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Learners' Attitude towards Mathematics, Technology on Their Mathematics Interest: The Mediating Role of Learners' Mathematics Perception

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Abstract

This research work surveyed inquired into, and scanned carefully, the exhibiting indirect causation of learners' mathematics perception, a connection jointly engaging learners' stance towards mathematics and technology on their mathematics interest. This inquest was conducted on 200 Senior High School learners sampled in the Central part of Ghana. The employment of a survey and comprehensive questionnaire was necessitated. Amos Software (v. 23) was instrumental in the Modeling analysis computations (SEM: EFA/CFA), and the paths were tested on the hypotheses. Attitude towards mathematics produced a positive impact on learners' interest, which in turn impacted positively on learners' perception of mathematics, and technology yielded a positive impact on how learners perceive mathematics. There was a complete mediation of learners' perception of mathematics in the association between learners' attitudes towards mathematics and their interest in mathematics. Further studies could be carried out on the parameters using other methods to inquire about the impact of learners' attitudes on mathematics and the technology involved in their learning on their mathematics interests. The education system must be mindful of learners' attitudes, perceptions, and technology in their learning process. Colleges of education must bring up teachers in the light of learners' attitudes, perceptions, and technology in their learning and the appropriate pedagogy in their delivery of lessons.

Keywords: Learners' Attitude on Mathematics, Technology, Mathematics Interest, Mathematics Perception, Mediating Role

Abstrak

Penelitian ini bertujuan untuk mengetahui bagaimana sikap peserta didik terhadap matematika dan teknologi terhadap minat peserta didik. Penelitian ini dilakukan pada 200 peserta didik SMA yang dijadikan sampel di Ghana bagian Tengah. Teknik pengumpulan data dilakukan melalui survei dan kuesioner yang komprehensif. Perangkat Lunak Amos (v. 23) berperan penting dalam perhitungan analisis Pemodelan (SEM: EFA/CFA) dan jalurnya diuji pada hipotesis. Hasil penelitian menunjukkan bahwa sikap terhadap matematika menghasilkan dampak positif terhadap minat peserta didik, serta berdampak positif pada persepsi pelajar terhadap matematika, dan teknologi. Terdapat mediasi penuh persepsi pelajar terhadap matematika dalam hubungan antara sikap peserta didik terhadap matematika dan minat mereka terhadap matematika. Penelitian lebih lanjut dapat dilakukan terhadap parameter-parameter tersebut dengan menggunakan metode lain untuk mengetahui dampak sikap peserta didik terhadap matematika dan teknologi yang digunakan dalam pembelajaran terhadap minat matematika mereka. Sistem pendidikan harus memperhatikan sikap, persepsi, dan teknologi peserta didik dalam proses pembelajaran mereka. Perguruan tinggi pendidikan harus berupaya mendidik guru dengan mempertimbangkan sikap, persepsi, dan teknologi peserta didik dalam pembelajaran mereka serta pedagogi yang sesuai dalam penyampaian pelajaran.

Kata kunci: Sikap Peserta Didik Terhadap Matematika, Teknologi, Minat Matematika, Persepsi Matematika, Peran Mediasi

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INTRODUCTION

This study focuses on the union and collaboration between the learners' stance towards mathematics, technology, and their interests, with specific emphasis on the mediating role of learners' mathematics perception. Mathematics education has become increasingly reliant on technology as a tool for instruction and learning (Tambunan, 2019; Hillmayr et al., 2020). However, it is essential to understand how learners' attitude towards mathematics and technology impacts their interest in the subject (Cai et al., 2019).

The attitude toward mathematics refers to an individual's feelings, beliefs, and values towards the subject, including their taste in mathematics, perception of its usefulness, and zeal for solving problems (Ashton, 2018; Baah-Duodu et al., 2021). Similarly, learners' attitude towards technology involves their perception and beliefs regarding technological tools in learning.

Mathematics interest refers to learners' engagement. Curiosity and enjoyment of mathematical activities (Ran et al., 2022). It is crucial to investigate the factors that influence learners' interest in mathematics as it is closely related to their achievement and success in the subject.

