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FACTORS INFLUENCING THE ACADEMIC PERFORMANCE OF GRADE 4 LEARNERS IN MATHEMATICS

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Abstract :

This study investigates the demographic, socio-economic, and educational factors influencing the Grade 4 learners' academic achievement in Mathematics in Anda District, Schools Division Office I Pangasinan. The findings indicate that sex, parental education, and household income significantly impact learners' academic outcomes. The education level of parents varied significantly, with many learners coming from families where parents had relatively low educational attainment. Financial constraints were also prevalent, as a substantial proportion of households reported lower monthly incomes, which may restrict access to essential resources for academic success. Family size emerged as another factor, with the majority of learners coming from medium-sized families. However, the number of siblings did not appear to have a significant effect on their academic performance. Many learners also faced challenges related to the lack of key educational resources, such as computers and internet access, which are increasingly vital for modern learning environments. Furthermore, learners devoted a moderate amount of time to academic activities each day, though a notable percentage exhibited negative attitudes toward mathematics, which could hinder their engagement and performance in the subject. The analysis demonstrated that socio-demographic factors, such as parental education and available resources, had a strong correlation with academic performance, explaining a substantial portion of the variation in learners' outcomes. Learners' attitudes toward mathematics were found to be a key predictor of performance, with a positive attitude strongly associated with higher academic achievement. These findings underscore the importance of addressing socio-economic challenges, improving access to resources, and fostering positive attitudes to enhance academic outcomes in mathematics.

Keywords: Mathematics, academic performance, socio-economic factors

INTRODUCTION

Mathematics education is increasingly recognized as foundational for individual and national competitiveness in a globalized world. Studies like the *Trends in International Mathematics and Science Study (TIMSS)* and *Programme for International Student Assessment (PISA)* highlight a strong correlation between students' attitudes toward mathematics and their performance. Mullis et al. (2020) found that students who exhibited a positive attitude toward mathematics outperformed their peers across most participating countries. These findings underscore the need for a better understanding of how attitudes influence mathematics achievement globally.

Mathematics plays a vital role in the academic and intellectual development of individuals worldwide. Comparative studies such as the *Trends in International Mathematics and Science Study (TIMSS)* and the *Programme for International Student Assessment (PISA)* consistently highlight the disparity in mathematical performance across countries. These studies emphasize the significance of factors such as socio-economic status, school resources, and teaching quality in shaping students' mathematical competence. For example, results from PISA reveal that countries with high investments in education, such as Finland and Singapore, produce students who outperform their peers globally in mathematics (OECD, 2019). This underscores the need to address systemic issues that impact mathematics education to improve global competitiveness.

Countries like the United States have conducted similar analyses to identify gaps in mathematics performance. The National Assessment of Educational Progress (NAEP) data shows persistent differences in mathematics achievement between socio-

economic and ethnic groups (Darling-Hammond, 2017). Studies also reveal gender-based disparities, where males tend to excel in mathematics-related tasks during adolescence (Wolleat et al., 20199). Efforts to understand these gaps have prompted interventions such as STEM-focused programs and initiatives aimed at encouraging underrepresented groups to pursue mathematics and related fields.

In the Philippines reflects similar challenges. According to data from the Department of Education, Filipino students consistently score below the regional average in mathematics tests conducted by the Southeast Asian Ministers of Education Organization (SEAMEO). A study by Apolonio (2023) showed that students' socio-economic status significantly affects their mathematical performance, with those from urban and affluent families performing better than those from rural and less-privileged backgrounds. This aligns with international findings, where access to quality education and resources remains a determinant of success in mathematics.

Socio-economic status is a recurring factor influencing mathematics performance. Studies conducted by Eamon (2015) and Biddle (2017) found that poverty negatively correlates with academic achievement due to resource limitations, parental stress, and educational inequality. Locally, this is evident in the wide achievement gaps between public and private school students. Families with higher incomes can afford better educational resources, tutoring, and access to technology, giving their children a significant advantage in subjects like mathematics.

Gender differences in mathematics achievement also merit attention. Research by Tatsuoka et al., as cited by Moenikia, identified that males tend to perform better in mathematics during high school years, with differences attributed to societal expectations, motivation, and attitudes towards mathematics. Similar patterns were noted in the Philippines, where girls often experience lower confidence in tackling mathematical problems despite comparable abilities (Navarro, 2020). Addressing these disparities is crucial to ensuring equitable opportunities for all students.

