GERMANE
GLOBAL JOURNAL OF
EDUCATIONAL RESEARCH & MANAGEMENT

e-ISSN : 2805-4695 https://jurnal.nun-g.com/index.php/germane

INSIGHT INTO YOUTHS' LEARNING MATHEMATICS: ATTITUDE AND PERFORMANCE

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Received: 26 July 2025 | Accepted: 24 August 2025 | Published: 24 September 2025

Abstract: This study investigates youths' attitude towards learning mathematics and their mathematics performance. A total of 250 youths in Seri Manjung, Perak at range age of 15-24 years old participate in this study. A quantitative data was collected by using structured online questionnaire. Descriptive statistics, t-test, one-way ANOVA, correlation, and multiple linear regression was implemented to analyse the data by using SPSS software. A significant difference was shown among age group while there is no significant difference among gender and education level of the youths towards learning mathematics. A weak, positive correlation was established between youths' attitude and their mathematics performance. Mathematics enjoyments were the attitude aspects that contribute highly towards the performance of youths. The result provides a better view for educators, schools, and institution to improve the teaching and learning technique for a better way of understanding and enjoy learning mathematics, which will improve youths' performance in mathematics.

Kata kunci: attitude, mathematics, teaching and learning, performance, youths

Cite This Article: Nurul Mashitah Ramly & Muzirah Musa. 2025. Insight into Youths' Learning Mathematics: Attitude and Performance. *Global Journal of Educational Research and Management (GERMANE), 5*(4), 15-26.

INTRODUCTION

Mathematics is one of the crucial subjects and tools for understanding the world (Abe & Gbenro, 2014). Research conducted at Stanford University indicates that fostering a positive attitude towards learning mathematics can predict mathematical performance and enhance brain memory (Callaman & Itaas, 2020). Particularly for young individuals, mathematics holds great importance, as it nurtures future researchers capable of competing intellectually

and producing significant scholarly works (Raygoza, 2016, Ulum, 2024). Undoubtedly, mathematics serves as an essential instrument for youth, driving global wealth and development. However, despite its undeniable significance, there persists a concerning trend of poor mathematics achievement among young learners (Abe & Gbenro, 2014; Yahya, 2022, Ulum. 2024). The crucial role of mathematical knowledge and skills in university admissions is widely recognized, given their extensive application across various fields. For those aspiring to pursue higher education, especially in STEM disciplines or research and development fields like science and technology, excelling in mathematics becomes imperative. Nevertheless, despite mathematics' pivotal role in personal and national advancement, numerous youths encounter difficulties in achieving satisfactory grades, with a significant portion performing poorly in both national and international examinations.

The students' achievement is correlate with their engagement at the early stage of learning, as they will achieve a good achievement when they are well behaved and engage positively at the early stage of age (Ladd & Dinella, 2009, Hernández de la Hera et al., 2023, Siller & Ahmad, 2024). Children's interest in, and competence perceptions of mathematics are generally quite positive as they begin school. However, there was a declined in mathematics performance due to the disengagement of the subject mathematics (Martin et al., 2012) and learning attitude (Jufrida et al., 2019). Moreover, student's motivation in learning is closely related to their learning attitude. Many researchers claim that motivation and students' interest were factors that contributing to their performance in mathematics (Cordova and Lepper, 1996; Kunhertanti & Santosa, 2018; Morano et al., 2021; Hammoudi and Grira, 2023, Siller & Ahmad, 2024, Lehocká, Z. N. & Kmeťová, M. 2025). As Dobson (1985) suggests, our attitude significantly shapes the choices we make each day, how we behave, and our views on the importance of mathematics. Emphasizing youth's attitude emerges as a crucial factor in enhancing youths' performance in mathematics learning. The way young people feel about learning mathematics is shaped by a mix of factors, just like the ABC (Affective, Behaviour, and Cognition) Model suggests. Their confidence in themselves, how they feel about mathematics, whether they enjoy it, how motivated they are, and whether they see mathematics as useful all play a part in their overall attitude towards learning mathematics. Hence, attitude stands as a crucial factor that demands attention. Its impact on students' performance in mathematics can vary, being either positive or negative depending on the individual student. In addressing this issue, this study aims to investigate students' attitudes towards learning mathematics.

