on student interest in mathematics. The results was consistent with the

earlier studies in (Arthur et al., 2017; Arthur et al., 2017; Zainal et al., 2012). The results suggested that the more positively students perceive mathematics the better their interest in mathematics. Also the study implied that the more students are motivated to learn mathematics the better their interest in mathematics for better achievement. The influence of students' perception on student motivation to learn mathematics revealed to be direct and significant. This shows that positive perception of students about mathematics will give rise to greater motivation for learning mathematic. Student with very good perception about mathematics are more likely to be motivated to learn mathematics as compared to students will negative perception about mathematic.

5.0 Conclusions and recommendations

This section of the study presents the conclusions and recommendations drawn from the findings derived from the data analysis conducted.

5.1 Conclusions

The study concluded as follows

i. Students background positively and significantly affect their motivation to learning mathematics
ii. Students background positively and significantly affect students' perception about mathematics.
iii. Students background positively and significantly affect students' interest in mathematics.
iv. Student motivation to learn mathematics positively and significantly influences the student interest in mathematics.
v. Student perception about mathematics positively and significantly influences students interest in mathematics
vi. Students' perception about mathematics positively and significantly influences students' motivation in learning mathematics.

5.2 Recommendations

It is recommended by this study to educators and educational stakeholders to focus attention on determinants of students' mathematics interest by introducing positive interventions from the very beginning of students' mathematics educational. Parental support for their children is highly recommended by this study since student from background where parental supports and involvement are present turns to become more motivated, develop positive perception and exhibit good interest in mathematics. The study recommends that parent should provide their children with the necessary educational learning materials to help provide as well as introducing their children to emerging technologies in learning mathematics more renewed interest.

References

Agnihotri Anil Kumar. (2015). PROBLEM SOLVING ABILITY AMONG SENIOR SECONDARY SCHOOL STUDENTS. *Indian Streams Research Journal*, *5*(2), 1–8. http://doi.org/10.9780/22307850

Alonzo, A. C., Kobarg, M., & Seidel, T. (2012). Pedagogical content knowledge as reflected

in teacher-student interactions: Analysis of two video cases. *Journal of Research in Science Teaching*, *49*(10), 1211–1239. http://doi.org/10.1002/tea.21055

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*. http://doi.org/10.1037/0022-0663.84.3.261

Arthur, Y., 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. http://doi.org/10.9734/ARJOM/2017/33023

Arthur, Y. D., Aseidu-Addo, S., & Annan, J. (2015). Student mathematics interest in Ghana: The role of parent interest, gender, basic school attended and fear of basic school mathematics teacher. *Advances in Research*, *5*(5), 1–8. http://doi.org/10.9734/AIR/2015/19889

Arthur, Y. D., Asiedu-addo, S., & Assuah, C. (2017). Teacher-Student Variables as Predictor of Students â€™ Interest in Mathematics : The Use of Stepwise Multiple Linear Regression Analysis. *Asian Research Journal of Mathematics*, *4*(3), 1–11. http://doi.org/10.9734/ARJOM/2017/33544

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.

Asiedu-addo, S., Assuah, C., & Arthur, Y. D. (2016). Compulsion in Studying Mathematics and Career Influence by Mathematics on Student Interest in Mathematics. *Asian Research Journal of Arts & Social Sciences*, *1*(2), 1–8. http://doi.org/10.9734/ARJASS/2016/27543

Bhanot, R. T., & Jovanovic, J. (2009). The links between parent behaviors and boys' and girls' science achievement beliefs. *Applied Developmental Science*, *13*(1), 42–59. http://doi.org/10.1080/10888690802606784

Bramlett, D. C., & Herron, S. (2005). A Study of African-American College Students ' Attitudes towards Mathematics. *Journal of Mathematical Sciences*, *4*(2), 43–51.

Buck, R. (1985). Prime theory: An integrated view of motivation and emotion. *Psychological Review*, *92*(3), 389–413. http://doi.org/10.1037/0033-295X.92.3.389

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum Press.