The mediating role of learners' mathematics perception in this study refers to how learners' perception of mathematics moderates their attitude toward mathematics and technology and their interest (Li et al., 2020). It is hypothesized that learners' zeal for mathematics and technology will lead to a good perception of mathematics, which, in turn, will positively influence learners' interest in the subject (Singh et al., 2002; Casinillo et al., 2020).

Understanding the mediating role of learners' mathematics perception is critical as it provides insight into the underlying mechanisms that shape learners' interests. This investigation enables educators, stakeholders, and policymakers to develop effective strategies and interventions to enhance learners' interest and engagement in mathematics.

Overall, it aims to add to existing works on factors that affect learners' interest in mathematics. By incorporating the mediating role of learners' mathematics perception, this research provides a holistic understanding of the complex relations between learners' attitudes towards mathematics and technology, their perception of mathematics, and their interest in it (Fabian et al., 2018a).

Mathematics and computational strength are essential for global success and the world (Arthur et al., 2018). Mathematical knowledge is essential in engineering, sciences, and social sciences (Das, 2020; Leyva et al., 2022). In our schools, right from the lowest level (Kindergarten) to the higher level (University), mathematics has become a significant component of the school's curriculum (Yeh et al., 2019). Daily, we come across Mathematics in the cause of discharging our duties. In the classroom setting, most learners' attitude toward mathematics is very discouraging since they have put it at the back of their minds that mathematics is complicated to learn (Casinillo et al., 2020).

All over the world, mathematics is an essential and thrilling subject. Mathematics is applicable and primarily used in other areas of study, such as engineering, statistics, medicine, construction, and

many more. It is one of the significant prerequisites or requirements for pursuing further studies in universities and colleges.

Mathematics is unavoidable; its toughness is seen in how learners approach it (Chu et al., 2017). Mathematics excellence remains to be a problem throughout the globe. There have been some disappointing results in mathematics since most countries still need to meet the required standards (Partovi & Razavi, 2019). Learners' attitudes and the technology involved in mathematics learning, coupled with their perception, do not improve matters at all (Higgins et al., 2019). The relevance of interest in studying and working in mathematics fields, with factors including how the learner values mathematics, has been a significant setback influencing their attitudes, which may primarily influence their perception (Arhin & Gideon, 2020; Mazana et al., 2018).

Students who come to the classroom with the correct attitude and interest do have the thirst to study and actively take part in classroom lessons. Berger et al., (2020) stated categorically that students' attitudes are essential to their career ambitions. Students' ambitions or interest is related to their attitudes and perceptions of knowing mathematics, leading to various outfits like developing their quantitative skills and raising their confidence levels.

Mathematics is essential in the school curriculum. Attitudes alter and develop with time, and once the right attitude is formed, it can enhance learners learning (Kusumawati et al., 2020; Baah-Duodu et al., 2021). Similarly, a negative attitude will be a setback to effective learning and affect the outcome of the learner's performance. This implies that attitude is a critical factor that cannot be brushed aside.

Many learners in our schools see mathematics as a complicated subject, and for that matter, they need help to be successful in mathematics (Shara, 2020). This mental attitude affects their attitudes toward mathematics (Şahin & Danaci, 2020; Otoo et al., 2018). This opinion goes on during schooling, and as a result, some learners have developed negative attitudes toward mathematics, resulting in a loss of self–confidence in mathematics (Vaiopoulou et al., 2021; Yalçin & Hasan, 2018). It depends on many factors, such as learners' perceptions, interests, and attitudes toward mathematics (Chu et al., 2017; Fabian et al., 2018a). It is also noticed that many students have a negative perception of the study of Mathematics (Arthur et al., 2017). This is a result of the mass failure of learners in the subject.

How severe the learner will be and attaching some importance to the learning affects performance in their examinations (Mazana et al., 2018). Attitude as a concept is individual reasons, reactions, and acts. It impacts the learner and the environment (Casinillo et al., 2020).

Measuring learners' attitudes toward mathematics is an exciting topic for many researchers (Mazana et al., 2018). Students' attitude toward mathematics is a critical component that impacts learners' academic achievement (Kosel et al., 2021). Many research studies examined the link between students' attitudes toward mathematics and their educational achievement, and most came out positive. Some students have anxiety about mathematics (Yalçin & Hasan, 2018; Cetin-Dindar, 2016). Students' mathematics attitude generally evolves as a result of previous bad experiences.