According to Agyeiwaah et al. (2021), attitude can be defined as three main components which were affect that explained the feeling, cognition that explained the thought, and behaviour that explain the action. Buhs and Ladd (2001) claim that the effect components in attitude where the emotional engagement which related among students encounters the feeling of the students towards their surroundings. Behavioural engagement refers to the how the children engage in classroom teaching and learning activities. Cognition engagement mostly related to the students' belief and perception and the effort they used to process the learning task and mastering the learning skills (Helme & Clarke, 2001).

In this study, we assessed the following aspects to comprehend the youths' attitude towards learning mathematics.

Self-confidence can be defined as the belief of self-competency and skills, the capability of dealing with various type of situation (Kunhertanti & Santosa, 2018). Cretchley (2008) essentially points out that self-confidence in math boils down to a person's belief in themselves when it comes to learning and tackling math tasks and problems. It's about having faith in your own abilities to handle mathematical challenges and tasks. Ultimately, it's important to investigate into the relationship between self-confidence and how it impacts the math performance of young people. Understanding how self-confidence influences their ability to succeed in math is key to improving their overall performance and learning experience.

Mathematics anxiety was a mental disorganization that occurs to individuals while solving mathematics task or problem, the feeling of panic and helplessness (Mutodi & Ngirande, 2014). Mathematics anxiety gave effect towards students' performance and achievement in mathematics, which lead to poor performance and students' avoidance in learning mathematics (Mutodi & Ngirande, 2014). Mathematics anxieties effect on how the students behave where some of them lead to math phobia while some of them increase the performance in mathematics (Ashcraft, 2002). Therefore, it is desirable to study the attitude of mathematics anxiety and how anxiety related to the performance in mathematics.

Mathematical enjoyment was a positive attitude towards learning mathematics where they felt more confident, and happy when it comes to learning mathematics (Haack, 1967). Students will enjoy the feeling of solving mathematics problem and find Mathematics is fun when they are emotionally engaged (Martin & Rimm-Kaufman, 2015). Ku and Sullivan (2002) claimed that students' attitude increased as their interest and preference increased in learning mathematics. Therefore, it is importance to study the attitude of mathematics enjoyment and how the feeling of enjoyment in learning mathematics related to the youth's performance.

Motivation can be the desire to change by overcoming the barriers and empowering people's performance, the motivation is a force where people will behave accordingly to their point of view (Tohidi & Jabbari, 2012). Helme and Clarke (2001) claimed that the students who were highly motivated in learning will develop a better and deeper understanding in the teaching and learning session. The realization of an individual goals encouraged their motivation to believe in themselves in learning mathematics (Hannula, 2006). Generally, it can be stated that motivation and curiosity play a crucial role in achieving excellent academic performance. Good grades play a significant part in fostering positive intrinsic motivation, and vice versa (Lehocká & Kmeťová, 2025). On top of that, the attitude of motivation was desirable to be studied and how the motivation related to the mathematics performance.

Mathematical usefulness was seen to be a belief or thinking of students towards mathematics, there is no uniform definition for this as it is differed from objective and subjective knowledge to be taken into effective component (Maass, 2010). Leder and Forgasz (2010) claimed that majority of the respondents in their study believed the usefulness of mathematics in their achievement of life and future career. Students failed to see the usefulness of mathematics, the real-life application of mathematics as they were trapped and often see mathematics in an isolated procedure (Watt & Goos, 2017).

Drawing from the identified concerns, thus, this study aimed to comprehend the youths' attitude towards learning mathematics, and their performance in mathematics. Specifically, the investigation of the youths' attitude towards learning Mathematics was conducted to:

1. Assess and compare the youths' attitude towards learning mathematics across three different age groups, gender, and level of education,
2. Determine the relationship between the youths' attitude and performance.

It was very important to find the best solution to make an improvement of the youth performance in mathematics. Therefore, the study of youth attitude towards learning mathematics with regards to their performance in mathematics examination was a worth investigation. The result of this study will benefit many parties with the aim to gain improvement of youths' performance in learning mathematics. Besides, educators, schools, and institution also will gain benefit with this study as the information gather will help them improve teaching skills and develop strategies to improve the performance of youth in learning mathematics.

