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Effect of Interest in Mathematics Learning on Students' Performance

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ABSTRACT
The purpose of this study is to investigate how interest influences mathematics learning among science students in higher education. Interest plays a significant role, acts as a powerful motivator to influence student's positive attitude and actively encouraging their effort in understanding mathematics. Exploratory factor analysis, confirmatory factor analysis and structural equation modeling methods used to analyse the data collected from 239 selected students. The results proved that the interest significantly has a positive effect to greater success in mathematics (p-value = 0.000). This study reveals that more than 15 points will be achieved for an additional level of interest and indirectly promoting higher education students to have better motivation level towards mathematics. Therefore, to maximize positive interest, enhanced understanding, and a more engaged learning experience in mathematics, it is suggested that a great effort be made to create a supportive and positive learning environment.

KEYWORDS
Interest; mathematics learning; mathematics performance.

INTRODUCTION

Mathematical interest can grow from positive experiences when students discover patterns, resolve difficult questions and are proud to present what they have solved. Those moments are more than a momentary feeling of enjoyment and attractiveness, but also a part of a core motivator of how students learn, grasp and succeed. Interest is an example of enjoyment emotions that can be measured consistently using suitable questionnaires and behavioral indicators. Pekrun (2006) in his study highlighted that interest is considered as performance related feeling that can be captured through students' involvement and responses toward challenges. Meanwhile, Akinmola (2014) used surveys to assess mathematics interest and found that students with higher interest consistently achieved better performance. Interest is considered as one of the achievement emotions shaped by two elements: students perceived control and value (Pekrun, 2024). The increment of interest level will lead to greater attention, deeper strategy use, and longer persistence if both elements are perceived positively by students. These processes explain why various studies repeatedly highlight a close relationship between interest and performance.

Students' interest in mathematics is positively correlated with their academic performance (Park & Han, 2023; Salifu & Bakari, 2022; Frimpong, Frimpong et al, 2025). These findings show that helping students boost interest is crucial to keep students engaged, persistent, and successful in mathematics (Schoenherr et al., 2024; Li et al., 2022; Akinmola, 2014; Pekrun, 2006). The students' achievement may be supported by other

factors such as technology used, collaborative learning, and motivation with the student interest plays as a key mediator.

Previous studies conducted by Kaku and Arthur (2025) which in line with Boadu and Boateng (2024), show that students' interest acts as a mediator, between positive perceptions and academic performance. Their studies explained clearly that structured lessons can lead to better learning process and higher achievement, supported by Schoenherr et al. (2025) whose found that interest consistently helps students to perform better. In addition, Li et al. (2022) indicated that being interested in mathematics helps students feel more confident, perform better in their work, and feel less anxious. Park and Han (2023) on the other hand showed that task-based interest can grow into personal interest, which affects students' achievement, while interest by itself indirectly improve performance.

Many studies consistently show that student interest is closely related to mathematics achievement. Campbell (2025) brings a new perspective by demonstrating that interest in mathematics generally decreases as students move from primary to secondary school, with female students reporting lower levels of confidence and enjoyment compared to males. Although Campbell's study focused on school environments, this scenario raises important issues for higher education. If interest already decreases during earlier schooling, it may continue to affect students' engagement and performance at the higher education level. Therefore, this study aims to further investigate the effect of interest emotions towards mathematics performance among higher education students, so that the findings by Campbell (2025) can be discussed significantly.

RESEARCH METHODS

239 students from a particular Malaysian higher education institution were chosen to participate in the study. Purposive sampling was employed in this study to select respondents aged 19 to 21, who shared the same program and semester. The questionnaire included six items on interest ("*I am cheerful in my math class*", *I look forward to learn a lot in my math class*", "*I am happy that I understood the math material*", "*I could listen enthusiastically for hours in my math class*", "*I feel my heart pounding with joy before math class*" and "*I smile at my lecturer with joy during my math class*") in mathematics learning, was modified from a prior study (Bieleke et al., 2021) using 7-point Likert scale, with 1 indicating "strongly disagree" and 7 indicating "strongly agree". Direct questionnaire has been used for data collection method among selected respondents, while their mathematics score was provided by their respective lecturers.

SPSS version 24.0 and AMOS version 24.0 software were used to analyse the data in this study. The first phase of the data analysis is to conduct an exploratory factor analysis (EFA) using 75 pilot data, which is a different dataset from the actual data. From the factor analysis using principal axis factoring method, results show that the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) = 0.850 (> 0.70), significance value of Bartlett's Test = 0.000 (< 0.05), and the total variance explained by one factor = 72.22% (> 60%) with factor loadings all six items ranged from 0.631 to 0.781 (> 0.60). In addition, the reliability analysis found that the Cronbach's alpha value for the interest = 0.939 (> 0.70). Therefore, the same instrument will be used for real study because all the conditions for the EFA was fulfilled (Ullman & Bentler, 2013; Awang, 2015; Heir et al., 2010).

The second phase is to conduct confirmatory factor analysis (CFA) on the actual data set through unidimensionality, validity and reliability to ensure the suitability of the measurement model (Ullman & Bentler., 2013; Awang, 2015; Hair et al., 2010). Unidimensionality is achieved because all factor loading values exceed 0.6 and in a

positive direction. The validity of the CFA has been tested using convergent validity and the validity of the building. Convergent validity has been met as all items have a factor loading values in between 0.75 to 0.90, more than 0.60 (Byrne, 2016; Awang, 2015; Heir et al., 2010), and average variance extracted (AVE) is also more than 0.5 (Awang, 2015; Hair et al., 2010). Meanwhile, the construct validity achieved for each fitness index at least in the minimum requirements as shown in Table 1. The last step is to obtain composite reliability (CR) and this study has CR = 0.932, considered to be reliable because the value obtained is greater than 0.70 (Awang, 2015; Hair et al., 2010). The normality test also proves that the data distribution in this study is approximately normal given that the skewness value obtained is between -1.00 to 1.00 (Awang, 2015). Therefore, structural equation modeling (SEM) can be applied since all requirements for the appropriateness of the validity and reliability of the measurement model in this study have been proven.

