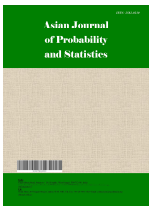

Asian Journal of Probability and Statistics

5(3): 1-13, 2019; Article no.AJPAS.51429
ISSN: 2582-0230

The Effect of Background on Students' Interest in Mathematics: The Mediation of Students' Motivation and Perception in Ghana

Yarhands Dissou Arthur[1*]

[1]Department of Mathematics Education, College of Technology Education, University of Education, Winneba-Kumasi Campus, P.O. Box 1277, Kumasi, Ghana.

Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/AJPAS/2019/v5i330135
Editor(s):
(1) Dr. Manuel Alberto M. Ferreira, Professor, Department of Mathematics, ISTA-School of Technology and Architecture, Lisbon University, Portugal.
Reviewers:
(1) Alan Garfield, University of Dubuque, USA.
(2) Munnazza Afreen Mohd Hamid, India.
(3) Vera Lucia Felicetti, La Salle University, Brazil.
Complete Peer review History: http://www.sdiarticle4.com/review-history/51429

Original Research Article

Received: 11 July 2019
Accepted: 14 September 2019
Published: 14 October 2019

Abstract

The dependence of scientific and technological advancement on mathematics requires investigation into what affects students' motivation in mathematics. The present study investigated the influence of students' background (SB) as mediated by students' perception (SP), and students' motivation (SM) as predictor of students' interest in mathematics (SIM). The study further presented an empirical structural equation models (SEM) that predicts students' interest, students' motivation and students' perception in mathematics. Using cohort samples of randomly selected 1,263, participants completed researcher-designed and validated questionnaires with a-reliability of 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% alpha level indicated as statistically significant relationship between SP, SB, SM and SIM. SP, SB, SM explain 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. It was further concluded that student motivation is related to students' perceptions and students' background. Finally, although students' background predicts students' perception about

**Corresponding author: E-mail: day1981boy@yahoo.com, day1981boyy@gmail.com;*

mathematics. It is recommended 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 education.

Keywords: Ghana; high school; students' motivation; students' perception; students' interest.

1 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 the 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 developed countries has widened the gap between the developed and the developing countries. The recognition and further steps to make mathematics an interesting subject and liked by most students from elementary through the senior high school require the attention of educational leadership of developing countries. The examination oriented learning in mathematics cannot produce the kind of mathematical innovations for development. The earlier the focus on examination is shifted to interest, the better it will be for student mathematics achievement. Many studies in mathematics education have focused on students' achievement and performance. However, students' performance cannot be isolated from students' interest. Students' interest in mathematics is perceived by this study to drive performance and achievement. For this very reason, 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.

1.1 Theoretical underpinning

The theoretical considérations of this study are considered under expectancy-value model, students' interest, students' perception and attitude on interest, students' motivation students' background, interest and achievement.

1.1.1 Expectancy –value model

In recent years, research on the theory of expectancy-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 some researchers [1–3]. The model refers to expectation as beliefs and judgment 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 involved in a task [4–6]. 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 a subject like mathematics when it will further their future career [7].

1.1.2 Student Interest

The construct interest notably prevails in the educational curriculum and its influence on students' achievement and goal orientation is great. The students' achievement and goal orientation is a 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 student's degree of enjoyment to perform a given task [8,9]. 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 [1,10,11]. The students' interest in a learning process plays 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 [12,13]. The studies further imply that the school environment and the teachers have strong influence on students' interest development in mathematics. The discussion can be extended by creating a link between students interest and motivation in line with the assertions championed by [1] to throw some light on theory of expectation.

1.1.3 Students' perception and attitude on interest

Several studies and research have been done in many countries to determine 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 [14–17]. 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. These studies have shown 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 [18,19].

1.1.4 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 [19,20] . Although students may equally be motivated to perform a task, the sources of their motivation may differ [21,22]. 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 [23,24]. This definition, however, encompasses both intrinsic and extrinsic characteristics of motivation. The presence of motivation in a student learning is characterized by long-term, quality involvement in learning and commitment to the process of learning [25,26]. 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 [5,27–29]. 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 [30,31]. These studies clarify 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 [32–34]. 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.