To start with mathematics teachers with bad attitudes could lend it to their learners (Alam, 2020). Also, parents can transfer bad attitudes towards mathematics to their wards by discussing with them the toughness of mathematics. Many researchers do believe that learners' attitude, perception, and interest towards mathematics is most of the time created in the classroom setting. Learners' mathematics anxiety and perception come at the early stages of schooling. When learners cannot solve some mathematics questions, their anxiety and perception widen, gradually affecting their interest in mathematics. Mathematics offers so much to the society.

Learners' Attitude towards Mathematics and Learners' Interest in Mathematics

The learners' attitudes toward mathematics have a significant impact on learners' mathematics interests (Yalçin & Hasan, 2018; Tambunan et al., 2021). A positive attitude towards mathematics motivates learners to engage in more meaningful learning experiences (Callaman & Itaas, 2020; Mishra et al., 2022). They will be more apt to try out different methods or strategies to solve problems, which can lead to increased achievement and interest in mathematics (Cetin-Dindar, 2016; Chu et al., 2017; Jankvist et al., 2020).

Learners will likely make extra effort to understand complex mathematical concepts (Azmidar et al., 2017). They will be more apt to try out different methods or strategies to solve problems, which can lead to increased achievement and interest in mathematics (Cordero & Gil-Izquierdo, 2018; Samuel & Warner, 2021).

Learners' attitude toward mathematics goes a long way in affecting their mathematics interest (Eyyam & Yaratan, 2014). The recognition of the essence of mathematics in an actual situation by the learner does affect their interest in mathematics (Ran et al., 2022). A positive attitude builds their mathematics interest. Hence, there is a link between learners' attitudes toward mathematics and their mathematical problem-solving skills, affecting their mathematics interests (Mazana et al., 2018; Tambunan, 2019).

When learners have a positive attitude toward mathematics, they solve mathematical problems and, in turn, charge up their interest in mathematics (Fried, 2001). This enables them to yield toward mathematics and have a directed interest towards higher academic goals (Adams et al., 2020).

A positive attitude can lead to building learners' confidence in mathematics (Ayotola & Adedeji, 2009). This confidence can translate into a greater willingness to take risks and tackle more challenging problems, which can help further reinforce their interest in mathematics (Yalçin & Hasan, 2018).

H1: Learners' attitude towards maths has direct positive effects on learners' interest in maths.

Technology in Learning Mathematics and Learners' Mathematics Perception

Technology on learners' mathematics perception has a significant impact on learners' perception of the subject (Fabian et al., 2018b). It makes mathematics more interactive and engaging, leading to

increased interest and curiosity in learners (Karatas-Aydin & Isiksal-Bostan, 2022). Interactive apps and tools make mathematical concepts accessible and lead learners to investigate and play with mathematics (Cochrane & Bateman, 2009; Chu et al., 2017).

It paves the way for a more precise visual representation of mathematical concepts, making them easier to understand. Graphs and models generated by technology can help learners better visualize mathematical concepts and relationships and enhance their mathematical perception (Casinillo et al., 2020; Ran et al., 2022).

Incorporating technology in the delivery and absorption of mathematics has impacted learners' mathematics perception (Gómez-García et al., 2020). There has been a shift from the usual way of handling mathematics to a technological way of instructing mathematics (Eyyam & Yaratan, 2014). ICT tools for mathematics have cleared most negative perceptions of learners on mathematics in the classroom setting (Amoako et al., 2022).

Mathematics integration with technology has caught the attention of many learners to appreciate the beauty of mathematics (Otoo et al., 2018). Technology has boosted a positive perception of mathematics (Heck & Mahoe, 2010). The availability of various tutorial lessons on various topics in mathematics and several mathematical packages on the internet are all by technology (Huang et al., 2020; Gokkurt et al., 2012)

Technology personalizes learners' learning to enable them to employ and suit their individual needs. Adaptive learning software can provide personalized feedback to learners, helping them identify areas of difficulty and provide additional needs (Faber et al., 2017).

H2: Technology in learning maths has a direct positive effect on learners' maths perception.

