



# East African Journal of Education Studies

eajes.eanso.org

Volume 7, Issue 1, 2024

Print ISSN: 2707-3939 | Online ISSN: 2707-3947

Title DOI: <https://doi.org/10.37284/2707-3947>



EAST AFRICAN  
NATURE &  
SCIENCE  
ORGANIZATION

Original Article

## The Effect of Students Self-Confidence on Mathematics Achievement in High School in Korea

Emmanuel Byiringiro<sup>1\*</sup>

<sup>1</sup> Mount Kenya University, P. O. Box 342-01000, Thika, Kenya.

\* Author for Correspondence ORCID ID: <https://orcid.org/0009-0000-1636-7059>; Email: [byiremmy@gmail.com](mailto:byiremmy@gmail.com)

Article DOI: <https://doi.org/10.37284/eajes.7.1.1765>

Date Published: **ABSTRACT**

20 February 2024

**Keywords:**

Students 'Self-Confidence, Mathematics Achievement and Students.

This study looked into how students' self-confidence affected their performance in mathematics in South Korean high schools. This study employed an ex-post facto quantitative methodology with a correlational design on a sample size of 288 respondents selected using Yamane formulae. Students and math teachers from Daeyeon High School made up the sample size. To gather quantitative data, a mathematics achievement test and a confidence questionnaire in mathematics were employed. The null hypothesis, according to the Pearson product-moment correlation coefficient computation formula, is that there is no statistically significant correlation between students' self-confidence and mathematical achievement. The study discovered a statistically significant positive correlation ( $r=723$ ,  $p=0.000$ ) between math achievement and student confidence. Multiple linear regression analysis revealed that the independent variables in the model account for 70.8% of the variance in the dependent variable, indicating their critical role in high school mathematics achievement for students. Furthermore, it was concluded that there is a significant positive attitude towards students' mathematics achievement when it comes to their self-confidence. The study concluded that since student confidence is directly correlated with mathematical achievement, math teachers should help students solve mathematical problems in order to help them build self-confidence for better achievement.

### APA CITATION

Byiringiro, E. (2024). The Effect of Students Self-Confidence on Mathematics Achievement in High School in Korea *East African Journal of Education Studies*, 7(1), 231-239. <https://doi.org/10.37284/eajes.7.1.1765>.

### CHICAGO CITATION

Byiringiro, Emmanuel. 2024. "The Effect of Students Self-Confidence on Mathematics Achievement in High School in Korea". *East African Journal of Education Studies* 7(1), 231-239. <https://doi.org/10.37284/eajes.7.1.1765>

### HARVARD CITATION

Byiringiro, E. (2024) "The Effect of Students Self-Confidence on Mathematics Achievement in High School in Korea", *East African Journal of Education Studies*, 7(1), pp. 231-239. doi: 10.37284/eajes.7.1.1765.

### IEEE CITATION

E., Byiringiro "The Effect of Students Self-Confidence on Mathematics Achievement in High School in Korea" *EAJES*, vol. 7, no. 1, pp. 231-239, Feb. 2024.

### MLA CITATION

Byiringiro, Emmanuel. "The Effect of Students Self-Confidence on Mathematics Achievement in High School in Korea". *East African Journal of Education Studies*, Vol. 7, no. 1, Feb. 2024, pp. 231-239, doi:10.37284/eajes.7.1.1765

## INTRODUCTION

Mathematics is a vital subject in both education and society, and it offers tremendous advantages to both people and the environment. Additionally, students especially preservice teachers need to know this. It makes sense to research traits like critical thinking and confidence in preservice teachers in order to help them grasp mathematics better. Deciphering the preservice teachers' confidence and critical thinking is essential to preparing them as future math educators, just as it is to comprehend their math anxiety and math self-efficacy (Khine, et al. 2015). According to Adrej (2015), confidence is a mental state that promotes self-belief and allows people to push their boundaries. That implies that having confidence is the first step toward achieving goals. People develop their beliefs and characterize themselves as self-confident as a result of their experiences, learning, and action. They also receive detailed feedback about their potential. For preservice teachers, confidence and critical thinking in mathematics are crucial. Math confidence enables preservice teachers to solve mathematical problems. On the other hand, because it improves their ability to analyze, interpret, evaluate, examine, infer, and explain math problems, preservice teachers have more confidence to become participative (Slankov, 2014).