1.1.5 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 examined as the measure of students' background as in some similar studies [32,35]. The students' with strong parental educational background tend to perform better in mathematics even though students from other backgrounds exhibits some level of interest in mathematics [36,37]. 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 schools can develop strong interest in mathematics. This suggests 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 [20,38,39]. 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 [19,40]. These results make it worthwhile to further investigate the influence of students' background on other constructs as they influence students interest and achievement in mathematics. The issue of students' background and its influence on

students' interest in mathematics has received very little attention especially in Africa and Ghana. The study justifiably needs to be undertaken to build upon the existing literature.

2 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.

2.1 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?

2.2 Research hypotheses

The following research hypotheses were formulated to guide the study.

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.

3 Research Methodology

The study used questionnaires to collect data and the variables are measured using a 5- point Likert scale. The respondents were Ghanaian senior high students randomly selected from the list of secondary schools. This study used stratified sampling technique to randomly select an average of 150 students each from 10 senior high schools giving a total 1500 respondents to respond to the 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% representing 1263 valid respondents. The consent of the students was sought and they were assured of anonymity. The students were first taken through the various sections of the questionnaire and what was expected of them to do. They were then left to respond to the various sections of the questionnaire and which were returned after completing them. The enumerators together with mathematics teacher offered assistance to students when they had any misunderstanding with the questionnaire. The questionnaire was tested for reliability using Cronbach's alpha which yielded a value of 0.939 hence the questionnaire items were deemed reliable. The constructs were tested for validity using discriminant validity and convergent validity.

4 Data Analysis and Findings

The study applied Structural Equation Modeling and used Smart PLS version 3.0 as analytical software tool and maximum likelihood estimation for data parameter estimation. This study also attempts Smart PLS confirmatory factor analysis method to examine the measurement model's reliability 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 in some related studies [41,42]. The result presented in Table 1 shows that the composite reliability values for the constructs are greater than 0.7 is an indication acceptable of affirming the presence of internal consistency in the constructs of the model of students' 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 which indicate the significant testing of path coefficient to ascertain their level of significance at 5% alpha level. To also confirm that the indicators of the measurement model has conformed to the reliability criteria, their standardized loads should also be greater than 0.7 according to [41,43]. The results from the Fig. 2 show 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 were below 0.6 which is the minimum requirement for exploratory purposes as shown in Fig. 4 [41,43,44]. The study further assessed convergent and discriminant validity using the average variance extracted (AVE) which should be greater than 0.50 for all constructs as shown in Table 1.The constructs presented in the study did not indicate sufficient degree of convergent validity except for students' interest construct which had AVE value greater than 0.50.

4.1 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 is shown in Fig. 2, Fig. 3, and Fig. 4. The values of the student 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 (students' perception, students' interest and students' 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 addition to the assessment criteria for the structural model, the level of significance of the path coefficient after bootstrapping algorithm was performed was used. The results of the study showed statistical significance for all the structural paths as shown in Fig. 3 and Fig. 5.

Table 1. Discriminant validity using Fornell-Larcker criterion

Construct	Student background	Students interest	Students motivation	Students perception
Students' 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

Construct	Cronbach's Alpha	Rho_A	Composite reliability	Average variance extracted (AVE)
Students' 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