Learners' Interest in Mathematics and Perception in Mathematics

Learner interest in mathematics can have impact on how they perceive mathematics (Çevik, 2018; Heck & Mahoe, 2010). Learners with genuine interest in mathematics can positively perceive the subject. Learners with interest in mathematics partake in work in the class, participate in problem-solving activities and ask questions (Fung et al., 2018). The level of engagement leads to better understanding of concepts. Learners who find mathematics interesting, participate in the subject. When learners have a positive perception of mathematics, and are interested in it, they perform well academically. Interest leads to improved perception of the subject, influencing learners' real-life application of mathematics (Monrat et al., 2022). They consider careers related to mathematics like computer science, finance or data analysis. However, learners with little or no interest in the subject have negative perception about it. It is therefore significant for educators to nurture learners' interest in the subject to monitor and enhance their learning experience and outcome.

H3: Learners' maths interest has a positive effect on learners' maths perception.

Mediating Effect of Learners' Mathematics Perception

The mediating effect of learners' mathematics perception on attitude and interest shows that learners perceive mathematics networks' interest in mathematics (Arthur et al., 2022; Otoo et al., 2018). If learners have a positive attitude toward mathematics, they are likely to perceive it as being helpful, exciting, and relevant to their lives (Fabian et al., 2018a). Thus, this, in turn, increases their likelihood of being interested in mathematics (dos Santos & Cirillo, 2021). On the other hand, learners with negative attitudes perceive it as unimportant, uninteresting, and difficult (Azmidar et al., 2017). This might lead to a decreased interest in mathematics. Therefore, learners' mathematics perception mediates their attitude to mathematics and mathematics interest (Figure 1).

In sum, Chand et al., (2021) said that improving learners' desire for mathematics can have a positive impact on their perception of the subject, which may increase their interest and motivation to learn more about it.

H4: Learners' mathematics perception mediates the relationship between their attitude to maths and their interest.

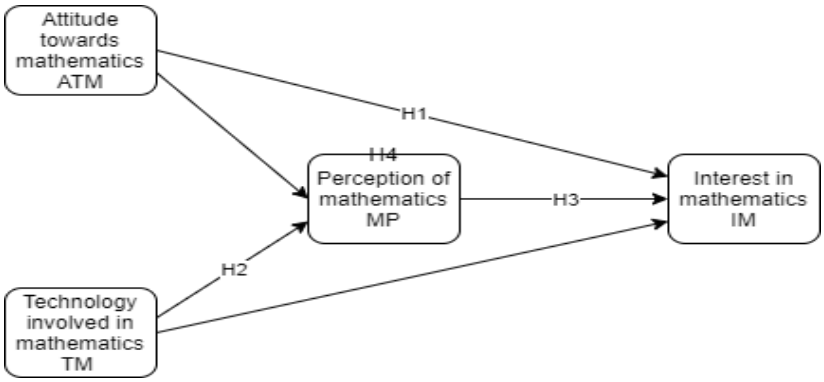

Figure 1. Conceptual framework design

METHODS

Sampling and Gathering of Data

Currently, this study applied a quantitative approach and adopted the positivist research philosophy. Structured questionnaires were used, which were printed and distributed among the targeted sample (Arthur et al., 2015; Parveen, Mahmood, Mahmood, & Arif, 2011). A sample of 220 second-year students was sourced from four (4) Schools in the Central part of Ghana. This questionnaire was composed of five sections, namely: Section A (demographic data), section B (Interest in mathematics, IM), section C (Attitude towards mathematics, ATM), section D (Mathematics perception, MP), and

Section E (Technology in mathematics, TM). This comprised four demographic items and 40 variable items.

A convenient sampling method was adopted as students who were around while administering the questionnaires were captured for the study. Learners responded to 40 items on a Five Point Likert Scale. This research instrument was specially carried out, and respondents were given enough time to answer them. Fifty-five questionnaires were given to each school, yielding 220 expected datasets. After 14 days, when they were collected, 200 questionnaires, representing 91%, were obtained for data analysis. Twenty questionnaires were rejected as they were not correctly filled or missing, representing 9%. Factor loading was very low in the EFA process. After the Confirmatory Factor Analysis, the items were left with ten items, with three items on interest in mathematics IM, four items on attitude towards mathematics ATM, three items on mathematics perception PM, and four items on technology in mathematics.