According to Pečiuliauskienė (2020), self-confidence is the belief and attitude that an individual has about his or her ability to accept things as they are, both positively and negatively. It is developed and learned through the process of learning how to make himself happy. Isroila (2018) defines self-confidence as an optimistic mental attitude that enables a person to assess both themselves and their surroundings and feel at ease carrying out actions to reach predetermined objectives. This indicates that a person with a positive outlook who arranges or conditions himself can assess both himself and his surroundings and feel at ease engaging in the activities necessary to reach the predetermined objectives. According to Kunhertanti and Santosa

(2018), students who possess self-confidence tend to have reasonable confidence in their abilities, which aids in their perseverance and persistence when learning mathematics. A significant portion of the research on students' achievement in mathematics has focused on self-confidence, one of the most significant psychological constructs (Zimmerman, 2000).

Furthermore, according to Reddy (2014), having self-confidence is an attitude that enables people to have optimistic but grounded opinions about who they are and the circumstances in which they find themselves. People who are confident in themselves feel that they can accomplish anything they set out to do, plan, and anticipate, and they have faith in their own abilities and overall sense of control over their lives. Self-confidence in the context of Max and Kishor (2014) is the conviction in one's own ability to finish a task or solve an issue. Furthermore, confidence is defined by Isroila (2018) as self-belief in one's own ability to resist the fulfillment of all expectations and desires. Confidence, also known as self-confidence, is the belief in one's own ability to perform and learn mathematics in a particular context—not necessarily in a general one. Thus, a student may possess confidence in one area of mathematics while lacking it in another (Slankov, 2014).

According to Fitriani (2015), students' achievement is influenced by their level of self-confidence because individuals with high levels of self-worth strive for success in order to succeed academically. Furthermore, Şişman's (2017) findings indicate that mathematical reasoning skills are influenced by self-confidence. Thus, through the use of an independent curriculum, researchers hope to learn more about the impact that students' self-confidence has on their comprehension of mathematical ideas. According to Singh and Kaur (2008), mathematics serves as the foundation for all other creations and is necessary for the world to function even slightly. Because mathematics helps students develop cognitive skills that may be useful in their future careers, we can conclude that it is an important

discipline, particularly in the formal education system. However, Narton and Rennie (1998) noted that all academic and governmental institutions are now concerned about low math achievement in many areas. Lester and associates. (2017) noted that students' performance in mathematics is extremely low, and possible causes include insufficient practice, ineffective teaching strategies, and a lack of educational resources like games, computers, or instructional media. But in order to address the caliber of education students receive, teaching strategies and teacher caliber have gained national prominence (Hyde et al., 2006). It is clear from this that mathematics is essential to understanding and using in daily life, as well as being valuable for the advancement of the country.

Students from Korea consistently rank among the best in the world in international mathematics assessments. According to Mullis et al.'s 2015 Trends in International Mathematics and Science Study (TIMSS), fourth graders placed third and eighth graders placed second. 2016.). According to the OECD (2019), the 15-year-old students maintained their strong performance in the Programme for International Student Assessment (PISA) 2018. When all of these factors are taken into account, Korean students rank among the best in the world when it comes to applying pertinent knowledge and skills in novel mathematical problem situations—questions that are frequently included in PISA studies—in addition to excelling in understanding mathematical knowledge and applying related skills, which are evaluated by TIMSS. However, Korean students generally don't show positive attitudes toward mathematics, just like the majority of their peers worldwide, if not all of them. Comparing themselves to other participants in TIMSS 2015, they reported nearly the lowest levels of confidence and interest in mathematics (Mullis et al. 2016.). As of late, the results of PISA 2018 (OECD, 2019) show that only 57% of Korean students are satisfied with their lives (the OECD average is 67%), and 75% of students strongly agreed or agreed that they worry about what other people will think of them

if they fail (OECD average is 56%). (OECD, 2019).

