Indonesian Journal of Education Research (IJoER)
Vol. 6, No. 2, April 2025, pp. 227~233
ISSN: 2722-1326, DOI: 10.37251/ijoer.v6i2.1500

College Entrance Exam Scores and Mathematics Self-Efficacy of Prospective High School Teachers in The University of Southern Mindanao, Philippines: A Correlational Study

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Article Info

Article history:

Received Feb 18, 2025
Revised Apr 14, 2025
Accepted Apr 27, 2025
Online First Apr 30, 2025

Keywords:

Academic Performance
College Entrance Exam
Mathematics Self-Efficacy

ABSTRACT

Purpose of the study: With mathematics self-efficacy and entrance exam scores being predictors of academic performance, the researchers of this study examined the relationship between these two predictors.

Methodology: The instrument used for this study is the Mathematics Self-Efficacy Survey to measure the first-year prospective high school teachers' mathematics self-efficacy. After the data were obtained, they were analyzed through the Spearman's rank correlation coefficient to find the relationship between the two variables.

Main Findings: The researchers of this study concluded that the level of mathematics self-efficacy of first-year prospective high school teachers differs, indicating that there are some areas of improvement in terms of their confidence in performing everyday math tasks, solving problems, and dealing with mathematics courses. Moreover, it is also concluded that the college entrance exam scores of prospective high school teachers do not have a significant relationship with mathematics self-efficacy.

Novelty/Originality of this study: Despite the evidence that points to the predictive validity of entrance exam scores and mathematics self-efficacy on academic performance, there are limited studies concerned about the relationship between these two predictors, particularly in the context of USM students. Hence, the researchers of this study aim to delve into the possible relationship between college entrance examination scores and mathematics self-efficacy.

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1. INTRODUCTION

Mathematics self-efficacy (MSE) is an essential element in a student's academic endeavor as it posits the degree of persistence and resilience of students when facing activities or problems involving mathematics [1]. It is considered as a factor affecting the academic achievements and attitudes of students toward mathematics since it is linked to how students behave while learning [2], reflecting their actions, efforts, persistence, flexibility in differences, and goal realization [3].

According to Albert Bandura's Social Cognitive Theory, individuals learn through observation, asserting that human behavior is the product of interactions between, personal, cognitice, behavioral, and environmental factors [4]. This theory assumes that people actively participate in their environment which consequently shapes them [5]. Through observation, reinforcement, and modeling, people collect information, learn them, and shape their behavior, connecting both their cognitive and behavioral learning [6]. In relation to

Bandura's social cognitive theory, self-efficacy is formed by mastery and vicarious experiences, verbal persuasion, and emotional states [7]. Among these sources, emotional/physiological state predicted mathematics self-efficacy [8].

In the context of mathematics, a student's mathematics self-efficacy is a construct that is very important in the attempt to understand students' engagement and performance in mathematics classes. Recent studies have continued to establish a strong relationship between mathematics self-efficacy and academic performance. It has been noted that students with high academic self-efficacy tend to have higher academic performance than their counterparts with low academic self-efficacy [9], [10]. Similarly, Mukuka et al. [11] have identified that self-efficacy, or a student's belief and confidence in oneself, have great influence on his/her level of perseverance in exploring and solving mathematical tasks, which could eventually lead to enhanced mathematical reasoning skills. Self-efficacy also helps sustain motivation [12]. Furthermore, mathematics self-efficacy was found to be a strong predictor of academic achievement across different grade levels [13].

With mathematics self-efficacy being an important factor in a student's academic performance, predictors of this attribute have been explored by multiple studies. According to Yesuf et al. [14], mathematics self-efficacy is directly associated with the students' grade level, living arrangements, expected marks in the semester, and expected grade in the upcoming national exam. Additionally, it has been found that teachers' competence and skills also predict students' mathematics self-efficacy. In a study by John Afufu [15], he found that students' self-efficacy in mathematics is significantly predicted by mathematics teachers' problem-solving skills. Also, some studies emphasized the difference between the mathematics self-efficacy of boys and girls, where girls were found to have lower mathematics self-efficacy than boys and that supporting self-efficacy for mathematics may be crucial for girls [16].