Permission was sought from the leadership of the four senior high schools for approval, explaining the essence of the study for approval before the students were given the questionnaires to respond to. Selected students' identity was also kept confidential. They were from the General Science, Agriculture, Technical, and Home Economics departments.

Questionnaire and Measures

The questionnaires were composed of five sections, namely: Section A (demographic data), section B (Interest in mathematics, IM), section C (Attitude towards mathematics, ATM), section D (Mathematics perception, MP), and section E (Technology in mathematics, TM). This comprised four demographic items and 40 variable items. The measurement scales were developed from past studies (Habók et al., 2020).

Analysis of Reliability and Validity Measures

The CFA done on Amos (v.23) software was run and used for the validity and reliability examinations, and factor loadings of less than 0.5 were dropped (Marsh et al., 2020). A Cronbach's alpha analysis using Amos SPSS (v.23) was run to find out the internal reliability of the measurement scales. From Table 1, interest in mathematics, attitude towards mathematics, mathematics perception, and technology in learning mathematics had Cronbach's Alpha values of .732, .962, .948, and .953, respectively, as indicated in Table 1. Hence, internal consistency was obtained since a CR value of at least 0.7 was obtained.

Computations of the Average Variance Extraction (AVE) were undoubtedly carried out to test for the convergent validity, and values of AVE/CR must be at least .5 and .7 accordingly to achieve it. This, reading from Table 1, was achieved since the least AVE and CR were .855 and .959, respectively, for attitude towards mathematics.

The fitness of the model was tested using the criteria put forward and CMIN, and DF < 3, TLI and CFI > 0.9, RMSEA and RMR < 0.08, PClose > 0.00, and all these indices were achieved as in Table 1 and Figure 2, so the dataset fitted well.

Table 1. Confirmatory factor analysis (CFA)

Fitness Model: CMIN = 132.473; Df = 70; CMIN/Df = 1.892; TLI= .976; CFI = .981;RMSEA = .067; SRMR = .0286; PClose = .057	*Factor Loadings*
Interest in Mathematics: CA =.732; CR=.971; AVE =.919	
IM4	*.969*
IM5	*.963*
IM6	*.944*
Attitude Towards Mathematica: CA= .962; CR=.959; AVE =.855	
ATM4	*.872*
ATN5	*.937*
ATM6	*.971*
ATM7	*.915*
Technology Involvement in Mathematics: CA=.953; CR= .953; AVE =.837	
TM2	*.920*
TM4	*.976*
TM7	*.904*
TM9	*.856*
Mathematics Performance: CA=.948; CR=.950; AVE =.863	
MP1	*.892*
MP2	*.973*
MP3	*.921*

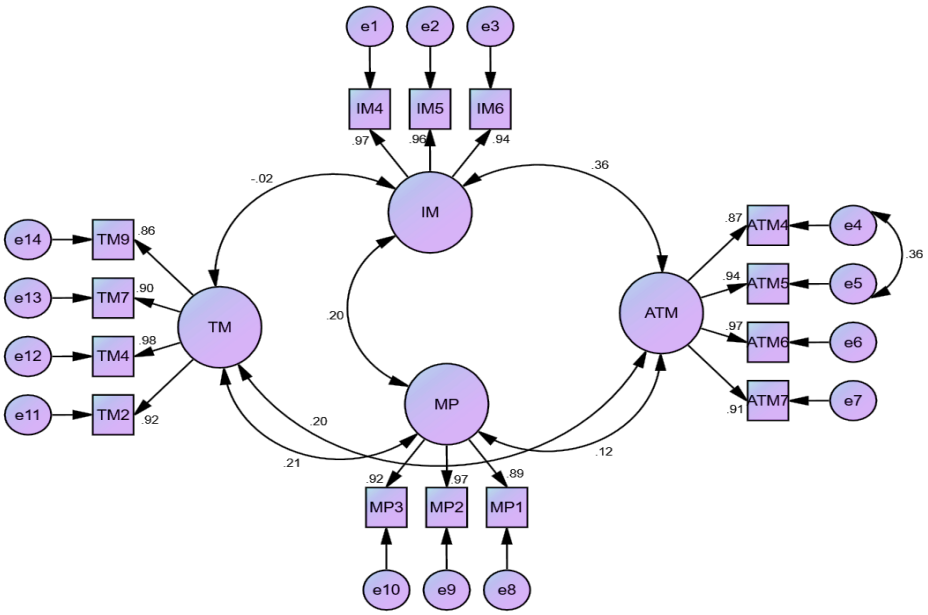

Figure 2. Confirmatory factor analysis (CFA)