### **Problem Statement**

Everyone, especially students in school, needs to feel confident. According to this, one must have confidence in order to realize one's potential (Mashihah, 2019). Confident students will find it very simple to engage with the learning environment and the learning process. Students' confidence helps to create a learning environment where they can perform learning activities as well as possible, complete assignments honestly, and have faith in their own efforts without resorting to cheating (Pečiuliauskienė, 2020). Confidence is a person's fundamental resource for independently addressing a variety of needs, according to Çiftçi (2019). Additionally, it was stated that having self-confidence means believing in oneself to be able to handle any situation to the best of one's abilities. In secondary school, Korean students typically exhibit even more negative attitudes toward mathematics. As an example, TIMSS 2015 (Mullis et al. In terms of mathematical confidence, only 13 percent of Korean fourth graders (2016, p. 51) were very confident (OECD averages, 32 percent and 45 percent, respectively). In contrast to the OECD averages of 14% and 43%, respectively, only 8% of Korean eighth graders expressed extreme confidence in their mathematical abilities, while 38% expressed confidence. Comparatively speaking, the proportion of eighth graders who said they enjoyed learning mathematics significantly less than that of fourth graders. They also inspired us to investigate how.

According to the Trends International Mathematics and Science Study (TIMSS) 2011 report (2011), students in Korea, particularly those at Daeyeon High School, exhibit low confidence. Just 14% of students worldwide have high confidence in their arithmetic abilities, according to a 2011 TIMSS report. Merely 3% of Korean students exhibit high confidence in their mathematical abilities, whereas 52% of students fall into the moderately confident student category and 45% of students have low self-esteem. In light

of this, a study was conducted in Korean high schools to determine how self-confidence affects math achievement. Our study aimed to evaluate the relationship between mathematics achievement in Korean high schools and self-confidence. The following research hypothesis was specifically the goal of this study:

**H<sub>01</sub>:** In Korean public secondary schools, there is no statistically significant correlation between students' self-confidence and their mathematical achievement.

## METHODOLOGY

This study employed a quantitative approach, specifically an ex post facto design with a correlational methodology. As defined by Kothari (2004), ex-post facto research involves a systematic empirical examination where the researcher does not directly manipulate the independent variable due to its pre-existing nature or inherent non-manipulability. In this investigation, self-confidence serves as the independent variable, while Mathematics achievement is considered the dependent variable.

The study focused on the entire group of secondary students and Mathematics teachers affiliated with Daeyeon High School in Busan Metropolitan City, Republic of Korea, comprising 1022 students and 12 teachers, totaling 1034 individuals. Purposive sampling was employed to select a targeted subset of participants for analysis. This method was chosen because it allows the researcher to deliberately select individuals or units based on specific characteristics or attributes of interest, ensuring that the sample represents those characteristics effectively.

The Yamane Formula was applied to this study in order to establish the suitable sample size for data collection.

$$n = \frac{N}{1 + (N)(e^2)}$$

Where: n = sample size; N = the population size; e = the acceptable sampling error (5%) at 95% confidence level

Thus;

$$n = \frac{1024}{1 + (1024)(0.05^2)} = 288$$

In this study, the researcher utilized questionnaires and documentary reviews as methods for collecting data. The questionnaires predominantly consisted of closed-ended questions, where respondents selected answers from predefined categories, ensuring responses were discrete, distinct, and limited in number. This format facilitated ease of response for participants, minimizing the likelihood of irrelevant answers as appropriate categories were provided. The primary respondents were teachers who were allocated sufficient time to respond to questions aligned with the research hypothesis. Both Mathematics teachers and students received questionnaires. To ensure reliability, the questionnaire underwent face validation, where the research instrument was thoroughly examined and validated by the supervisor. Contributions and corrections made by the supervisor were integrated into the final version of the research instrument utilized.

The study is exclusively quantitative in nature. Following the gathering of both primary and secondary data, the researcher conducted data analysis using SPSS 21. Standard multiple linear regression was employed to examine the impact of the aforementioned independent variables on the dependent variables. The correlation coefficient was utilized to assess the relationship between all independent variables and the dependent variables. The collected data are presented in tables, enhancing the comprehensiveness of data analysis for readers. Utilizing a five-rating Likert scale, the collected data were analyzed and interpreted. Consequently, the study entails a thorough description of the case, succeeded by a data analysis to establish a conceptual framework.