Parental involvement and family size also play significant roles in shaping students' mathematical abilities. Bahadurin et al. found that children from smaller families and with more educated parents tend to perform better academically. This is attributed to increased parental attention and access to resources. Locally, these findings are supported by studies that highlight the positive correlation between parental education levels and students' performance in intermediate algebra (Apolonio, 2023).

Another critical factor is the foundational knowledge students bring into their current mathematical studies. Lee (2020) emphasized the importance of mastering prerequisite concepts for success in intermediate algebra. Students with a weak foundation struggle to grasp advanced topics, leading to poor performance. This aligns with findings from local studies, where gaps in basic arithmetic skills significantly hinder students' progress in higher-level mathematics.

Study habits and learning strategies further influence mathematics achievement. Fielden, as cited by Balbalosa, highlighted that effective study habits, including critical reflection and time management, are strong predictors of academic success. Locally, studies show that Filipino students with disciplined study routines perform better in intermediate algebra than their peers with less structured approaches (Navarro, 2020).

While these factors offer a broad perspective on the challenges in mathematics education, the interplay between personal, socio-economic, and school-related variables calls for a holistic approach. Interventions at the local level must align with global and national efforts to address disparities in mathematics education. Strengthening teacher training, providing equitable access to resources, and fostering supportive home environments are essential steps in improving student outcomes.

Mathematics education faces persistent challenges. Data from the National Achievement Test (NAT) reveal a steady decline in mathematics performance as students progress through the grade levels, with substantial drops observed from Grade VI to secondary levels (Department of Education, 2017). This gap is partly attributed to students' attitudes, which often manifest as math anxiety or avoidance, significantly impacting their academic outcomes (Pelonia, 2020). Similar patterns have been documented in other countries, where Bandura's self-efficacy theory highlights the role of attitudes and beliefs in shaping student performance (Bandura).

Statement of the Problem

This study aimed to assess the factors influencing the academic performance of Grade 4 learners in Mathemartics in Anda District, Schools Division Office I Pangasinan during the school year 2024-2025.

Specifically, it sought to answer the following sub-problems:

1. What is the socio-demographics profile of the Grade 4 learners in terms of:
   - 1.1 sex;
   - 1.2 highest educational attainment of mother;
   - 1.3 highest educational attainment of father;
   - 1.4 monthly family Income
   - 1.5 number of siblings
   - 1.6 number of books available at home;
   - 1.7 availability of computer;
   - 1.8 internet access;and
   - 1.9 number of study hours daily.
2. What is the attitude of the Grade 4 learners towards Mathematics?
3. What is the level of academic performance of the Grade 4 learners in during the second quarter?
4. Is there a significant relationship between the attitude and socio-demographics of Grade 4 learners?

5. Is there a significant relationship between the academic performance and socio-demographics of Grade 4 learners?
6. Is there a significant relationship between the attitude and academic achievement of Grade 4 learners?
7. Based on the findings, what recommendations can be proposed to improve learners' academic achievement in Mathematics by addressing the identified correlates.

METHODOLOGY

This chapter presents the research design, sources of data, instrumentation and data collection and tools for data analysis.

Research Design

The research design most applicable to this study is a **descriptive-correlational research design**. This design is appropriate as the study seeks to describe the current academic performance of Grade 4 learners in Mathematics and identify the relationships between various factors, such as attitudes, socio-economic status, parental education, and study habits, that may correlate with their performance. Descriptive research allows for the systematic collection of data to understand the characteristics of the learners and the factors affecting their performance, while the correlational aspect aims to examine the degree and direction of relationships between the independent variables and academic achievement. Therefore, the combination of descriptive and correlational research is ideal for exploring how these different factors are related to students' academic success in mathematics.

Sources of Data

This study was conducted in Anda District, Schools Division Office I Pangasinan. The respondents of this study were the Grade 4 learners who were randomly selected from all elementary schools of the said district.

Instrumentation and Data Collection

The socio-demographic data were gathered using researcher-made questionnaires. The learners' attitude toward Mathematics was measured using a scale.The level of performance of the Grade 4 learners was obtained using the SF9 or card..