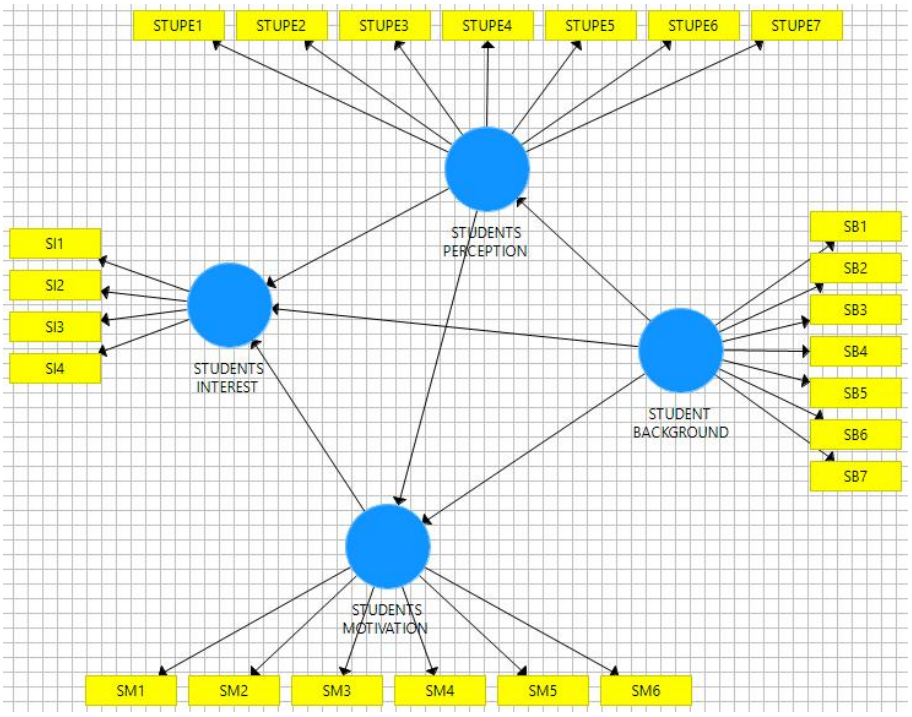

Fig. 1. Conceptual students oriented model

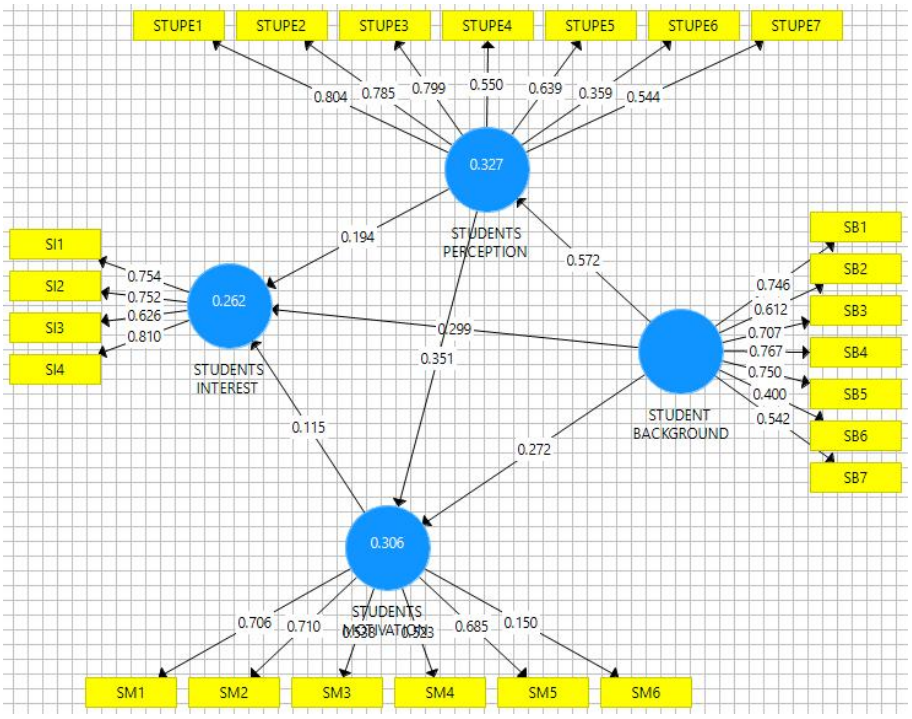

Fig. 2. Empirical model of students interest in mathematics

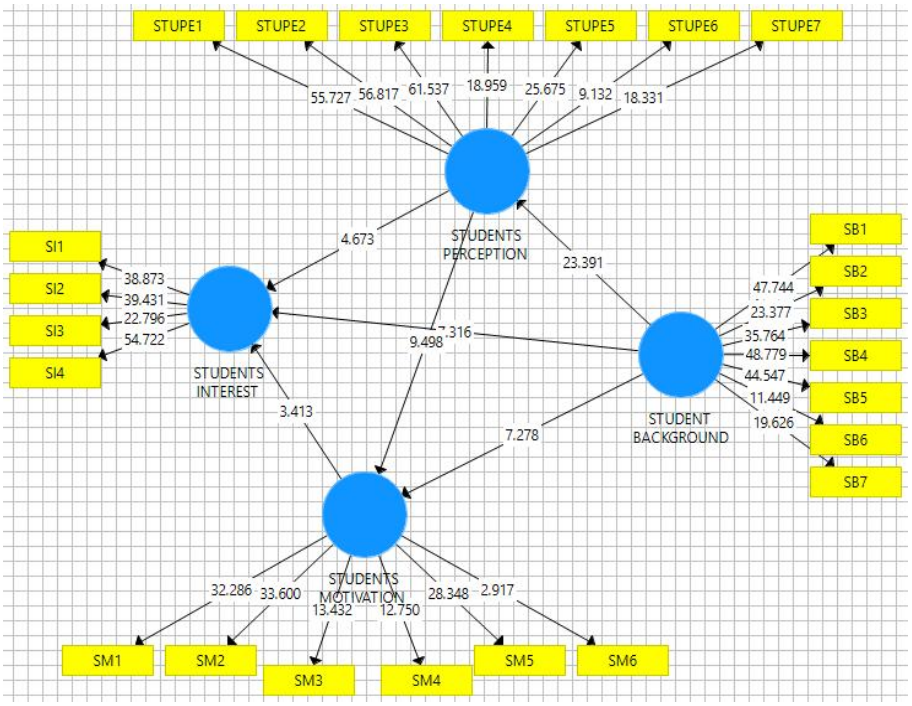

Fig. 3. Empirical bootstrap model

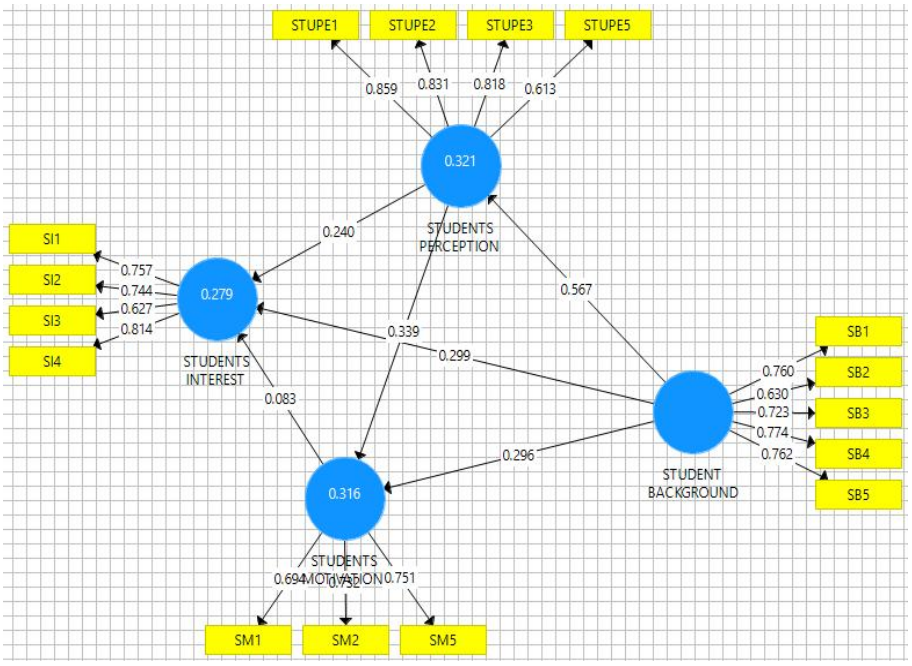

Fig. 4. Empirical modified model

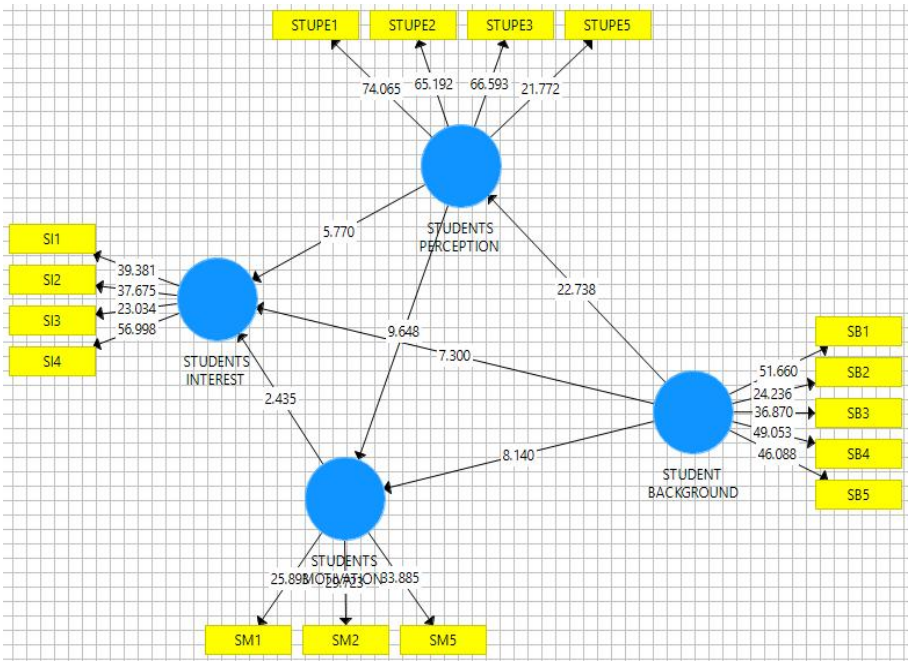

Fig. 5. Empirical modified bootstrap model

Table 3. Average variance extracted (AVE) Mean, STDEV, T-values, P-values

Construct	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T Statistics (|O/STDEV|)	P- values
Students' 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 -> students' background	0.599	0.600	0.034	17.465	0.000
Students' motivation -> students' 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 -> students' 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

5 Discussion of Results

The influence of students' background on students' perception, students' motivation and students' interest in mathematics was assessed. The study established empirical evidence that, there exists 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. (2014, 2015). The results explain further that students' background impact positively and statistically significant in predicting students' motivation for learning mathematics, students' interest in mathematics as well as students' perception about mathematics. The results is consistent with the with the findings of other similar studies [32,35,45] that students with strong background in terms of parental involvement and socioeconomic status positively influence student achievement in mathematics. The study suggests that student with very good socioeconomic background where parents educational and financial capacity are