Research Article

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The role of teacher quality on students' mathematics interest: The facilitating effect of students' perception of mathematics

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ABSTRACT

The study aimed to examine the role of teacher quality on students' mathematics interest as facilitated by students' perception of mathematics. The participants were 300 students from three senior high schools. The study was purely a quantitative method that employed a questionnaire as a data collection tool. The data was analyzed using Structural Equation Modeling (SEM) to estimate the result for the hypothesized paths. The findings from the study revealed that teacher-student collaboration and teacher empathy had a direct positive and statistically significant effect on student's mathematics interest. On the other hand, student's perception in mathematics partially facilitates the relationship between teacher empathy and the student's mathematics interest. Moreover, the perception of mathematics partially facilitates the relationship between teacher-student collaboration and student's mathematics interest. The study recommended that mathematics teachers must collaborate with students in terms of classroom teaching and learning and work more practical mathematics examples with students in the class in order to enhance student's mathematics interest.

Keywords: teacher-student collaboration, teacher empathy, mathematics perception, mathematics interest, teacher quality, mediating effect, quantitative design, questionnaire, structural equation modeling (SEM)

INTRODUCTION

Mathematics is the body of science that plays a significant impact in the development of individual life and the nation's development. Mathematics is a branch of science that deals with numbers, calculations, and logical reasoning. It is a fundamental subject that contributes to advancing technology, engineering, medicine, economics, and other sciences. According to Maass et al. (2019), mathematics provides the framework for solving complex real-world problems, from designing bridges and building to predicting stock prices. Naganjaneyulu et al. (2020) found that mathematics provides the foundation for modern technology. Computer

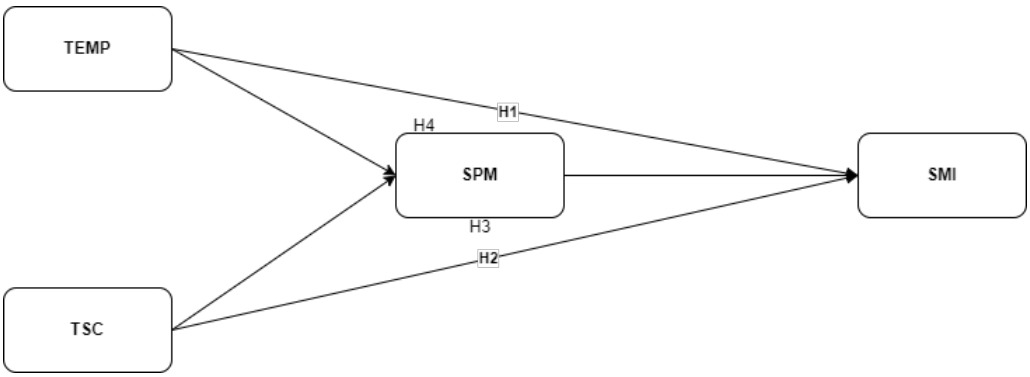

Figure 1. Conceptual framework

programming, such as robotics, artificial intelligence, and many other technological advancements, would not be possible without mathematical principles. Yadav (2019) also points out that mathematics is used in various scientific fields, including physics, chemistry, biology, and medicine. It helps scientists understand and predict the behavior of natural phenomena and study complex biological systems. Based on the contribution of mathematics to individuals and nations, mathematics has been made a compulsory subject for students to undertake in some West African countries, such as Ghana and Nigeria. Students in Ghana see mathematics as a difficult subject due to its complex nature.

Problem Statement

Studies have pointed out some factors that influence students' interest and performance in learning. According to Chand et al. (2021), teacher's role plays an effective part in students' interest in mathematics. He further notices that, if the teacher is skilled and enthusiastic in teaching mathematics, he/she is more likely that students will develop a knee interest in mathematics. Parental involvement helps children's interest in mathematics noticed by Landas et al. (2022). Vaiopoulou et al. (2021) also emphasized that, if the parents provide positive reinforcement and encourage their children to explore mathematics-related activities at home, the child is more likely to develop an interest in mathematics learning. Mokhtar et al. (2012) insisted that students' attitude towards mathematics impact students' mathematics interest and performance. A positive attitude towards mathematics can encourage students to enjoy the subject which can further improve their performance. Toropova et al. (2019) found that when students have a teacher who is knowledgeable, enthusiastic, supportive, and well-prepared, they are more likely to develop an interest in studying mathematics.