Descriptive and Discriminant Validity

Descriptive and discriminant validity analysis of the study, variable used for the study, measured, and mean being five. Discriminant validity was also achieved because the least √AVEs were .915, and the most significant value obtained for the correlation was .364, as in Table 2, resulting in uncorrelation among constructs on the scales. From Table 2, we recognize that the values obtained for the correlations were all seen to be < 0.7, which tells us that the correlation among constructs is not so much. Hence, multicollinearity is also achieved.

Table 2. Discriminant validity

Variable	IM	ATM	TM	MP
IM	.959			
ATM	.364	.924		
TM	-017	.199	.915	
MP	.204	.123	.214	.929

*√AVE values are bolden P- value at 5% (.05); ** ~ P- value at 1% (.01)*

Path analysis is critical, and an SEM was carried out, and the employment of EFA and CFA was used to accept or reject the study's hypotheses, using SPSS Amos (v.23).

Exploratory Factor Analysis (EFA)

An EFA was carried out to cut down several items on the research tool. The idea behind this was to ensure maximization of the explained variance and to acquire the correct number of items in each variable, be it interest in mathematics, IM, attitude towards mathematics, ATM, perception in mathematics, MP, or technology in learning mathematics, TM. Factor loading was very low in the EFA process. After the Confirmatory Factor Analysis, the items were left with ten items, with three items on interest in mathematics IM, four items on attitude towards mathematics ATM, three items on mathematics perception PM, and four items on technology in mathematics. The lowest and highest loadings for interest in mathematics, attitude towards mathematics, mathematics perception, and technology in learning mathematics were (.944, .969), (.872, .971), (.892, .973) and (.856, .976) respectively.

The Confirmatory Factor Analysis (CFA)

CFA is necessary in ensuring the results of EFA done. From a sample of 200 participants, the variables were tested using SPSS (v.23), and the standardized outputs were carried out for the parameter estimation.

RESULTS AND DISCUSSION

The results indicates that (see Table 3), technology in learning mathematics (TM) yielded a significant negative impact on learners' interest in maths (IM) (λ = - 0.082, p<0.01). This implies that learners' interest in mathematics is decreased by technology at 8.2%. Attitude toward mathematics (ATM) has a direct effect on learners' perception of maths (MP) (λ = 0.007, p<0.01). This tells us that when teachers can nurture positive attitudes towards mathematics in learners, learners' perception of mathematics increases by 0.7%.

Table 3. Path analysis

Path	Standard. Estimate	S. E	C. R	P – value
TM → IM	-.082	.061	-1.342	.180
ATM → IM	.402	.075	5.361	000
IM → MP	.237	.088	2.694	.007
TM → MP	.220	.074	2.974	.003
ATM → MP	.007	.094	.070	.944
Indirect effect	Std. Estimate	Lower BC	Upper BC	P-value
ATM → IM → MP	0.012	-0.029	0.172	0.528

Hypothesized Paths Results

The results obtained for the hypotheses, whether to accept or reject, showed that attitude towards mathematics (ATM) made positive results in learners' Interest in maths (IM) (λ = 0.402, p<0.01). This implies that when instructors put together strategies to improve learners' attitude towards learning mathematics, their Interest in learning mathematics will go up by 40.2%. Hence, the hypothesis: 'H1: Learners' attitude towards Maths has a direct positive effect on learners' Interest in Maths' is accepted. Results of this study also indicated that technology in learning mathematics (TM) had an excellent positive impact on learners' perception of mathematics (MP) (λ = 0.220, p<0.01). Hence, technology will increase learners' perception of mathematics by 22%. In this case, technology in learning mathematics must be an integral part of our school curriculum for our learners' mathematics perception to be positively increased to enhance their mathematics perception. Thus, 'H2: Technology involvement in learning Maths has a direct positive effect on learners' perception of maths was accepted.