Eccles, J., Adler, T. F., & Kaczala, C. M. (1982). Socialization of achievement attitudes and beliefs: Parental influences. *Child Development*, *53*, 310–321.

Eccles, J. S., Adler, T., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, Values, and Academic Behaviors. *Achievement and Achievement Motivation*. http://doi.org/10.1207/s15327752jpa8502

Eccles, J., Wigfield, A., & Flanagan, C. (1989). Self-concepts, domain values, and self-esteem: Relations and changes at early adolescence. *Journal of*. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1467-6494.1989.tb00484.x/abstract

Fan, W., & Williams, C. M. (2010). The effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation. *Educational Psychology*, *30*(1), 53–74. http://doi.org/10.1080/01443410903353302

Fan, X. (2001). Parental Involvement and Students' Academic Achievement: A Growth Modeling Analysis. *Journal of Experimental Education*, *70*(1), 27–61. http://doi.org/Article

Gasco, J., Goñi, A., & Villarroel, J. D. (2014). Sex differences in mathematics motivation in 8 th and 9 th grade. *Procedia - Social and Behavioral Sciences*, *116*, 1026–1031. http://doi.org/10.1016/j.sbspro.2014.01.340

Gonida, E. N., & Cortina, K. S. (2014). Parental involvement in homework: Relations with parent and student achievement-related motivational beliefs and achievement. *British Journal of Educational Psychology*, *84*(3), 376–396. http://doi.org/10.1111/bjep.12039

Guo, J., Marsh, H. W., Parker, P. D., Morin, A. J. S., & Yeung, A. S. (2015). Expectancy-value in mathematics, gender and socioeconomic background as predictors of achievement and aspirations: A multi-cohort study. *Learning and Individual Differences*, *37*. http://doi.org/10.1016/j.lindif.2015.01.008

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A Primer on Partial Least Squares Structural Equation Mode ling (PLS - SEM)*. Thousand Oaks: Sage.

Hair, J., Ringle, C., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, *19*(2), 139–151.

Henseler, J., Ringle, C., & Sarstedt, M. (2011). *Using partial least squares path modeling in advertising research: Basic concepts and recent issues. In Handbook of research on international advertising,*. Northampton, USA:.: Edward Elgar.

Henseler, J., Ringle, C., & Sinkovics, R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, *20*, 277–319.

Katz, I., Assor, A., Kanat-Maymon, Y., & Bereby-Meyer, Y. (2006). Interest as a motivational resource: Feedback and gender matter, but interest makes the difference. *Social Psychology of Education*, *9*(1), 27–42. http://doi.org/10.1007/s11218-005-2863-7

Kember, D., Ho, A., & Hong, C. (2010). Characterising a teaching and learning environment capable of motivating student learning. *Learning Environments Research*, *13*(1), 43–57. http://doi.org/10.1007/s10984-009-9065-8

Kuperminc, G. P., Darnell, A. J., & Alvarez-Jimenez, A. (2008). Parent involvement in the academic adjustment of Latino middle and high school youth: Teacher expectations and school belonging as mediators. *Journal of Adolescence*, *31*(4), 469–483. http://doi.org/10.1016/j.adolescence.2007.09.003

Levesque, C., Copeland, K. J., Pattie, M. D., & Deci, E. L. (2010). Intrinsic and Extrinsic Motivation. *International Encyclopedia of Education*, 618–623. http://doi.org/10.1016/B978-0-08-044894-7.00612-6

Mohd, N., Mahmood, T., & Ismail, M. (2011). Factors that influence students in mathematics achievement. *International Journal of*. Retrieved from https://www.researchgate.net/profile/Mohd_Nazri_Ismail/publication/228757092_Factor

s_that_influence_students_in_mathematics_achievement/links/00b7d52065cdcf1358000000.pdf

Muenks, K., Miele, D. B., & Wigfield, A. (2015). How Students' Perceptions of the Source of Effort Influence Their Ability Evaluations of Other Students. *Journal of Educational Psychology*, *108*(3). http://doi.org/10.1037/edu0000068