Deducing from above indicates that several studies have been conducted on the effect of teacher quality on students' mathematics interest, but limited research has been done on the teacher quality that has an effect on students' mathematics interest. The current study found that, several studies (Arthur et al., 2018; Ekmekci & Serrano, 2022; Liebendörfer & Schukajlow, 2020) limited their views on student's interest without looking at the impact of teacher quality on student's perception of mathematics learning. To close the gap, the researcher emphasizes teacher empathy and teacher-student collaboration as a teacher quality variable to determine its effect on students' mathematics interest as facilitated by student's perception of mathematics.

Therefore, this study sought to examine the role of teacher quality on students' mathematics interests. Further, we explore the facilitating role of students' perception of mathematics in the relationship between the teacher quality and students' mathematics interests. The research considers two teacher qualities for this study, which include teacher-student collaboration and teacher empathy, which serve as an independent variable for the study. The conceptual framework is shown in **Figure 1**, where teacher empathy (EMPT) and teacher-student collaboration (TSC) serve as independent variables. Moreover, students' perception of mathematics (SPM) represents the mediating variable, and student mathematics interest (SMI) is the dependent variables.

Research Questions

1. What is the effect of a teacher's empathy on a student's mathematics interest?
2. What is the effect of teacher-student collaboration on students' mathematics interests?
3. What is the mediating effect of how students perceive mathematics on the relationship between teacher empathy and student's mathematics interest?
4. What is the mediating effect of students' mathematics perception on the relationship between teacher-student collaboration and student's mathematics interest?

LITERATURE REVIEW

The Effect of Teacher Empathy on Students' Mathematics Interest

From Ali et al., (2021) research conducted indicates that empathy has good effect on students' mathematical interests. When teachers show empathy to their students, they yield a positive learning environment where students feel respected and valued (Ali et al., 2021). This improves students' self-esteem and confidence level to increase interest in mathematics (Arthur et al., 2022a; Mishra et al., 2022). Empathy allows the teacher to better understand their students' strengths and weaknesses to enable them to vary their teaching methods to meet the needs of every student (Gerdes et al., 2011). When students get to know that their teacher is interested in their progress and success, they are automatically motivated and well-engaged in the learning process (Wolff et al., 2021). Therefore, by showing empathy towards your students, they inspire a great interest in mathematics and create a positive classroom experience for them (Mishra et al., 2022). According to the study conducted by Arthur et al. (2022b) upon determine the effect of teaching quality of a teacher using Service Quality (SERVQUAL) perspectives on students' mathematics interest and performance, the findings from their study present that mathematics teaching empathy has a significant positive impact on students' mathematics interest and performance. This proposed:

H_1 *Teacher empathy has direct positive effect on student's mathematics interest.*

The Effect of Teacher-Student Collaboration on Students' Mathematics Interest

Studies suggest that collaboration has a positive turn on students' mathematics interests (Arthur et al., 2022a). According to Dahal et al. (2022) collaborative learning allows students to work together and share ideas which helps them acquire conceptual skills of mathematics. When they work together, they are more likely to feel at ease asking questions and taking risks which can increase their mathematics interest (Jahnke et al., 2022). Collaboration also assists students to see a clear picture of the real-world application of mathematics which can make the subject more meaningful and engaging to them (Lo & Hew, 2021). This proposed:

H_2 *Teacher-student collaboration has direct positive effects on student's mathematics interest.*