Data were collected from Grade 4 learners in Anda District with permission from the Schools Division Superintendent and school heads. The questionnaires on personal profiles and attitudes were distributed to the respondents. After data collection, Microsoft Excel was used for tallying responses. Descriptive statistics using SPSS analyzed the frequency of correlates, while multiple regression analysis in SPSS was used to determine the factors affecting learners' academic achievement in Mathematics and the impact of attitude on performance.

Tools for Data Analysis

In this study, the researcher used the following statistical measures to analyze the data for the problems.

For sub-problem 1, which focused on understanding the demographic profile of Grade 4 learners (e.g., age, sex, number of siblings, socio-economic status, etc.), frequency and percentage were used as statistical tools for analysis.

For sub-problem 2, which focused on the attitude of Grade 4 learners towards Mathematics, descriptive statistics would be the most suitable statistical tool. Additionally, frequency and percentage analysis can be applied to categorize the learners' responses based on a predefined attitude scale (e.g., "strongly agree," "agree," "neutral," "disagree," and "strongly disagree").

To answer sub-problem 3, the level of academic performance of Grade 4 learners during the first quarter, frequency and percentage was used.

To answer sub-problem 4, the significant relationship between the attitude and socio-demographics of Grade 4 learners, the Pearson-r test of independence was used.

To answer sub-problem 5, the significant relationship between the academic achievement and socio-demographics of Grade 4 learners, Pearson's correlation coefficient was used.

To answer sub-problem 6, significant relationship between the attitude and academic performance of Grade 4 learners, Pearson's correlation coefficient was used.The mean for the scores of the respondents to measure their attitudes towards Mathematics was determined and interpreted as follows:

RESULTS AND DISCUSSION

This chapter presents the elements of presenting and interpreting data to answer the sub-problems posited in the chapter of the study.

Profile of Grade 4 Learners

Table 1
Profile of Grade 4 Learners in Terms of Sex

Sex	Frequency	Percentage
Male	123	37.40
Female	206	62.60
Total	**329**	**100**

The data shows that the majority of the Grade 4 learners in this study were female, with 62.6% of the sample being female and 37.4% male. This gender distribution is consistent with general trends observed in many educational settings, where female students often outnumber male students, particularly in primary and secondary education.

Several studies have explored the influence of gender on academic performance and attitudes toward mathematics. For instance, a study by Bassey, et al. (2021) found that female students generally showed more positive attitudes toward mathematics compared to male students, which could have a direct impact on their academic performance. However, this trend is not universal, as other

studies, such as the one by Doolittle (2015), suggested that gender differences in mathematical achievement could vary depending on the educational context and the specific subjects being studied.

Table 2

Highest Educational Attainment of Mothers of Grade 4 Learners

Highest Educational Attainment	Frequency	Percentage
Elementary Level	76	23.10
Elementary Graduate	28	8.50
High School Level	91	27.70
High School Graduate	58	17.60
College Level	40	12.20
College Graduate	36	10.90
Total	**329**	**100**

The data on the highest educational attainment of the parents of the Grade 4 learners reveals a diverse range of educational backgrounds. Among the respondents, 23.1% of parents reached the elementary level, while 8.5% were elementary graduates. A larger proportion, 27.7%, were high school level, with 17.6% having completed high school. Meanwhile, 12.2% of parents were college level, and 10.9% were college graduates.

This distribution of educational attainment reflects the varied socio-economic and educational backgrounds of the respondents. Studies have consistently shown that parents' educational level significantly influences children's academic performance. For instance, a study by Hill and Tyson (2019) found that children whose parents have higher educational attainment tend to perform better academically. This may be due to the parents' ability to provide more academic support, have higher expectations, and foster a conducive learning environment at home. In contrast, lower levels of parental education may limit these factors, which could negatively affect children's academic performance.

Table 3

Highest Educational Attainment of Fathers of Grade 4 Learners

Highest Educational Attainment	Frequency	Percentage
Elementary Level	101	30.70
Elementary Graduate	23	7.00
High School Level	85	25.80
High School Graduate	58	17.60
College Level	28	8.50
College Graduate	34	10.30
Total	329	100

The data on the highest educational attainment of the parents of the Grade 4 learners indicates a diverse range of educational backgrounds. A notable proportion of parents (30.7%) reached the elementary level, while 7.0% were elementary graduates. Approximately 25.8% of parents were at the high school level, and 17.6% were high school graduates. On the other hand, 8.5% of parents were college level, while 10.3% had completed college.