Pantziara, M., & Philippou, G. N. (2014). Students' Motivation in the Mathematics Classroom. Revealing Causes and Consequences. *International Journal of Science and Mathematics Education*, pp. 1–27. http://doi.org/10.1007/s10763-013-9502-0

Papanastasiou, C. (2000). Effects of attitudes and beliefs on mathematics achievement. *Studies in Educational Evaluation*. Retrieved from http://www.sciencedirect.com/science/article/pii/S0191491X00000043

Papanastasiou, C. (2002). Effects of background and school factors on the mathematics achievement. *Educational Research and Evaluation*, *8*(1), 55–70. http://doi.org/10.1076/edre.8.1.55.6916

Patterson, M. P., Decker, C., Eckert, R., & Klaus, S. (2003). Wendling, L., and Papanastasiou, E. Factor associated with high school mathematics performance in the United States. *Studies in Educational Evaluation*, *29*, 91–108.

Pintrich, P. (2000). An Achievement Goal Theory Perspective on Issues in Motivation Terminology, Theory, and Research. *Contemporary Educational Psychology*, *25*(1), 92–104. http://doi.org/10.1006/ceps.1999.1017

Sansone, C., & Morgan, C. (1992). Intrinsic motivation and education: Competence in context. *Motivation and Emotion*, *16*(3), 249–270. http://doi.org/10.1007/BF00991654

Schiefele, U., & Schaffner, E. (2015). Teacher interests, mastery goals, and self-efficacy as predictors of instructional practices and student motivation. *Contemporary Educational Psychology*, *42*, 159–171. http://doi.org/10.1016/j.cedpsych.2015.06.005

Silins, H., & Mulford, B. (2004). Schools as Learning Organisations - Effects on Teacher Leadership and Student Outcomes. *School Effectiveness and School Improvement*, *15*(3–4), 43–466. http://doi.org/10.1080/09243450512331383272

Tapola, A., Veermans, M., & Niemivirta, M. (2013). Predictors and outcomes of situational interest during a science learning task. *Instructional Science*, *41*(6), 1047–1064. http://doi.org/10.1007/s11251-013-9273-6

Teodorović, J. (2012). Student background factors influencing student achievement in Serbia. *Educational Studies*, *38*(1), 89–110. http://doi.org/10.1080/03055698.2011.567027

Van Matre JC, Valentine, J., & Cooper, H. (2000). Effect of Students' After-School Activities on Teachers' Academic Expectancies. *Contemporary Educational Psychology*, *25*(2), 167–183. http://doi.org/10.1006/ceps.1998.0999

Wigfield, A. (1994). Expectancy-value theory of achievement motivation: A developmental perspective. *Educational Psychology Review*, *6*(1), 49–78. http://doi.org/10.1007/BF02209024

Wigfield, A., & Eccles, J. (1992). The development of achievement task values: A theoretical

analysis. *Developmental Review*. Retrieved from http://www.sciencedirect.com/science/article/pii/027322979290011P

Xiang, P., Chen, A., & Bruene, A. (2005). Interactive impact of intrinsic motivators and extrinsic rewards on behavior and motivation outcomes. *Journal of Teaching in Physical …*, *24*, 179–197. Retrieved from http://libres.uncg.edu/ir/uncg/f/A_Chen_Interactive_2005.pdf

Zainal, N. F. A., Shahrani, S., Yatim, N. F. M., Rahman, R. A., Rahmat, M., & Latih, R. (2012). Students' Perception and Motivation Towards Programming. *Procedia - Social and Behavioral Sciences*, *59*, 277–286. http://doi.org/10.1016/j.sbspro.2012.09.276

Zimmer-Gembeck, M. J., & Collins, W. A. (2008). Autonomy Development During Adolescence. In *Blackwell Handbook of Adolescence* (pp. 174–204). http://doi.org/10.1002/9780470756607.ch9