The effects of these factors on students' mathematics self-efficacy are amplified by the amount of exposure they have on these sources [17]. Furthermore, Baiduri and Usmiyatun [18] found that self-efficacy is essential for prospective teachers, suggesting that teachers and policymakers should adapt strategies that foster self-confidence and positive self-perception and enhance teacher training programs [19], [20]. Other factors that influence mathematics self-efficacy are learning perceptions [21], mathematics anxiety, mathematics self-concept, interest, emotional support, and motivation [22]-[24].

An important factor that is also related to the students' academic performance is their entrance examinations which influences one's career and future prospects [25]. According to Estacio et al. [26], it is important for students to take entrance examinations seriously, as these determine the school the students can attend and, consequently, their future career path [27]. Despite Galla et al.'s [28] claim that high school grades were valid predictors of academic success, college entrance exams should still be explored as it is used to evaluate students, ensuring that they possess the characteristic to face the challenges and succeed in higher education [29].

Allensworth and Clark [30] have stated that, compared to high school grades, entrance exam scores are more consistent in predicting students' academic performance since students indicate different levels of readiness given that they come from different schools, suggesting that entrance exam scores predict academic performance [31]-[34]. In a study by Burgoyne et al. [35], the American College Test (ACT) score predict college grades, showing that college entrance exam scores are useful predictors of college performance.

In 2015, Ferdauz K. Gumaga [36] explored the mathematics self-efficacy of freshmen students in the University of Southern Mindanao. His study found that freshmen students only had some confidence in dealing with mathematics tasks, mathematics problems, and mathematics courses. This suggests that freshmen students in the aforementioned university at the time had some room for improvement when it came to their mathematics self-efficacy, further suggesting that the mathematics self-efficacy of freshmen students should be explored to find ways to improve their self-efficacy in mathematics. Many studies have explored the college entrance exam scores of students and how this is related to particular attributes. However, there are limited studies that explored the same in the context of students in the University of Southern Mindanao.

Furthermore, college etrance exam scores and mathematics self-efficacy have been studied separately by many researchers. These studies have found that college entrance exam scores predict academic performance as proven in the study of Allensworth and Clark [30], while mathematics self-efficacy also predict academic performance according to Yokoyama [9]. However, there are limited studies that delved into the relationship between the two in the context of students in the University of Southern Mindanao. Since studies suggest that mathematics self-efficacy is related to students' academic performance and other essential attributes, such as academic persistence, exploring the relationship between college entrance exam scores and mathematics self-efficacy is important for the improvement of admission processes and the overall academic experiences of students. Hence, the researchers of this study aim to delve into the relationship between college entrance examination scores and mathematics self-efficacy. Specifically, the researchers aim to determine the entrance examination scores of first-year prospective high school teachers in the University of Southern Mindanao (USM), determine the mathematics self-efficacy of first-year prospective high school teachers in USM, and

determine the relationship between the college entrance examination scores of first-year prospective high school teachers in USM and their mathematics self-efficacy.

This study will be beneficial for students, teachers, and institutions in that it will shed light on whether or not entrance examination scores have a relationship with the students' mathematics self-efficacy. The results of this study will provide suggestions on how admission policies can be improved and provide insights on why attributes, such as mathematics self-efficacy, should also be considered in the admission process. Also, it will benefit future researchers, as they can use this study as a benchmark for looking more into the possible factors that are related to mathematics self-efficacy. Researching on this will allow those concerned with the academic performance of students to create a more nurturing environment in which the mathematics self-efficacy of students is not neglected and the factors that may be related to it are put into use.

2. RESEARCH METHOD

2.1. Type of Research

This study employed the descriptive-correlation type of research to examine the relationship between college entrance exam (CEE) scores of first-year prospective high school teachers and their mathematics self-efficacy.

2.2. Research Subjects

The subjects of the study were first-year prospective high school teachers enrolled in the University of Southern Mindanao, Kabacan, Cotabato in the first semester of the school year 2024-2025 with a complete enumeration of english majors (n=51), filipino majors (n=47), mathematics majors (n=33), social studies majors (n=50), and science majors (n=38).

The study employed a complete enumeration sampling technique since the population had a manageable size. Also, employing complete enumeration ensures precision and accuracy of results, eliminating sampling error and enhancing validity.

Since the total population was only 219 and the researcher can specify the population, the researcher opted to haved all 219 as respondents. This also ensures accuracy since a larger sample size provides better accuracy than a smaller one [37].