Data was presented in the form of tables and graphs.

The study used the following multiple regression model to establish the statistical significance of

the independent variables on the dependent variable.

$$Y = a + \beta_1 X_1 + \epsilon$$

Whereby Y =Mathematics achievement; a Constant; X<sub>1</sub> = Mathematics self-confidence

β<sub>1</sub> represents regression coefficients. These were helped in the generalization of the findings on the relationship between students' self-confidence and Mathematics achievement.

**FINDINGS**

In this study, 288 respondents were sampled from Daeyeon High School. The collected data were analyzed using tabular representation, employing simple percentages for clarity and comprehension. While 288 student questionnaires were

distributed, only 246 (85.4%) were returned. This response rate appears sufficient for the study conducted at Daeyeon High School in South Korea. According to Mugenda and Mugenda (2003), a response rate of 50% is deemed adequate for data analysis and reporting, 60% is considered good, and a response rate exceeding 70% is excellent. Therefore, the approximately 85.4% response rate achieved in this study is deemed suitable for both data analysis and reporting.

**Mathematics Self-Confidence in Mathematics Achievement**

This study examined the impact of student self-confidence on their mathematics achievement. Participants were requested to assess statements based on their relevance to their educational institution.

**Table 1: The confidence level of students**

Category	Frequency	Percentage
High	14	5.8%
Moderate	68	28.3%
Low	159	68.8%
Total	240	100%

**Source:** Field research, 2023

As indicated by *Table 1*, 68.8% of the students in the class selected for the study population have low self-confidence, which is in line with the researcher's expectations. In order to determine a relationship between the students' self-confidence

traits and their test scores, the researchers also talked about the answers to self-confidence questionnaires that seventh-grade math teachers gave their students.

**Table 2: Self-confidence questionnaire results**

Option	Frequency	Percentage
Never	0	0%
Often	8	3.3%
Very Often	6	2.5%
Always	226	94.2%
Total	240	100%

**Source:** Field research, 2023

The responses of students to statements indicating their confidence in their mathematical achievement skills and abilities are displayed in *Table 2*. Out of the 240 responders, 8 (33.3%) selected frequently, 6 (25.5%) selected extremely

frequently, and 226 (94.2%) selected always. The information reveals that a large number of respondents who provided a response frequently had self-confidence and competence.

**Table 3: Correlation between variables**

	Students 'self-confidence	Mathematics achievement
Students' self-confidence	Pearson Correlation	1
	Sig. (2-tailed)	
	N	240
Mathematics achievement	Pearson Correlation	.723**
	Sig. (2-tailed)	.000
	N	240

\*\**. Correlation is significant at the 0.01 level (2-tailed).*

Table 3 reports that in Daeyeon High School in Busan Metropolitan City, South Korea, there is a positive and significant relationship between students' self-confidence and Mathematics achievement in secondary school. The Pearson

correlation analysis indicated a statistically significant correlation ( $r=0.723$ ,  $p=0.000$ ), with a p-value of less than 5%. This suggests that higher levels of self-confidence are linked to better Mathematics performance in high school.

**Table 4: Multiple correlation of independent variables with dependent variable**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.848 <sup>a</sup>	.719	.708	.48113

*a. Predictors: (Constant), Students self-confidence*

Table 4 above illustrates the amount of variance attributed to the predictor variables. The initial statistic, R, represents the multiple correlation coefficient between all predictor variables and the dependent variable. In this model, its value is .848a, indicating a substantial amount of shared variance between the independent and dependent variables. The subsequent value, R Square,

represents the squared value of R, commonly used to assess the goodness of fit or the proportion of variance explained by a specific set of predictor variables. Its value, 70.8%, signifies that the independent variables in the model account for 70.8% of the variance observed in the dependent variable.