Table 1. The goodness of measurement model fit

Category	Name of index	Level of acceptance	Index value
Absolute fit	Root mean square of error approximation (RMSEA)	< .080	.058
Incremental fit	Tucker-Lewis Index (TLI)	> .900	.986
	Comparative Fit Index (CFI)	> .900	.991
Parsimonious fit	Chi-Square/ Degrees of Freedom (Chisq/df)	< 3.00	1.800

SEM has been used to test the hypothesis by performing path analysis. This study aims to examine the effect of interest on students' mathematical performance among higher education science students. This finding is significant if the significance value (*p*-value) obtained is less than at least 5% of the level of significance, which means that there is sufficient evidence to conclude that interest has a significant effect on mathematical performance, as stated as the following hypothesis.

H_1: Interest has a significant effect on mathematical performance among higher education science students.

RESULTS AND DISCUSSION

In total 93 (%) male and 146 (%) female students were involved in the study with majority of them agreed (Mean, M = 5.89, Standard deviation, SD = 0.5852) that they have positive interest emotions in mathematics learning. This study found that there exists a moderate positive significant relationship between interest in mathematics learning and students' achievement (correlation value, r = 0.582, p-value = 0.000), with 36% total variation of the achievement contributed by the interest itself.

Figure 1 shows that the path analysis between the two variables and the information gathered was simplified in Table 2. The positive standardized regression coefficient value obtained concluded that the students' achievement will be increased by 15.36 points for an additional one interest level. The result from the path analysis also shows the significant positive effect of interest emotions in mathematics achievement among higher education level students since the p-value obtained is 0.000 (< 0.01).

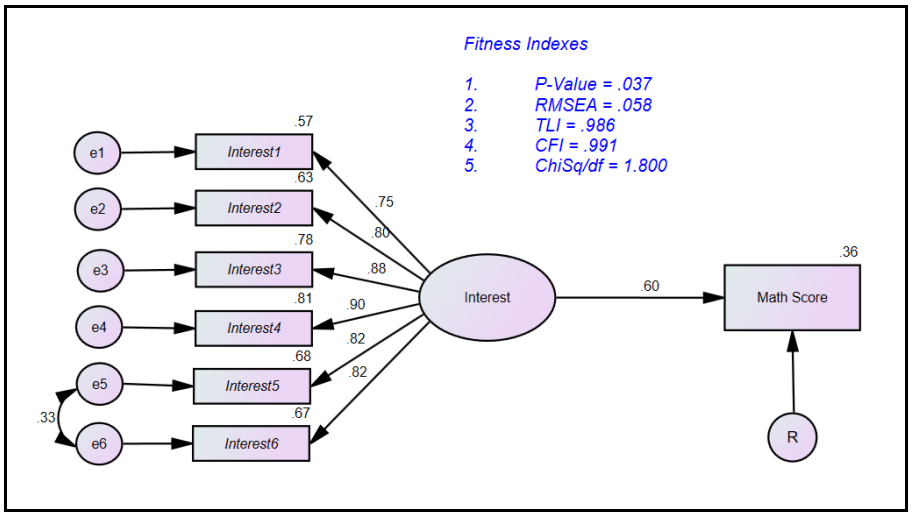

Figure 1. Standardized regression coefficient of the path analysis

Table 2. Result of the path analysis

Path	Estimate (β)	S.E.	C.R.	P
Math Performance <--- Interest	15.360 (.60)	1.557	9.863	.000*

** Significance at 1% level of significance*

The results from this study supported the stated hypothesis at 1% level of significance which indicates that there is at least 99% that the current study confident that the positive interest in mathematics learning has significant effect on mathematics performance among higher education science students. The positive interest in mathematics learning promised better achievement as stated by Pekrun (2024). The significant result in this study is consistent to the higher mean score obtained for all the six items of interest in mathematics. Furthermore, the positive relationship obtained between the two variables of interest that gathered in this study is in line with Frimpong, Menlah and Boateng (2025), Schoenherr et al. (2024), Park and Han (2023), Li et al. (2022) and Salifu and Bakari (2022). It was proven that students' interest in learning process is positively correlated to their mathematics performance.

CONCLUSION

This study shows clearly that students' interest is not an optional factor but an important factor shaping how students learn and succeed in mathematics. When students are deeply curious and engaged, they are more willing to persist, explore challenges, and accept mathematics as meaningful rather than stressful. These findings suggest that structured lessons which bring enjoyment and reflect students' real-world situations can make a concrete difference. For educators and administrators, the findings show that supporting students' interest is equally important as teaching mathematics itself, since motivation and performance are strongly connected.

In addition, this study comes with certain limitations. The data highlights a specific group of students, and additional study is needed to explore other conditions, age groups, or even socio-cultural backgrounds. Future studies could also investigate how interest interacts with other factors, such as perceived competence, perseverance in problem-solving, or mathematical mindset to achieve a deeper understanding of what drives mathematical success. By enhancing these perspectives, educators and researchers can collaborate to develop classroom environments that are not only effective but also truly

enjoyable which helps students carry a positive relationship with mathematics well in real-world situations.

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