Additionally, the results also showed that Interest in mathematics (IM) has a direct positive effect on learners' perception of mathematics (MP) (λ = 0.237, p < 0.01). It, therefore, means that if learners' Interest in mathematics is well taken care of by instructors, their perception of mathematics is 23.70%

positively impacted. Then H3: 'Interest in maths has a direct positive effect on learners' perception of maths was accepted.

Now, the mediating effect on attitude towards maths in the relation connecting Interest in maths and perception in mathematics resulted in complete mediation since there was a significant coefficient of 0.012 for the mediating effect, and the Lower Bound and the Upper Bounds were negative and positive, respectively. This indicates that the perception of learners on mathematics plays a significant role in influencing their Interest in mathematics and their attitude toward it. Thus, learners' perception of mathematics influences their Interest and attitude toward it. For example, a deep interest in mathematics results in a positive attitude. The whole mediation by learners' perception of maths relating attitude towards maths and Interest in maths means the impact of Interest in maths on attitude depends entirely on learners' perception. In other words, learners' perception acts as a bridge or mediator between their Interest in mathematics and their attitude towards it. This statement serves a pivotal role in the perception of mathematics in shaping the connection between Interest in mathematics and attitude towards mathematics. This highlights that learners' positive perception can enhance Interest in mathematics and promote a better attitude towards it. In contrast, a negative perception can hinder Interest and lead to an unfavorable attitude. Per the outcome, 'H4: Learners' perception of maths mediates the relationship between Interest in mathematics and attitude towards maths' accepted.

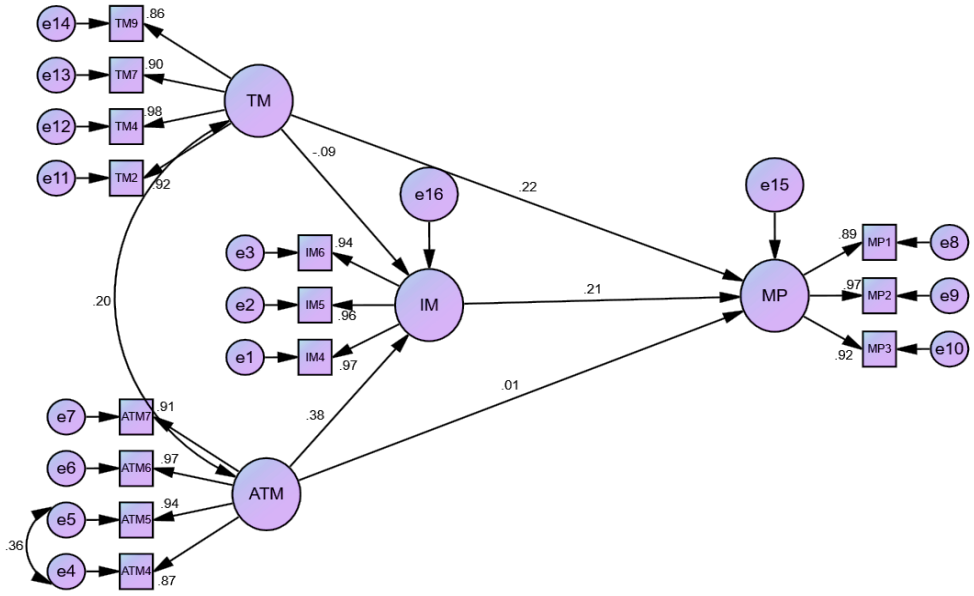

Figure 3. Path analysis

Learners' attitudes towards mathematics had a positive impact on their interest in maths. Instructors, as well as curriculum developers, must see to developing learners' right attitude to impact their interest. Learners' interest enhances their perception positively. It is, therefore, essential for our education system to put in place measures that seem to increase learners' interest in mathematics. This is because learners' interest directs their perception. Mathematics is often viewed as a hard-to-crack subject, and learners who have a negative attitude about it may see it challenging to engage with such

a subject and to develop their mathematical skills. Technology can be a helpful tool for learners learning mathematics since it can provide a visual aid, simulations, and interactive exercises, making it easier for learners to understand and grasp concepts and enable them to engage with the concrete material put before them.