Facilitating the Role of Students' Mathematics Perceptions

Perception in mathematics is defined as how students personally view and react to mathematics as a course and how they see and think about learning mathematics (Otoo et al., 2018). Kusumawati et al. (2020) insisted that students' perception of mathematics refers to their beliefs, attitudes, and feeling toward mathematics. This can involve their perceived abilities, confidence levels, and overall enjoyment of the subject (Klassen,

2002). When students have positive perceptions of mathematics, they are more likely to be interested in the subject. They become motivated to learn and engage in mathematics problem-solving tasks (Cetin-Dindar, 2016). In this scenario, students' mathematics perception acts as a mediator between collaboration as teacher quality and students' mathematics interest. The teacher's collaborative approach creates a positive environment for students, which increases their perception of mathematics, and subsequently, sparks their interest in the subject. This can be done when teacher focuses on creating a positive classroom environment that promotes collaboration, they can not only improve mathematical learning outcomes but also fosters alone lasting interest in mathematics.

H_3 *Students' perception of mathematics facilitates the relationship between teacher and student's collaboration and students' mathematics interests*.

Perception is the way students interpret and make meaning out of their experiences. Students' perception of mathematics, as a subject, can affect their interest and proficiency. The perception of mathematics as difficult, boring, or irrelevant can decrease students' interest in learning mathematics (Arthur et al., 2022b). On the other hand, if students perceive mathematics as a fun and useful subject, their interest in learning may increase. Empathy is one of the critical qualities of an effective teacher. A teacher who shows empathy can understand their student's perspectives, feelings, and needs. They can create a supportive learning environment where the student feels safe to take risks, ask questions, and share their ideas. Students who perceived that their teachers are empathetic towards them may have a positive attitude towards teachers and mathematics (Maloney & Matthews, 2020). Therefore, it can be proposed that students' perception of mathematics could mediate the relationship between empathy and their mathematics interest. If students perceive that their teachers are empathetic towards them, it can lead to positive attitudes towards teachers, increasing their interest in learning mathematics. However, if students perceive that their teacher lacks empathy, it will result in negative attitudes and decreased interest in learning mathematics.

H_4 *Students' perception of mathematics facilitates the relationship between empathy as teacher quality and students' mathematics interests*.

RESEARCH METHODOLOGY

Design

The quantitative research method was adopted by this study, which uses a questionnaire for the collection of data.

Population

The study population made of three senior high school in the Ashanti region of Ghana in total of 1,200 students where mathematics serves as the core and compulsory subject for their study. The researchers selected three senior high schools because various heads gave them permission to conduct the study in their school.

Participants

The participant for the study was calculated with Yamane and Sato's (1967) sample size determination approach with a total population of 1200. The sample size approach was given as

$$n = \frac{N}{1 + Ne^2} \tag{1}$$

From the formula, n represents the unknown sample size, N represents the total population (set as 1200), and e represent the error margin (set as 0.05). By method of substitution, **Equation 1** becomes

$$n = \frac{N}{1 + Ne^2} = \frac{1200}{1 + 1200(0.05)^2} = 300 \quad (2)$$

The required sample size for the study was three hundred (300) students. The researcher distributed 100 questionnaires to each school and 300 datasets was expected. 3 weeks were used for the data collection. 300 questionnaires were valid for analysis of data. There were no questionnaires which were rejected on the basis of some being incompletely filled and others with multiple responses. The response rate was 100%, thus [(300/300x100)] which was good for the study.

Sampling Approach

Two sampling techniques were used in the study. Namely, convenience and simple random sampling. Convenience sampling was used to select the three SHS and simple random sampling with later employed to select respondents (students) from the selected three SHS. Permission was sought from the headship of the selected SHS before the research was conducted. Upon granted permission, the questionnaires were distributed to the schools and were during class hours.