moderately strong, are likely to have motivation and good perception about mathematics. Student from schools where mathematics is taught in more friendly manner with more student-centred 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 students' motivation on students' interest in mathematics as well as students' perception about mathematics on student interest in mathematics. The results was consistent with other earlier studies [18,19,46]. The results suggest that the more positively students perceive mathematics, the better their interest in mathematics. Also, the study implies that the more students are motivated to learn mathematics, the better their interest in mathematics for better achievement. The influence of students' perception on students' 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. Students with very good perception about mathematics are more likely to be motivated to learn mathematics as compared to students will negative perception about mathematic.

6 Conclusions and Recommendations

This section of the study presents the conclusions and recommendations drawn from the findings.

6.1 Conclusions

The study concluded as follows:

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

6.2 Recommendations

It is recommended to educators and stakeholders to focus attention on determinants of students' mathematics interest by introducing positive interventions from the very beginning of students' mathematics education. Parental support for their children is highly recommended since students from background where parental support and involvement are present tend to become more motivated, develop positive perception and

exhibit good interest in mathematics. The study also recommends that parents should provide their children with the necessary educational learning materials and help introduce their children to emerging technologies in learning mathematics.

Consent

As per international standard or university standard informed written student consent has been collected and preserved by the author(s).

Competing Interests

Author has declared that no competing interests exist.

References

[1] Wigfield A, Eccles J. The development of achievement task values: A theoretical analysis. Dev Rev [Internet]; 1992.
[Cited 2016 Jun 18]
Available:http://www.sciencedirect.com/science/article/pii/027322979290011P

[2] Eccles JS, Adler T, Futterman R, Goff SB, Kaczala CM, Meece JL, et al. Expectancies, values and academic behaviors. Achievement and Achievement Motivation. 1983;76–146.

[3] Eccles J, Wigfield A, Flanagan C. Self-concepts, domain values and self esteem: Relations and changes at early adolescence. J [Internet]; 1989.
[Cited 2016 Jun 17]
Available:http://onlinelibrary.wiley.com/doi/10.1111/j.1467-6494.1989.tb00484.x/abstract

[4] Wigfield A. Expectancy-value theory of achievement motivation: A developmental perspective. Educ Psychol Rev. 1994;6(1):49–78.

[5] Guo J, Marsh HW, Parker PD, Morin AJS, Yeung AS. Expectancy-value in mathematics, gender and socioeconomic background as predictors of achievement and aspirations: A multi-cohort study. Learn Individ Differ. 2015;37.

[6] Gasco J, Goñi A, Villarroel JD. Sex differences in mathematics motivation in 8th and 9th grade. Procedia - Soc Behav Sci [Internet]. 2014;116:1026–31.
Available:http://dx.doi.org/10.1016/j.sbspro.2014.01.340

[7] Asiedu-addo S, Assuah C, Arthur YD. Compulsion in studying mathematics and career influence by mathematics on student interest in mathematics. Asian Res J Arts Soc Sci. 2016;1(2):1–8.