This distribution suggests that many of the learners come from families where the parents may not have completed higher levels of education. Research has consistently shown that a parent's educational level can have a significant impact on a child's academic success. According to a study by Jeynes (2015), children whose parents have higher educational attainment are more likely to perform well academically, as these parents are more capable of supporting their children's learning at home and providing better educational resources. Conversely, parents with lower educational attainment may have limited resources or less experience in providing academic support, potentially affecting their children's academic outcomes.

Table 4

Monthly Family Income of Grade 4 Learners

Monthly Family Income	Frequency	Percentage
Above 20,000	7	2.10
15,001 - 20,000	11	3.30
10,001 - 15,000	14	4.30
5,001 - 10,000	18	5.50
5,000 and below	279	84.80
Total	329	100

The data on the monthly family income of the Grade 4 learners reveals that a majority of the respondents (84.8%) come from households earning P5,000 and below. A smaller proportion, 5.5%, have a monthly income ranging from P5,001 to P10,000. Even fewer families, 4.3%, earn between P10,001 and P15,000, while 3.3% earn between P15,001 and P20,000. Only 2.1% of households earn above P20,000.

This income distribution suggests that most of the learners come from lower socio-economic backgrounds. Research indicates that family income is a critical factor influencing children's academic achievement. According to a study by Duncan, Yeung, Brooks-Gunn, and Smith (2018), children from low-income families tend to perform lower academically due to limited access to educational resources, lack of parental support, and other socio-economic challenges. Similarly, a study by Sirin (2015) found that low family income is a significant predictor of lower academic performance in children, as it affects both the resources available to the family and the overall learning environment at home.

Table 5

Number of Siblings of Grade 4 Learners

Number of Siblings	Frequency	Percentage
1-2	54	16.40
3-4	209	63.50
5-6	61	18.60
7-8	5	1.50
Total	**329**	**100**

The data on the number of siblings of the Grade 4 learners shows that a majority of respondents, 63.5%, have 3 to 4 siblings. Another 18.6% have 5 to 6 siblings, while 16.4% have between 1 and 2 siblings. Only 1.5% of the respondents have 7 to 8 siblings. This distribution suggests that the majority of learners come from families with a moderate number of children. Research has shown that the number of siblings in a family can influence academic performance. According to a study by Downey (2015), children from larger families may experience lower academic achievement due to divided parental attention, fewer resources per child, and less time for individualized support. In contrast, children from smaller families may have more access to parental guidance and academic resources, which can enhance their performance.

However, the impact of the number of siblings on academic performance is not always straightforward. A study by McLanahan and Sandefur (2024) found that other factors, such as family income, parental education, and the quality of the home environment, can mediate the relationship between family size and academic outcomes.

This data provides a basis for exploring how the number of siblings may correlate with Grade 4 learners' academic performance in mathematics. It could also help identify whether learners from larger families face unique challenges in their academic journey, especially in subjects like mathematics.

Table 6

Number of Mathematics Books Available at Home

Number of Mathematics Books Available at Home	Frequency	Percentage
1	104	31.60
2	193	58.70
3	16	4.90
4	10	3.00
5	6	1.80
Total	**329**	**100**

The data on the number of mathematics books available at home reveals that the majority of Grade 4 learners have access to two mathematics books, with 58.7% of respondents falling into this category. A significant proportion, 31.6%, have only one mathematics book at home, while 4.9% have three books, 3% have four books, and 1.8% have five books.

This suggests that a large number of learners have access to at least one or two mathematics books, which could contribute to their learning experience in mathematics. The availability of educational resources at home, such as textbooks, has been shown to play a crucial role in academic performance. According to a study by Cheung and Slavin (2023), access to quality educational resources, including textbooks, significantly enhances students' learning outcomes by providing them with additional materials for practice, understanding, and application.

Table 7

Availability of Computer

Availability of Computer	Frequency	Percentage
Not Available	293	89.10
Available	36	10.90
Total	329	100

The data on the availability of a computer at home indicates that the majority of Grade 4 learners, 89.1%, do not have access to a computer, while only 10.9% of learners reported having a computer available at home.