Therefore, it's valuable to explore how the perceived usefulness of mathematics relates to the actual performance in mathematics among the youth in one district in Perak. Understanding this connection can provide insights into how students perceive the practicality of mathematics and how it affects their academic achievements.

RESEARCH METHOD

Respondent for this research was youth from the range age of 15 to 24 years old in Seri Manjung, Perak. A total of 250 of youths participated in this research selected from secondary school level to higher education level by using convenient sampling method. The distribution for the secondary school were 94 respondents (37.6%) while from pre-university and university category were 105 (42.0%) and 51 (20.4%) respondents respectively (as in Table 1).

Table 1 Summary of respondents' demography

Variable		N	Percentage
Gender	Male	97	38.8
	Female	153	61.2
Age	15-17	33	13.2
	18-20	142	56.8
	21-24	75	30.0
Education Level	Secondary School	94	37.6
	Pre-university	105	42.0
	University	51	20.4

N population size

The main instrument that used in this research was Mathematics Attitude Questionnaire (MAQ) which consisted of 39 statements with 5 demographic questions adapted from Mazana et al. (2018) as we want to ensure the validity of the content (refer Appendix B). The data entry for online questionnaire was a 5-point Likert scale survey where 1 represented strongly disagree and 5 represented strongly agree with the statements. Self-confidence in mathematics, mathematics usefulness, mathematics enjoyment, mathematics anxiety and motivation were the five attitude aspects that were being considered in the MAQ. Each statements score was range in a 5-point Likert scale and the Cronbach's Alpha score was 0.967.

The data was collected as the questionnaire was distributed among youths by using online platform. The questionnaire was distributed to the secondary students through the teachers. Besides, for the pre-university and university level, the questionnaire was distributed to the concerned authorities where they will be distributed among youths to complete the questionnaire. As the questionnaire was distributed, all the youth for each range of age, 15-17 years old, 18-20 years old, 21-24 years old in Seri Manjung, Perak completed the questionnaire and submitted by using online medium. The collected data consist of 97 male and 153 females.

The target of this study was to analyse the quantifiable portion of the survey, therefore; a quantitative analysis method was being used. Some analysis was performed by using SPSS 23.0 where a descriptive statistic, one-way ANOVA, t-test, correlation analysis, and multiple linear regression analysis were performed. All the collected data were being coded and transferred into SPSS software. All the negative items were being converted into positive code as a reverse order.

Descriptive analysis was conducted for each attitude aspects of youths among three different age groups, gender, and the youths' education level. One-way ANOVA was conducted twice conducted to compare the youths' attitude towards learning mathematics within the three group of ages and education levels. Besides, t-test with gender as the independent variable was conducted to compare the youths' attitude towards learning mathematics between gender. Correlation analysis was conducted in this research to analyse the relationship between youths' attitude and their performance The performance of the youths was converted into 6-point scale ranger from 1 (F), 2 (E), 3 (D), 4(C), 5(B), to 6 (A) followed by their mathematics grade in their previous final mathematics examination. A multiple linear regression analysis was conducted to determine the relationship and predict the youths' performance from their attitude.

RESULTS AND DISCUSSION

Youths' attitude towards learning mathematics among age group, gender, and education level

Descriptive statistic was conducted to find the mean and standard deviation value for attitudes among group of age, gender, and education level of the youths. The result was presented (in Table 2).