[8] Katz I, Assor A, Kanat-Maymon Y, Bereby-Meyer Y. Interest as a motivational resource: Feedback and gender matter, but interest makes the difference. Soc Psychol Educ. 2006;9(1):27–42.

[9] Levesque C, Copeland KJ, Pattie MD, Deci EL. Intrinsic and extrinsic motivation. Int Encycl Educ [Internet]. 2010;618–23.
Available:http://www.sciencedirect.com/science/article/pii/B9780080448947006126

[10] Deci EL, Ryan RM. Intrinsic motivation and self-determination in human behavior. New York, NY: Plenum Press; 1985.

[11] Tapola A, Veermans M, Niemivirta M. Predictors and outcomes of situational interest during a science learning task. Instr Sci. 2013;41(6):1047–64.

[12] Pantziara M, Philippou GN. Students' motivation in the mathematics classroom. Revealing Causes and Consequences. International Journal of Science and Mathematics Education. 2014;1–27.

[13] Alonzo AC, Kobarg M, Seidel T. Pedagogical content knowledge as reflected in teacher-student interactions: Analysis of two video cases. J Res Sci Teach. 2012;49(10):1211–39.

[14] Mohd N, Mahmood T, Ismail M. Factors that influence students in mathematics achievement. Int J [Internet]; 2011.
[Cited 2016 Jun 11]
Available:https://www.researchgate.net/profile/Mohd_Nazri_Ismail/publication/228757092_Factors_that_influence_students_in_mathematics_achievement/links/00b7d52065cdcf1358000000.pdf

[15] Bramlett DC, Herron S. A study of African-American college students' attitudes towards mathematics. J Math Sci. 2005;4(2):43–51.

[16] Papanastasiou C. Effects of attitudes and beliefs on mathematics achievement. Stud Educ Eval [Internet]; 2000.
[Cited 2016 Jun 11]
Available:http://www.sciencedirect.com/science/article/pii/S0191491X00000043

[17] Patterson MP, Decker C, Eckert R, Klaus S, Wendling L, Papanastasiou E. Factor associated with high school mathematics performance in the United States. Stud Educ Eval. 2003;29:91–108.

[18] Arthur YD, Asiedu-Addo S, Assuah C. Students' perception and its impact on Ghanaian students' interest in mathematics: Multivariate statistical analytical approach. Asian Res J Math [Internet]. 2017;4(2):1–12.
Available:http://www.sciencedomain.org/abstract/19069

[19] Arthur YD, Asiedu-addo S, Assuah C. Teacher-student variables as predictor of students ' interest in mathematics: The use of stepwise multiple linear regression analysis. Asian Res J Math. 2017;4(3):1–11.

[20] Arthur YD, Oduro FT, Boadi RK. Statistical analysis of Ghanaian students attitude and interest towards learning mathematics. Int J Educ Res. 2014;2(6):661–70.

[21] Muenks K, Miele DB, Wigfield A. How students' perceptions of the source of effort influence their ability evaluations of other students. J Educ Psychol. 2015;108(3).

[22] Xiang P, Chen A, Bruene A. Interactive impact of intrinsic motivators and extrinsic rewards on behavior and motivation outcomes. J Teach Phys … [Internet]. 2005;24:179–97.
Available:http://libres.uncg.edu/ir/uncg/f/A_Chen_Interactive_2005.pdf

[23] Pintrich P. An achievement goal theory perspective on issues in motivation terminology, theory, and research. Contemp Educ Psychol [Internet]. 2000;25(1):92–104.
Available:http://www.ncbi.nlm.nih.gov/pubmed/10620384

[24] Zimmer-Gembeck MJ, Collins WA. Autonomy development during adolescence. In: Blackwell Handbook of Adolescence. 2008;174–204.

[25] Ames C. Classrooms: Goals, structures and student motivation. Journal of Educational Psychology. 1992;84:261–71.

[26] Sansone C, Morgan C. Intrinsic motivation and education: Competence in context. Motiv Emot. 1992;16(3):249–70.

[27] Buck R. Prime theory: An integrated view of motivation and emotion. Psychol Rev. 1985;92(3):389–413.

[28] Kuperminc GP, Darnell AJ, Alvarez-Jimenez A. Parent involvement in the academic adjustment of Latino middle and high school youth: Teacher expectations and school belonging as mediators. J Adolesc. 2008;31(4):469–83.