**Table 5: Significance of Independent variables**

		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	63.222	4	15.805	68.277	.000 <sup>b</sup>
	Residual	24.769	107	.231		
	Total	87.991	111			

*a. Dependent Variable: Mathematics achievement*  
*b. Predictors: (Constant), students 'self-confidence*

Table 5 above displays standard regression results, revealing the impact of each individual predictor variable, specifically students' self-confidence. The table presents the output analysis, assessing whether there is a statistically

significant difference in group means. Notably, the significance value is 0.001, and the mean square value is 68.277. Consequently, there exists a statistically significant difference in the mean length of the model.

**Table 6: Regression coefficients and significance of the independent variable**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.479	.313		4.732	.000
	Students' self-confidence	.221	.038	-.371	-5.845	.000

*a. Dependent Variable: Mathematics achievement*

Based on Table 6 above, the regression model can be determined as follows:

$Y = \alpha + \beta X_1 + \varepsilon$  and result that  $Y = 1.479 + 0.221 X_1 + \varepsilon$   
Where  $y =$  Mathematics achievement.

The regression results presented above indicate that the variable representing students' self-confidence is statistically significant, with a value of 0.000. This signifies that the regression of the independent variable is linked to Mathematics achievement. Furthermore, the multiple regression analysis results above reveal the influence of independent variables based on their regression coefficients. The unstandardized coefficient for the constant is 1.479, with a standard error of 0.313 when associated with coefficients. Notably, among the four independent variables, the significant predictor is positively correlated with the criterion in the regression, as illustrated in *Table 5*.

## DISCUSSION

The research findings and data analysis indicate a positive association between self-confidence and students' mathematics learning achievements. This is evidenced by the regression equation model obtained:  $Y = 1.479 + 0.221 X_1 + \varepsilon$ . Additionally, a positive linear trend is observed in the scatter plot of the line equation. These findings affirm a beneficial impact of self-confidence on students' math learning outcomes. This aligns with Putri & Fazri's (2013) study, which suggested a positive influence on student learning outcomes within certain limitations. Moreover, the study's results affirm a positive correlation between self-confidence and mathematics achievement, as supported by Pearson correlation analysis ( $r = 0.723$ ,  $p = 0.000$ ), conducted among secondary school students at Daeyeon High School in South Korean Busan Metropolitan City. The statistically significant correlation, indicated by the  $p$ -value being less than 5%, further strengthens this relationship. This correlation is consistent with Şişman's (2017) assertion that self-confidence plays a pivotal role in influencing student mathematics achievement, as individuals with strong self-confidence are motivated to strive

for success in their learning endeavors. Additionally, Ningrum & Sutrisno's (2017) research findings suggest that self-confidence positively influences mathematical reasoning abilities, underscoring its importance in academic performance. Consequently, the study aims to explore the impact of self-confidence on students' comprehension of mathematical concepts through independent implementation.

## CONCLUSION

The study findings indicate that students' self-confidence significantly influences their mathematical achievement. According to the data analysis results presented above, it is evident that self-confidence plays a positive role in enhancing comprehension of mathematics. Moreover, educators recognize the need for improvements in certain aspects of students' mathematics learning. Currently, both teachers and students are confined to theoretical teaching methods primarily focused on exam performance. Consequently, students may struggle to connect mathematical concepts with real-life applications, hindering their ability to demonstrate practical understanding. Increased engagement and exposure to real-world contexts would enhance students' perspectives on mathematics, consequently boosting their confidence in the subject. This enhanced confidence promotes learning efficacy, leading to improved performance in mathematics examinations.

Thus, the researcher can affirm that the research hypotheses, including "H01: There is no statistically significant relationship between student self-confidence and achievement in mathematics in Korean public secondary school," were examined, validated, and ultimately affirmed through the statistical findings, specifically the regression analysis. Based on the research, the correlation coefficient of 0.723 (72.3%) is deemed positive and highly significant, confirming a substantial effect between self-confidence and mathematics achievement.

## Recommendations

Drawing from the preceding examination of the findings and conclusions, the research article suggests that mathematics educators should actively support students in tackling mathematical problems to foster self-confidence, as there exists a direct correlation between student confidence and mathematics achievement. Additionally, it is recommended that future studies explore the effects of tailored teaching approaches on students who exhibit lower confidence levels in mathematics.

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