This significant disparity in access to computers may reflect socio-economic factors that affect learners' access to technology, which can, in turn, influence their academic performance. Studies have highlighted the impact of computer availability on students' academic outcomes. For instance, a study by Liu et al. (2018) found that students with access to computers at home tend to perform better academically, especially in subjects that require extensive research, practice, and problem-solving, such as mathematics. The use of computers for educational purposes, including online learning tools, tutorials, and access to additional learning resources, can enhance students' engagement and understanding of the subject matter.

Table 8
Internet Access of Grade 4 Learners

Access to Internet	Frequency	Percentage
No Access	235	71.4
have Access	94	28.6
Total	329	100

The data on the availability of computers and access to the internet at home reveals a significant disparity in resources for Grade 4 learners. A vast majority, 89.1%, do not have a computer available at home, while only 10.9% of learners have access to a computer. Similarly, regarding internet access, 71.4% of the learners report having no access to the internet, while 28.6% have internet access.

These findings underscore the limited technological resources available to most learners, which may impact their academic performance, especially in a subject like mathematics that increasingly benefits from digital tools and online learning resources. Previous research has indicated that access to computers and the internet is positively correlated with academic performance, as these resources provide students with additional avenues for learning, research, and practice. For example, a study by Türel and Johnson (2022) found that students with access to computers and the internet showed higher achievement in subjects like mathematics due to increased opportunities for interactive learning and online educational support.

Table 9
Number of Study Hours Daily of Grade 4 Learners

Number of Study Hours	Frequency	Percentage
Less than 1 hour	53	16.10
1 hour	226	68.70
2 hours	50	15.20
Total	329	100

The data on the number of study hours per week reveals how much time the Grade 4 learners dedicate to studying. Among the 329 learners, 16.1% reported studying for less than 1 hour, while the majority, 68.7%, studied for 1 hour per day. Additionally, 15.2% of learners devoted 2 hours to studying each day.

This distribution suggests that the majority of learners are spending a minimal amount of time on their studies, with most devoting just 1 hour per day. A smaller portion of learners study for longer periods, while a significant number of students study less than an hour. It may be useful to investigate whether this limited amount of study time has an impact on their academic performance, especially in subjects like mathematics, where consistent practice and understanding of concepts are crucial.

Table 10
Academic Achievement in Mathematics of Grade 4 Learners Based on the Second Quarter

Second Quarter Grade in Mathematics	Frequency	Percent	Description
Below 75	2	0.60	Did Not Meet Expectations
75 - 79	100	30.40	Fairly Satisfactory
80 - 84	141	42.86	Satisfactory
85-89	13	3.95	Very Satisfactory
90-100	73	22.19	Outstanding
Total	329	100.0	

The data on the second quarter grades in mathematics reveals the distribution of learners' academic performance. Among the 329 learners, 0.6% scored below 75, indicating that they did not meet expectations. A significant proportion, 30.4%, had grades between 75 and 79, categorizing them as "fairly satisfactory." The largest group, 42.86%, scored between 80 and 84, reflecting a "satisfactory" performance. Only 3.95% of learners achieved a grade between 85 and 89, indicating "very satisfactory" performance. Additionally, 22.19% of the learners excelled, with grades between 90 and 100, which is categorized as "outstanding."

Table 11
Grade 4 Learners' Attitude towards Mathematics

Attitude Toward Mathematics	Frequency	Percentage
Negative	43	13.10
Neutral	153	46.50
Positive	133	40.40
Total	**329**	**100**

The data on the attitude of Grade 4 learners towards mathematics shows a diverse range of perspectives. A total of 13.1% of learners exhibited a negative attitude towards mathematics, while 46.5% had a neutral attitude. The remaining 40.4% of learners displayed a positive attitude towards the subject.

This distribution suggests that while a significant portion of learners have a neutral or positive outlook towards mathematics, a noteworthy proportion still holds negative feelings towards the subject. This aligns with previous studies that have highlighted the impact of students' attitudes on their academic performance in mathematics. For instance, research by Ma and Kishor

(2017) indicates that students with positive attitudes towards mathematics tend to perform better, while those with negative attitudes may struggle with the subject. Furthermore, neutral attitudes might reflect a lack of strong interest or confidence in mathematics, which could also influence performance outcomes.