Questionnaires and Measures

Four variables were used in the study, where two variables serve as independent variable (teacher empathy and teacher-students collaboration), one variable as mediator (students' perception of mathematics), and one variable as independent variable (students' mathematics interest). Each measurement item under the four (4) main constructs were measured on 5-Likert scale response as (*1 strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree*). The study also controlled age, gender and program of study. Five (5) measurement items for teacher empathy were adapted form Arthur et al. (2022), seven (7) measurement items of teacher-students collaboration were also adapted from Saka (2021), moreover, five (5) measurement items form students perception of mathematics were adapted from Arthur et al. (2022b), and ten (10) measurement items for students mathematics interest were also adapted from Asare et al. (2023).

This study adapted pre-existed scale for the study because, existing scales have usually been thoroughly validated and tested for reliability (Fosu et al., 2022). As a result, they are likely to measure validity and yield consistent results over time, or reliability, which offers a strong basis for further research.

Data Analysis Outline

SPSS (ver. 23) and Amos Graphics (ver. 23) were used to analyze the data. The study data were examined using five (5) different methods of data analysis: exploratory factor analysis (EFA), reliability analysis, confirmatory factor analysis (CFA), discriminant analysis, and path analysis. In order for the quantitative data to be analyzed for commerce, it must be coded into SPSS (Ver. 23).

DATA ANALYSIS

Exploratory Factor Analysis (EFA)

The factor analysis for the study data was executed using SPSS (ver. 23). The purpose of the factor analysis was to determine the number of measurement items whose loading were above the minimum threshold of 0.50 and strongly loaded on their respective constructs. **Table 1** presents the result for the exploratory factor analysis (EFA). From **Table 1**, the measurement items loaded strongly for teacher-student collaboration were three (that

Table 1. Exploratory factor analysis (EFA)

Measurement Items	Component			
	1	2	3	4
Teacher-student collaboration				
TSC5			.916	
TSC6			.900	
TSC7			.949	
Teacher empathy				
TEMP1				.944
TEMP4				.865
TEMP5				.935
Students' perception of mathematics				
SPM1		.925		
SPM2		.929		
SPM3		.933		
Students' mathematics interest				
SMI1	.903			
SMI3	.918			
SMI4	.926			
SMI8	.926			
SMI9	.939			
SMI10	.937			
KMO and Bartlett's Test				
TVE				91.13%
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.				.872
Bartlett's Test of Sphericity	Approx. Chi-Square			7226.671
	Df			105
	Sig.			0.000
Determinant				7.15E-10

is, TSC5, TSC6, and TSC7). In addition, the measurement items strongly loaded for teacher empathy were three, that is TEMP1, TEMP4, and TEMP5. Moreover, the measurement items strongly loaded for students' perception of mathematics were three, that is SPM1, SPM2, and SPM3. Finaly, the measurement items that strongly loaded for students' mathematics interest were five (5), that is SMI1, SMI3, SMI4, SMI8, SMI9, and SMI10.

Moreover, from **Table 1**, the coefficient of determinant as 7.15E-10 with a KMO of .872. The KMO further explains that there was 87.2% adequacy supposition among the observed variables loading in the correct construct on the latent variables. Bartlett's Test of Sphericity reported a significant p-value of .000 from a Chi-Square of 7226.671 and a degree of freedom of 105. Moreover, the four latent variables reported a cumulative variance of 91.13%. However, the observed variables which were not loaded at their construct on the component matrix were deleted.

Confirmatory Factor Analysis

CFA is a statistical method for evaluating how well an assumed factor structure fits actual data. After the EFA analysis, confirmatory factor analysis was done using Amos Graphics (ver. 23) software. According to Dogbe et al. (2022), the CFA model is fit if CMIN/DF is less than 3, TLI and CFI is at least 0.9, RMSEA and RMR is less than 0.6, and PClose should be statistically insignificant at 5%. According to the CFA results in **Table 2**, the study data fits the measurement model recommended by Dogbe et al. (2023), and the observed variables that are observed accurately represent the corresponding latent structures. The analysis supports the validity and reliability of the measuring model used in this study.