Table 2 Descriptive statistics of youths' attitude among age group, gender, and education level

Variable		Self-confidence		Anxiety		Enjoyment		Motivation		Usefulness		Attitude	
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Age	15-17	3.36	0.809	3.21	1.042	3.36	0.724	3.54	0.677	3.77	0.677	3.48	0.650
	18-20	3.69	0.91	3.68	1.07	3.74	0.85	3.79	0.93	4.11	0.80	3.82	0.79
	21-24	3.74	0.82	3.68	1.02	3.85	0.71	3.80	0.75	4.01	0.65	3.84	0.67
Gender	Male	3.77	0.73	3.64	1.05	3.76	0.71	3.88	0.95	4.06	0.69	3.85	0.62
	Female	3.59	0.95	3.50	1.06	3.70	0.86	3.69	0.95	4.02	0.78	3.74	0.81
Education level	Secondary School	3.58	0.97	3.46	1.10	3.59	0.86	3.64	0.87	3.96	0.76	3.69	0.79
	Pre-university	3.62	0.97	3.45	1.10	3.59	0.86	3.64	0.87	3.96	0.76	3.78	0.69
	University	3.90	0.89	3.89	1.04	4.00	0.78	3.90	0.87	4.13	0.63	3.99	0.73

M mean, *SD* standard deviation

As for age group, the highest recorded mean was mathematics usefulness for age 18-20 years old, while the lowest recorded mean was mathematics anxiety for age 15-17 years old. Besides, mathematics usefulness for male shows the highest score between gender while mathematics anxiety for female scores the lowest. Mathematics usefulness for university level shows the highest mean score in education level and the lowest mean score was mathematics anxiety for pre-university level.

A moderate positive attitude towards learning mathematics was shown in the overall attitude for age group 20-24 years old which was the highest mean score among the age group. Besides, male youths show a higher moderate positive attitude than female in learning mathematics. Last but not lease, the overall attitude shown by youth in university level was the most positive compared to the secondary school and pre-university level of youth towards learning mathematics.

Comparison of Youths' attitude towards learning mathematics among age group, gender, and education level

One-way ANOVA was used to compare the youths' attitude towards learning mathematics among three group of youths' ages and the different education level of youths. The results are presented (in Table 3). There was a statistically significant difference between groups of age and there was no significant difference between different education level. A Tukey post hoc test was done and as a result, there was a statistically significant difference in the age group 15-17 years old and 18-20 years old.

Table 3 Results of ANOVA youths' attitude towards mathematics between ages and different education level

Variable		N	Mean	SD	F	*p-value*
Age group	15 – 17	33	3.48	0.649	3.143	0.045
	18 – 20	142	3.82	0.787		
	21 – 24	75	3.83	0.743		
Education Level	Secondary School	94	3.69	0.79	0.748	0.937
	Pre-university	105	3.78	0.69		
	University	51	3.99	0.73		

N population size, *SD* standard deviation, *F* variations between sample means

An independent t-test was conducted to compare the youths' attitude towards learning mathematics between gender. The result presented (in Table 4) shows that there was no significant difference between gender towards learning mathematics. Dependency chi-squared test was done and as a result there is no significant association between gender to the attitude of youth in learning mathematics. Therefore, gender has no effect to the youths' attitude towards learning mathematics.

Table 4 Results of independent t-test of youths' attitude towards mathematics between gender

Gender	N	Mean	SD	*t*	*p-value*
Male	97	3.851	0.617	1.208	0.228
Female	153	3.741	0.813		

N population size, *1 SD* standard deviation, *t* variations between sample means

Relationship between youths' attitude and their performance in mathematics

Correlation analysis was conducted to determine the relationship between youths' attitude and their performance in mathematics. There was a positive, significant but weak correlation

between each attitude aspects towards youths' performance in mathematics presented (in Table 5). The correlation score varied from 0.383 to 0.568 representing from weak to moderate positive correlation.

Table 5 Correlation between variables

	Performance (grade)	
	r	*p-value*
Self-Confidence	0.533	0.000
Mathematics Anxiety	0.568	0.000
Mathematics Enjoyment	0.481	0.000
Motivation	0.383	0.000
Mathematics Usefulness	0.467	0.000

r correlation coefficients

Then, a multiple linear regression analysis was conducted to predict youths' performance based on their grade from attitude. The results presented (in Table 6) indicate where the regression model statistically significant to predict the outcome variables. The adjusted value was 0.317, and this indicates that 31.7% of the youths' performance can be predicted from the attitude of the youths.