Relationship between the Independent and the Dependent Variables

Table 12

Predictors' Contribution to the Total Variance in the Performance of the Grade 4 Learners in Mathematics

R	R Square	Adjusted R Square	Std. Error of the Estimate
.703[a]	.494	.470	3.081

The regression analysis reveals important insights into the relationship between the predictors and the academic performance of Grade 4 learners in Mathematics. The correlation coefficient (R) of 0.703 indicates a strong positive relationship, suggesting that the independent variables are closely associated with learners' academic performance. Furthermore, the R Square value of 0.494 demonstrates that approximately 49.4% of the variance in academic performance is explained by the predictors in the model. The Adjusted R Square, slightly lower at 0.470, accounts for the complexity of the model and confirms that the majority of the variance is still attributable to the included predictors, although some variables may have a weaker influence. The standard error of the estimate (3.081) reflects the average distance between observed values and the regression line, indicating the extent of variability in the residuals.

Table 13

Analysis of Variance

	Sum of Squares	Df	Mean Square	F	Significance value
Regression	2904.729	15	193.649	20.396	.000[a]
Residual	2971.696	313	9.494		
Total	5876.426	328			

The results of the analysis of variance (ANOVA) reveal that the regression model significantly predicts the dependent variable, as indicated by the F-ratio of 20.396 and a significance value of .000 ($p < 0.05$). This suggests that the combination of the predictors included in the model explains a substantial portion of the variance in the dependent variable.

The regression sum of squares (2904.729) indicates the portion of the total variance (5876.426) that is explained by the predictors in the model. The residual sum of squares (2971.696) represents the unexplained variance. The relatively large F-ratio and low p-value suggest that the predictors in the model collectively contribute significantly to the prediction of the dependent variable.

Table 14

Regression Analysis on the Independent Variables that Predict the Grade 4 Learners' Academic Achievement in Mathematics

Socio-Demographics Profile	B	Significance value	Interpretation
Sex	1.697	0.000	Significant
Highest Educational Attainment of Mother	0.521	0.000	Significant
Highest Educational Attainment of Father	0.569	0.000	Significant
Monthly Family Income	0.088	0.634	Not Significant
Number of Siblings	0.025	0.820	Not Significant
Number of Books Available at Home	0.352	0.007	Significant
Availability of Computer at Home	1.757	0.019	Significant
Internet Access	2.353	0.000	Significant
Number of Study Hours Daily	1.229	0.001	Significant
Grade during First Quarter	0.579	0.000	Significant

The regression analysis revealed several significant predictors of Grade 4 learners' academic achievement in Mathematics. Among the socio-demographic factors, **sex** was significant ($\beta = 1.697$, $p = 0.000$), indicating gender differences in performance. The educational attainment of both parents was significant, with the **mother's education** ($\beta = 0.521$, $p = 0.000$) and the **father's education** ($\beta = 0.569$, $p = 0.000$) positively influencing academic outcomes.

In terms of resource availability, the **number of books at home** ($\beta = 0.352$, $p = 0.007$), **availability of a computer** ($\beta = 1.757$, $p = 0.019$), and **internet access** ($\beta = 2.353$, $p = 0.000$) were significant predictors. These findings emphasize the importance of educational resources in fostering better performance.

Moreover, **daily study hours** ($\beta = 1.229$, $p = 0.001$) and prior academic performance in the first quarter ($\beta = 0.579$, $p = 0.000$) were strongly associated with higher achievement. These results highlight the role of consistent study habits and previous success in academic performance.

Conversely, **monthly family income** (β = -0.088, p = 0.634) and the **number of siblings** (β = 0.025, p = 0.820) were not statistically significant predictors, suggesting limited influence on learners' mathematics achievement within this sample.

The findings align with previous research by Fan and Chen (2001), which identified parental education and resource availability as critical factors in academic success. Additionally, Singh et al. (2022) emphasized the role of motivation and access to learning tools in enhancing performance, further validating the observed significance of study hours and educational resources.

These insights offer valuable implications for stakeholders, suggesting targeted interventions to support students through parental involvement, resource provision, and reinforcement of study habits to improve mathematics achievement.

Relationship between Attitude and the Learners' Performance in Mathematics

Table 15

Attitude as Predictor of the Grade 4 Learners Performance in Mathematics (N=329)

	Sum of Squares	Df	Mean Square	F	Significance value
Regression	134.702	1	134.702	7.672	0.006[a]
Residual	5741.723	327	17.559		
Total	5876.426	328			

The analysis of variance (ANOVA) revealed that attitude significantly predicts the academic performance of Grade 4 learners in Mathematics. The regression model yielded a **sum of squares for regression** of 134.702, with a corresponding **mean square** of 134.702 and an **F-value** of 7.672, which was significant at **p = 0.006**. This indicates that the learners' attitude towards Mathematics accounts for a meaningful proportion of the variance in their performance.