[29] Schiefele U, Schaffner E. Teacher interests, mastery goals, and self-efficacy as predictors of instructional practices and student motivation. Contemp Educ Psychol [Internet]. 2015;42:159–71. Available:http://linkinghub.elsevier.com/retrieve/pii/S0361476X15000314

[30] Kember D, Ho A, Hong C. Characterising a teaching and learning environment capable of motivating student learning. Learn Environ Res. 2010;13(1):43–57.

[31] Silins H, Mulford B. Schools as learning organisations - Effects on teacher leadership and student outcomes. Sch Eff Sch Improv. 2004;15(3–4):43–466.

[32] Fan W, Williams CM. The effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation. Educ Psychol. 2010;30(1):53–74.

[33] Eccles J, Adler TF, Kaczala CM. Socialization of achievement attitudes and beliefs: Parental influences. Child Dev. 1982;53:310–21.

[34] Bhanot RT, Jovanovic J. The links between parent behaviors and boys' and girls' science achievement beliefs. Appl Dev Sci [Internet]. 2009;13(1):42–59. Available:http://www.tandfonline.com/doi/abs/10.1080/10888690802606784

[35] Van Matre JC, Valentine J, Cooper H. Effect of students' after-school activities on teachers' academic expectancies. contemp educ psychol [Internet]. 2000;25(2):167–83. Available:http://www.ncbi.nlm.nih.gov/pubmed/10753545

[36] Teodorović J. Student background factors influencing student achievement in Serbia. Educ Stud [Internet]. 2012;38(1):89–110. Available:http://www.tandfonline.com/doi/abs/10.1080/03055698.2011.567027

[37] Gonida EN, Cortina KS. Parental involvement in homework: Relations with parent and student achievement-related motivational beliefs and achievement. Br J Educ Psychol. 2014;84(3):376–96.

[38] Arthur YD, Aseidu-Addo S, Annan J. Student mathematics interest in Ghana: The role of parent interest, gender, basic school attended and fear of basic school mathematics teacher. Adv Res [Internet]. 2015;5(5):1–8. Available:https://www.researchgate.net/profile/Yarhands_Arthur/publication/281555275_Student_Mathematics_Interest_in_Ghana_The_Role_of_Parent_Interest_Gender_Basic_School_Attended_and_Fear_of_Basic_School_Mathematics_Teacher/links/55ed945c08ae65b6389f5e63.pdf

[39] Agnihotri Anil Kumar. Problem solving ability among senior secondary school students. Indian Streams Res J [Internet]. 2015;5(2):1–8. Available:http://isrj.org/UploadedData/6207.pdf

[40] Papanastasiou C. Effects of background and school factors on the mathematics achievement. Educ Res Eval [Internet]. 2002;8(1):55–70.

Available:10.1076/edre.8.1.55.6916%5Cnhttp://ezproxy.umsl.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2002-17526-003&site=ehost-live&scope=site%5Cnedpapan@ucy.ac.cy

[41] Hair J, Ringle C, Sarstedt M. PLS-SEM: Indeed a silver bullet. J Mark Theory Pract. 2011;19(2):139–51.

[42] Henseler J, Ringle C, Sinkovics R. The use of partial least squares path modeling in international marketing. Adv Int Mark. 2009;20:277-319.

[43] Henseler J, Ringle C, Sarstedt M. 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; 2011.

[44] Hair JF, Hult GTM, Ringle CM, Sarstedt M. A primer on partial least squares structural equation modeling (PLS - SEM). Thousand Oaks: Sage; 2014.

[45] Fan X. Parental involvement and students' academic achievement: A growth modeling analysis. J Exp Educ [Internet]. 2001;70(1):27–61.
Available:http://www.scopus.com/scopus/inward/record.url?eid=2-s2.0-0035538790&partnerID=40

[46] Zainal NFA, Shahrani S, Yatim NFM, Rahman RA, Rahmat M, Latih R. Students' perception and motivation towards programming. Procedia - Soc Behav Sci [Internet]. 2012;59:277–86.
Available:http://linkinghub.elsevier.com/retrieve/pii/S187704281203724X

Peer-review history:
The peer review history for this paper can be accessed here (Please copy paste the total link in your browser address bar)
http://www.sdiarticle4.com/review-history/51429