Table 2. Confirmatory factor analysis (CFA)

Model fit indices: CMIN = 143.498; DF = 72; CMIN/DF = 1.993; TLI = .986; CFI = .990; RMSEA = .053; RMR = .0238; PClose = .318;	**Factor Loadings**
TEACHER EMPATHY (TEMP): CA = .978; CR =.934; AVE = .826	
TEMP1: Mathematics teachers know what causes students' negative feelings in mathematics learning.	.955
TEMP4: Mathematics teachers are able to recognize students' negative feelings towards mathematics learning.	.790
TEMP5: Mathematics teachers are able to change students' negative feelings into positive ones.	.970
TEACHER-STUDENT COLLABORATION (TSC): CA = .945; CR = .953; AVE = .871	
TSC5: Mathematics teachers are easy to be approached.	.992
TSC6: Mathematics teachers offer support to students whenever they faced difficulties in their mathematics learning.	.866
TSC7: Mathematics teachers collaborate with students in decision making in mathematics classes.	.937
STUDENT'S PERCEPTION OF MATHEMATICS (SPM): CA = .985; CR = .972; AVE = .919	
SPM1: The topics in mathematics are not easy to learn.	.928
SPM2: Mathematics contains a lot of formulas and it's very difficult to learn.	.928
SPM3: Mathematics is very complex which makes it difficult to understanding.	.976
STUDENT'S MATHEMATICS INTEREST (SMI): CA = .968; CR = .970; AVE = .842	
SMI1: I persist in solving mathematics problems even if I got it wrong.	.967
SMI3: I devote more time in studying mathematics than any other subject.	.910
SMI4: Mathematics is not boring subject to learn.	.906
SMI8: I am excited when attending mathematics class.	.893
SMI9: I don't give up easily when learning mathematics.	.912
SMI10: I love to study mathematics.	.916

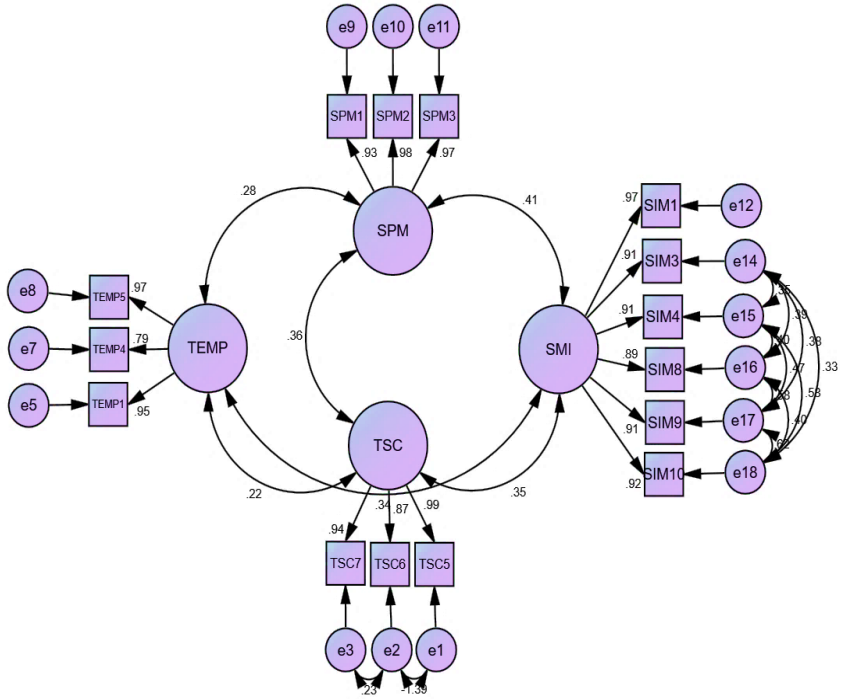

Figure 2. Confirmatory factor analysis diagram

From **Table 2**, TEMP1, TEMP4, and TEMP5 are the questionnaire items that measures teacher empath. TSC5, TSC6, and TSC7 are the questionnaire items that measures teacher student's collaboration. Moreover, SPM1, SPM2, and SPM3 are the questionnaire items that measure student's perception of mathematics. Finally, SMI1, SMI3, SMI4, SMI8, SMI9, and SMI10 are the questionnaire items that measures student's mathematics interest. **Figure 2** presents the graphical representation of the confirmatory facto analysis.