2.3. Data Collection Instruments and Techniques

The instrument used for this study is the Mathematics Self-Efficacy Survey employed by Ferdauz K. Gumaga [36] in his study to measure the first-year prospective high school teachers' mathematics self-efficacy. In his study, the instrument was adapted from Betz and Hackett [38], which had a Cronbach's alpha of 0.96, with minor revisions.

2.4. Data Analysis Techniques

After collecting the data, the researcher computed the weighted mean of the students' college entrance exam scores and their level of mathematics self-efficacy. After computing the weighted mean, the researchers identified the students' level of mathematics self-efficacy using the following interpretation: 0.00 to 1.99 (little confidence or no confidence at all), 2.00 to 3.99 (little confidence), 4.00 to 5.99 (some confidence), 6.00 to 7.99 (much confidence), and 8.00 to 9.00 (complete confidence).

After tabulating the data on the students' level of mathematics self-efficacy and their college entrance exam scores, the researcher subjected the data to a Spearman's rank correlation coefficient to find the relationship between the two variables.

2.5. Research Procedures

Before the questionnaires were administered, the researchers asked for the permission of the college dean and informed the respondents of their rights and responsibilities in the study. Upon signing the informed consent, the respondents then answered the survey questionnaire. After the data were obtained, they were tabulated, computed, and analyzed.

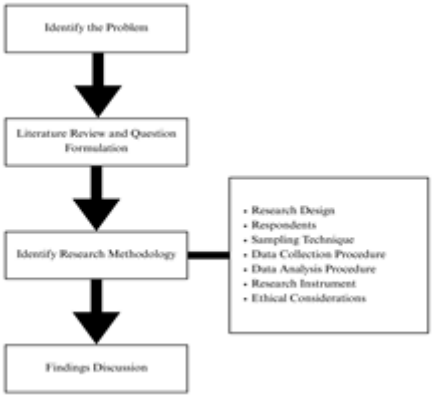

Figure 1. Research Procedure Flow Chart

3. RESULTS AND DISCUSSION

3.1. College Entrance Exam Scores

Table 1 shows the college entrance exam scores of first-year prospective high school teachers. From the data, 35.16% of first-year prospective high school teachers got a score between 51 to 60. On the other hand, only 8.68% of first-year prospective high school teachers got a score between 71 to 80. This result suggest that there are fewer students who scored high in the exam with only 19 among the 219 falling into the highest range.

Additionally, the data indicate that the distribution of the CEE scores is positively skewed. This means that most of the students' scores were lower than the overall mean, implying that most first-year prospective high school teachers got a CEE score below 56.02, the mean CEE score of the students.

Table 1. Frequency Distribution of Entrance Exam Scores

CEE Scores	Frequency	Percentage	SD
41-50	71	32.42	8.96389
51-60	77	35.16	
61-70	52	23.74	
71-80	19	8.68	
	219	100	

3.2. Mathematics Self-Efficacy

Table 2 shows the mathematics self-efficacy of first-year prospective high school teachers. The results show that first-year perspective high school teachers had some confidence in dealing with everyday math tasks with a mean score of 4.81, some confidence in dealing with mathematics problems with a mean score of 4.15, and little confidence in dealing with math courses with a mean score of 3.55.

The results revealed that first-year prospective high school teachers had a mean score of 4.17 in facing mathematical challenges. This indicates that first-year prospective high school teachers only have some confidence in dealing with mathematical tasks.

The result is similar to the findings of Ferdauz K. Gumaga [36] in his study titled "Mathematics Self-Efficacy of Freshmen Students Enrolled in Mathematics and Non-Mathematics Related Degree Programs" where he found that freshmen students had some confidence in dealing with mathematics tasks, mathematics problems, and mathematics courses.

Table 2. Mathematics Self-Efficacy of Prospective High School Teachers

	Mean	Remarks
Everyday Math Tasks	4.81	Some Confidence
Mathematics Problems	4.15	Some Confidence
Math Courses	3.55	Little Confidence
Mathematics Self-Efficacy	4.17	Some Confidence

3.3. Relationship Between CEE Scores and Mathematics Self-Efficacy

Table 3 shows the results of the correlation analysis between CEE scores and mathematics self-efficacy. From the data, with 95% confidence, CEE scores and mathematics self-efficacy gained a correlation coefficient of 0.10686, which indicates that the CEE scores and mathematics self-efficacy have a weak positive relationship. This means that as the CEE score increases, the mathematics self-efficacy also increases slightly, and vice versa.