Table 6 Multiple Linear Regression between Attitude and performance

	B	SE	Beta	*t*	*p-value*
Constant	2.241	0.344		6.518	0.000
Self-confidence	0.075	0.179	0.057	0.418	0.677
Mathematics Anxiety	0.117	0.102	0.108	1.148	0.252
Mathematics Enjoyment	0.603	0.171	0.426	3.522	0.001
Motivation	0.017	0.126	0.013	0.134	0.894
Mathematics Usefulness	0.003	0.113	0.013	0.134	0.894

Note: $R = 0.575;\ R^2 = 0.331;$ adjusted $R^2 = 0.317;\ F(5, 244) = 24.164,\ p = 0.00 < 0.05$

The results show that the age group of youths at 21-24 years old show high positive attitude towards learning mathematics compared to other group ages. Besides, there was no significant difference in youths' attitude between their gender and education level. Therefore, the gender and education level of the youths did not influence their attitude towards learning mathematics. Moreover, the findings indicate a positive yet weak correlation between youths' attitudes and their performance in mathematics. Mathematics enjoyment contributes 60% of

youths' performance in mathematics. This result aligns with the study conducted by Mazana et al. (2018) which found that mathematics enjoyment predicted students' performance in mathematics in Tanzania to be 69.8%.

The result was meaningful to the school and institution to improve teaching technique that will encourage positive attitude among youths and hence promote to the positive result in the mathematics performance. The attitude plays a big role for youths to get a good performance in mathematics but then there are also many other factors that contribute to their performance. There are youths enjoyed learning mathematics, despite of that some of them still have a poor performance in mathematics. This can be attributed to inadequate learning and examination skills, as well as ineffective teaching strategies employed by educators when delivering mathematics instruction to young learners. Therefore, there are other aspects that should be observe and taken care of to improve youth performance in mathematics learning where educators should also be part of it.

The study involves secondary schools and collage in the Seri Manjung, which is one of district in Perak. The questionnaire was distributed online to the respective teachers and educators in the district randomly. Hence, the sample may not represent a smooth scattered range of age and different type of areas such as rural areas. Besides, the study only limited to the study of youth attitude towards learning mathematics. But then, there were many other factors contributing to the youths' performance in mathematics such as the attitude of teachers towards the student for the further study. Besides, the study used online platform for the questionnaire question. This contributed to the limitation of the study as some of the youth in the region were from poor family background and they could not be the respondents for this study. As for the pandemic time, there were a limit in movement to complete the survey for this research study, and this issue takes time to get a certain number of respondents.

CONCLUSION AND RECOMMENDATIONS

The finding of the study show that the gender and level of education were not influence the youths' attitude towards learning mathematics, but the age of youths did. Therefore, this shall be concern as the attitude has a positive relationship towards learning mathematics. Despite a small number, it shall not be ignored as this will also give effect for the youths' mathematics learning. Youths play a big role in nation as the involvement of youths in the process of change towards a better nation is very crucial. The youth generation must give positive impact and make the effort to guarantee the worth of future. Therefore, it is important to target the youths and build the positive attitude in them for a better and promising future.

This study recommend that the further research should focus more on the youths from different family background such as the parents' education level, employment status, and number of siblings in the family. It can give an interesting result as these characteristics contribute the performance of the youth in learning mathematics. Besides, the educators, schools and institution shall appropriately adopt techniques that will reduce the barriers among educators and learners, minimize fear when learning, to increase the enjoyment of learning mathematics. Educators can consider of making a mathematics fun learning in the

classroom by using technology-based learning. Web-based graphing calculator, Desmos can be used as a platform. Here, the learners will engage with the learning while playing with the mathematics idea by using the Desmos activities page. Besides promoting to a fun learning classroom, the learners can have a better view of graphing technique.

CO-AUTHOR CONTRIBUTION

The authors affirmed that there is no conflict of interest in this article. The first author formulated the study's concept, carried out data collection and analysis, and penned the initial draft of the manuscript. The second author contributed by advising on study planning and design, offering perspectives on the manuscript draft's preparation, and significantly contributing to both revising and ultimately finalizing the manuscript's structure and written content.

ACKNOWLEDGEMENTS

This research was supported by the School of Mathematical Sciences and School of Educational Studies Universiti Sains Malaysia. We thank the youths that participated in this study.

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