Table 3. Discriminant validity

Variables	TSC	TEMP	SMI	SPM
TSC	**.933**			
TEMP	.218***	**.909**		
SMI	.350***	.336***	**.918**	
SPM	.362***	.282***	.406***	**.959**

Note. $\sqrt{AVE}$s are bolded; *** p-value significant at .01.

Table 4. Path analysis results

Direct Paths	*Std. Estimate*	*SE*	*CR*	*p-value*
Gender → SIM	-.147	.107	-.377	.754
Age → SIM	.096	.124	.775	.438
Program→ SIM	-.012	.038	-.314	.754
TSC → SPM	.247	.041	6.086	.000
TEMP → SPM	.201	.047	4.302	.000
TEMP → SIM	.223	.053	4.176	.000
TSC → SIM	.201	.047	4.327	.000
SPM → SIM	.307	.062	4.970	.000
Indirect Effect	***Std. Estimate***	***Lower Bound***	***Upper Bound***	***p-value***
TSC → SPM → SIM	.095	.037	.149	.010
TEMP → SPM → SIM	.072	.034	.127	.000

Discriminant Validity

In research methodology, discriminant validity is the idea that determines how much theoretically distinct variables or constructs are actually empirically distinct in a study; in other words, it looks at whether measures of different constructs are sufficiently different from one another and do not overlap excessively. The study discriminant validity is accepted when the highest intercorrelation result is less than the lowest result for the squares root of average variance extract (AVE). From **Table 3**, the study discriminant validity has been achieved since the lowest result for the square root of the AVE (that is, TEMP) is greater than the highest value of the intercorrelated result (SMP and SMI). **Table 3** presents the results for the discriminant validity.

RESEARCH RESULTS

Path analysis is a statistical technique that enables researchers to investigate and predict intricate interactions among numerous variables at once. It builds upon the capabilities of correlation and regression analysis. The hypothesized paths were examined using Amos Graphics (ver. 23) software, a plug-in tool from SPSS (ver.23) software. The hypothesis results are presented in **Table 4**. Moreover, **Figure 3** presents the diagrammatic representation of the paths analysis.

From the path analysis results in **Table 4**, the connection between gender and students' mathematics interest has a standardized estimate of -.147. The critical ratio (CR) is -.377, and the standard error (SE) is .107. This relationship's p-value of .754 indicates that gender has no statistically significant direct influence on students' mathematics interest. The association linking age and students' mathematics interest has a standardized estimate of .096. The critical ratio (CR) is .775, while the standard error (SE) is .124. The statistical significance of the association between age and students' mathematics interest is not found, as indicated by the p-value of 0.438. The usual estimate of the correlation between program and students' mathematics interest is -.012. The critical ratio (CR) is -.314 and the standard error (SE) is .038. There is no statistically significant direct impact of the program on SIM, as indicated by the p-value of 0.754 for this association. The conventional estimate of the correlation between teacher-student collaboration and students' perception of mathematics is 0.247. The