Table 3. Relationship Between MSE and CEE Scores

	N	p-value	ρ	Remarks
CEE Scores Mathematics Self-Efficacy	219	0.11481	0.10686	Weak Positive Correlation

Although there is a positive relationship, the analysis revealed that it is not statistically significant. Therefore, there is not enough evidence from which it can be concluded that CEE scores and mathematics self-efficacy have a significant relationship.

This result is contradicted by the study of Lawson et. al. [39] titled "Predicting engineering student success: An examination of college entrance exams, high school GPA, perceived competence, engineering achievement, and persistence" which revealed that scores in the mathematics American College Test (ACT), which is a college admission test, predicted the initial level of self-efficacy.

The result is also supported by Albert Bandura's Self-Efficacy Theory which says that self-efficacy is influenced multiple factors, which means that entrance exam alone cannot account for a person's self-efficacy.

Another study by Kihoro [40] titled "Test Completion Time, Subject Scores and Academic Self-Efficacy: How Do They Relate?" had a result that challenges this study. Kihoro [40] revealed that there is a positive relationship between test scores and academic behavior confidence scores in the Academic Behavior Confidence Scale, which is a scale that measures one's self-efficacy and self-concept.

The result of this study tells us that CEE scores and mathematics self-efficacy do not have a significant relationship. This suggests that CEE scores alone should not be the basis of institution in determining the students that can admitted to the said institution. Instead, institutions should also look into other factors that may be related to stduents' self-efficacy in mathematics, which is a limitation that future studies should address.

Although this study provides valuable insight on the relationship between the two variables, there are several limitations that should be acknowledged. First, the population of the study came from a specific institution which may affect the generalizability of the results. Second, since this study focuses on the relationship, it does not allow for causal inferences. Third, the data collection involved students' self-reported data which may have been subjected to their personal bias or inaccuracy.

4. CONCLUSION

The researchers of this study found that the college entrance exam scores of first-year prospective high school teachers were below the mean score. Also, it is concluded that the level of mathematics self-efficacy of first-year prospective high school teachers differs, indicating that there are some areas of improvement in terms of their confidence in performing everyday math tasks, solving problems, and dealing with mathematics courses. Moreover, it is also concluded that the college entrance exam scores of prospective high school teachers do not have a significant relationship with mathematics self-efficacy, which provides room for other possible factors that may be related to mathematics self-efficacy to be examined.

Based on the results, the researchers recommend that institutions should establish programs and teachers should employ effective strategies for the improvement of the mathematics self-efficacy of college students, particularly prospective high school teachers. Since there is no significant relationship between college entrance exam scores and mathematics self-efficacy, institutions should reevaluate the role of entrance examinations in admission processes. Some students who passed the exam but still have low self-efficacy may not perform as well as expected. Also, some students who failed the exam but have high self-efficacy may thrive in the field even if they did not pass the entrance examination. Since high mathematics self-efficacy is associated with high academic performance, institutions should not rely solely on college entrance exams in their admission processes; rather, they should look into other variables that predict academic performance, such as self-efficacy.

Additionally, with college entrance exam scores found to not have a relationship with mathematics self-efficacy, researchers should delve into other possible predictors of mathematics self-efficacy and study further whether college entrance exam scores can predict other attributes. Other factors that influence mathematics self-efficacy that were not explored in this study are learning perceptions, mathematics anxiety, mathematics self-concept, interest, emotional support, and motivation.

Furthermore, future studies should address the limitations of this study. The findings of this study may not be generalizable due to its context-specific nature. Also, since the data were collected at a single point in

time, this limits the ability to draw causal inferences between the two variables. These limitations should be addressed by future studies by including a more diverse sample, incorporating longitudinal or experimental designs, and using mixed method to add depth to the results found in this study and others.

ACKNOWLEDGEMENTS

Firstly, the researchers would like to extend their gratitude to their instructor for the Research in Mathematics course, Sir Paul John B. Ongcoy, PhD, for his support in allowing them to conduct this study and providing them invaluable advices along the way. Second, they would like to thank the dean of the College of Education, Ma'am Leslie Sales, EdD, for permitting them to conduct this study in the college. Also, they would like to thank the respondents of the study for their participation, which made the success of this study possible. Furthermore, they would like to express their appreciation towards their families for their unwavering support. Lastly, they would like to thank the Almighty God for his provisions and the strength, endurance, and resources that He bestowed upon them, which made this endeavor successful.

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