However, the relationship between learners' attitudes and technology and learners' interests is not straightforward and as simple as we may see it. Learners' perception of mathematics also plays a significant role. Learners who perceive mathematics as relevant, significant, and interesting have a positive attitude toward mathematics and technology in their learning. Conversely, learners who perceive mathematics as irrelevant, insignificant, and worrisome are less likely to engage with mathematics, regardless of the technology involvement.

Therefore, it is essential to foster, nurture, and cultivate a positive perception of mathematics in learners by engaging in relevant and result-oriented curriculum and practical application of technology. Now, technology must be a substitute for effective teaching and instructional processes rather than as a tool to enhance them. Instructors should, as a matter of fact, design lessons with technology being an integral part of the instructional process to build and support their learning and stimulate their interest in mathematics.

Thus, learners' attitude towards mathematics and technology, mediated by their perception of mathematics, brings a positive impact on their zeal to learn mathematics. Hence, teachers need to be conscious of their learner's perceptions and attitudes, and technology builds up to ensure a better attitude in maths.

Implications of the Study

Learners' maths in the linking their attitudes in maths and interest in maths has a significant implication for education managers and teachers. This will direct and provide effective professional development for teachers. As a result of this, facilitators must be trained in effective practices that integrate technology in a manner that supports learners ' interests and learning. All colleges of education must stress the need for it. Professional development must also emphasize pedagogical ways of promoting a positive attitude toward mathematics, inclusive of the teaching of the real-world applications of mathematics.

As an implication, our education system should foster and support a positive school culture towards mathematics. In this, school administrators can assist with the formation of learner clubs and competitions that promote and appreciate mathematics. Thus, celebrating and honoring learners' success in mathematics can create a supportive environment and promote a positive attitude toward the subject. As a pedagogical instructional tool, instructors or teachers must enforce and encourage learners to work in groups, solve mathematics problems and questions together in collaborative learning environments,

and use technology to ensure engagement of material. This promotes and fosters collaborative problem-solving practices. This creates a sense of teamwork and promotes a positive attitude towards the subject.

Learners are more engaged when learning is personalized and relevant to their being. During instructions, activities that support learners' interest and positive attitudes toward mathematics must be employed. This ensures learner-centered learning.

We must also implement effective assessment strategies that focus on learners' progress of work and feedback rather than grades or comparisons with other learners. This creates a positive learning environment and encourages learners to take ownership of their learning.

Thus, promoting a positive perception of mathematics and effective use of technology can improve learners' interest in mathematics. Education managers and teachers must proactively nurture learners positive attitudes, use technology wisely and effectively, and instill learner-centered learning practices during instructional engagements.

CONCLUSION

In conclusion, there is a significant relationship between learners' attitudes towards mathematics, technology, and interest in maths, which mediates their maths perception. Learners' beliefs about mathematics, including its importance, can significantly impact their interest in the subject and technology in learning. Management of education and teachers need to address learners' perception of maths, promote a good attitude, and use technology effectively during instructional processes. By fostering a supportive learning environment, providing opportunities for collaborative problem-solving, and implementing learner-centered learning practices, teachers can assist learners in developing a positive perception of mathematics and technology to enhance their interest in mathematics.

This study adopted the survey approach to administer questionnaires to uncover the effect of learners' attitudes in mathematics and technology in their learning on their mathematics interests—the mediating roles of learners' mathematics perception. A study could be carried out to investigate the long-term impact of learners' attitudes in mathematics and technology on learners' interest in mathematics.

The study concentrated only on learners' attitudes in mathematics and technology without considering other factors that could affect their interest in the subject, namely teacher quality, curriculum design, classroom environment, gender, socioeconomic status, and cultural background. In the future, other research could be conducted to factor in these other variables. Similarly, the study only factored in the mediating role of learners' mathematics perception without exploring the potential mediating factors. Thus, considering these variables paved the way for similar study considerations by other researchers. Future studies could be conducted to explore different instructional approaches that integrate technology in mathematics education to identify the most effective strategies for promoting learners' interest in mathematics.

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