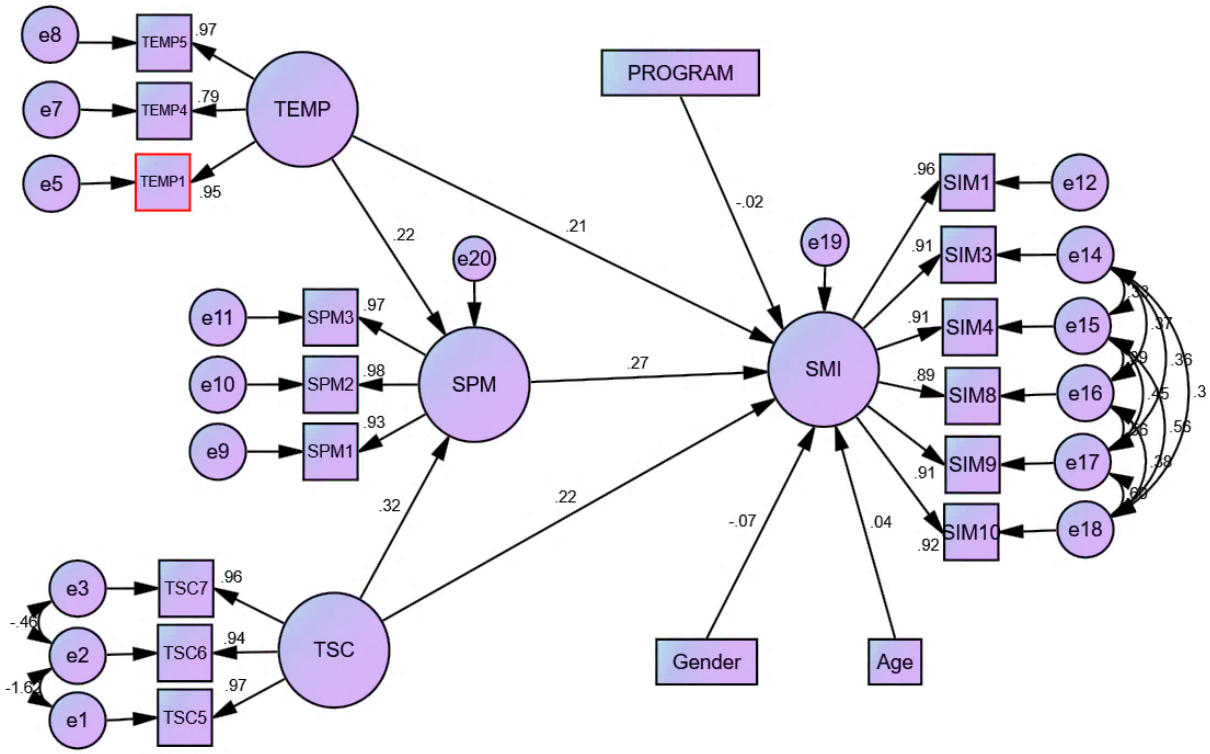

Figure 3. Path analysis diagram

critical ratio (CR) is 6.086 and the standard error (SE) is .041. There is a clear and statistically significant direct impact of teacher-student collaboration on perception of mathematics, as evidenced by the extremely low p-value ($p < .001$) for this association. The association between SPM and SIM has a standardized estimate of .307. The critical ratio (CR) is 4.970, and the standard error (SE) is .062. This relationship's p-value is extremely low ($p < .001$), suggesting that students' perception of mathematics has a direct impact on students' mathematics interest that is both statistically significant and substantial.

The association between teacher empathy and students' mathematics interest has a standardized estimate of .223. The critical ratio (CR) is 4.176, and the standard error (SE) is .053. A strong and statistically significant direct effect of teacher empathy on students' mathematics interest, as indicated by the extremely low p-value ($p < .001$) associated with this relationship. The association between teacher-student collaboration and students' mathematics interest h Simple random sampling ensure that each member of the population has an equal chance of being selected. This provides an unbiased and fair representation of the entire population in the sample as a standardized estimate of .201. The critical ratio (CR) is 4.327, and the standard error (SE) is .047. This relationship's p-value is extremely low ($p < .001$), suggesting that TSC has a substantial and statistically significant direct impact on SIM. The predicted indirect impact of teacher empathy on students' mathematics interest via students' perception of mathematics is .072. For this effect, the confidence interval's lower and upper bounds are .034 and .127, respectively. Strong and statistically significant indirect influence of teacher empathy on students' mathematics interest through students' perception of mathematics is indicated by the very low p-value ($p < .001$) for this indirect effect. The calculated indirect impact of teacher-student collaboration on students' mathematics interest via students' perception of mathematics is .095. The confidence interval for this effect has an upper bound of .149 and a lower bound of .037. There is a statistically significant indirect effect of teacher-student collaboration on students' mathematics interest through students' perception of mathematics, as indicated by the p-value of .010 for this indirect effect.

DISCUSSION

The findings from the current study show that teacher empathy has a direct positive effect and statistically significant effect on students' mathematics interest. The result of the current study confirmed with a study of Oppermann and Lazarides (2021). They conducted the study with a sample of two hundred and eighty-two (2082) and one hundred and thirty-three (133) teachers in third and fourth grade to examine the effect of teacher empathy on students' mathematics interest. The result confirmed that teacher empathy significantly impacted students' mathematics interest. Moreover, Arthur et al. (2022b) examine the 320 first years undergraduate students mathematics interest and mathematics performance with the use of service quality (SERVQUAL) perspective. Their study confirmed that mathematics teaching empathy has a significant positive direct effect on students' mathematics performance (.414****).

In addition, the significance of teacher-student collaboration was evaluated to find out the effect of it on students' mathematics interest and per the results obtained it was achievement. The result revealed that, teacher-student collaboration has a direct positive effect and is statistically significant on students' mathematics interest. The current study connects with the study of Ayuwanti et al. (2021). The result of their study confirmed that teacher-student collaboration has a significant effect on mathematics learning and students' interest in mathematics. Teacher-student collaboration creates teamwork spirit, and students learn to share mathematical concepts learned, learn communication skills as they converse and consult each other, and learn from the cultures of their peers. Thus, in effect teacher-student collaboration improves students' mathematics interest.

Moreover, the facilitating results of how students perceive mathematics in the network between teacher empathy and student's interest in mathematics was partially statistically significant with p-value less than 1%. The results further explain that, without students' perception in mathematics, teacher empathy still has a significant direct effect on students' mathematics interest.

Finally, perception in mathematics partially facilitates the relationship between teacher-student collaboration and students' mathematics interest. Here, teacher-student collaboration directly significantly positively impacts perception of mathematics. The results conform to the study of Appiah et al. (2023), which states that teacher-student collaboration has a significant effect on students' interest and performance of mathematics.

CONCLUSION

In conclusion, teacher empathy had a direct positive and statistically significant effect on students' mathematics interest. Moreover, teacher-student collaboration also had a direct positive and statistically significant effect on students' mathematics interest. In addition, students' perceptions of mathematics partially and statistically facilitate the relationship between teacher empathy and students' mathematics interest. Finally, students' perception of mathematics facilitates the relationship between teacher-student collaboration and students' mathematics interest.

RECOMMENDATIONS

Teacher qualities are such as collaboration and empathy essential characteristics that the teacher cannot do without in order to enhance and promote students' mathematics interest and perception. Teacher qualities are motivational tools for effective classroom activities. The following recommendation were based on the study findings:

i. Policymakers: Policymakers should as a matter of fact see to the necessary application of this study to ensure effective and strategic policies to enhance teaching and learning.

ii. Teachers: Teachers as the major agents to carry out teaching and learning in the classroom must exhibit the right quality to accelerate delivery of lessons. Other teacher qualities can be explored in the future.

iii. Stakeholders: Stakeholders are recommended to push forward and ensure effective teacher-student relationship to bridge the gap between them for harmonious collaboration to yield beneficial teacher-student engagement.

iv. Book writers: Book writers should make maximum use of this material as a reference guide to publish the benefits obtained from study.

v. Institutions and colleges: Our institution and colleges must ensure the production and training of quality teachers with the requisite skills to see to effective teaching and learning in our schools for success and development of our world.

vi. This study can be carried out with different problem outlook, different teacher qualities assessment, sample determination, approach, and data analysis method.

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Ethical statement: The authors stated that the study was approved by the Department of Mathematics Education Research Ethics Committee of Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development (AAMUSTED) on July 17, 2023. Written informed consent was obtained from Heads of the Departments, lecturers, and students.

Data Availability: The data used to support this study's findings are available from the corresponding author upon request.

Conflict of Interest: The author declares that there was no conflict of interest for the study.

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