By emphasizing the cultivation of positive attitudes through effective teaching strategies, parental support, and encouragement, educators and stakeholders can significantly enhance learners' performance in Mathematics.

Table 16

Attitude Towards Mathematics of Grade 4 Learners

Predictor	β	Significance value
Attitudes Towards Mathematics	0.943	0.006

The regression analysis revealed that **attitudes towards Mathematics** significantly predict the academic performance of Grade 4 learners. The standardized beta coefficient (**β**) for attitude was **0.943**, with a **p-value of 0.006**, indicating a statistically significant relationship. This implies that a positive attitude towards Mathematics contributes meaningfully to improved academic performance.

These findings align with studies highlighting the importance of attitudes in academic success. For instance, Zan and Di Martino (2017) noted that students with favorable attitudes toward Mathematics exhibit higher motivation, engagement, and resilience, which positively influence their learning outcomes.

This result suggests the need for educational programs and strategies aimed at fostering positive attitudes towards Mathematics. Such interventions, including engaging teaching methods, positive reinforcement, and collaborative learning opportunities, could help improve learners' perception of the subject, thereby enhancing their overall performance.

Test of Relationship between Independent Variables and Performance with Attitude as Mediator

Table 17

Mediation Analysis between the Correlates and the Grade 4 Learners' Performance in Mathematics with Attitude as Mediator

Steps		Independent Variables	Dependent Variables	p	Significance value	Interpretation
Regression 1		Sex	Performance	0.521	0.000	Significant
Regression 2				-0.019	0.440	Not Significant
Regression 1		Highest Educational Attainment of Mother	Performance	0.521	0.000	Significant
Regression 2				-0.019	0.440	Not Significant
Regression 1		Highest Educational Attainment of Father	Performance	0.569	0.000	Significant
Regression 2				-0.018	0.460	Not Significant
Regression 1		Monthly Family Income	Performance	0.466	0.019	Significant
Regression 2				-0.005	0.873	Not Significant
Regression 1		Number of Available Mathematics Books	Performance	0.352	0.007	Significant
Regression 2				0.027	0.231	Not Significant
Regression 1		Availability of Computer/Desktop	Performance	1.757	0.019	Significant
Regression 2				-0.234	0.066	Not Significant
Regression 1		Internet Access	Performance	2.353	0.000	Significant
Regression 2				0.097	0.273	Not Significant

Regression 1		Study Hour	Performance	1.229	0.001	Significant
Regression 2		Study Hour	Attitude	0.220	0.000	Significant
Regression 3		Attitude	Performance	0.991	0.002	Significant
Regression 4		Attitude	Performance	0.807	0.013	Significant
		Study Hour		1.051	0.004	Significant
Regression 1		Grade in Mathematics	Performance	0.664	0.000	Significant
Regression 2				0.001	0.875	Not Significant

The mediation analysis explored whether **attitude towards Mathematics** acts as a mediator between various independent variables (correlates) and the academic performance of Grade 4 learners in Mathematics. The results showed mixed findings across different variables:

Sex, highest educational attainment of parents, and monthly family income were significantly related to performance in Regression 1 ($p < 0.05$). However, after including attitude as a mediator in Regression 2, the relationships became non-significant, suggesting no mediation effect of attitude for these variables.

For **number of Mathematics books available**, **computer availability**, and **internet access**, significant relationships were observed in Regression 1. However, these also turned non-significant when attitude was introduced, indicating no mediation effect. **Study hours**, in contrast, showed a significant mediation effect. Regression 2 demonstrated a significant relationship between study hours and attitude ($p = 0.000$), while Regression 3 showed attitude significantly influenced performance ($p = 0.002$). In Regression 4, both study hours ($\beta = 1.051$, $p = 0.004$) and attitude ($\beta = 0.807$, $p = 0.013$) remained significant predictors of performance, confirming a partial mediation effect.

For **grades in Mathematics**, the direct effect in Regression 1 was significant, but no mediation effect was observed in subsequent regressions.

The findings underscore the role of **study hours** as a critical factor in academic performance, partially mediated by attitude. This suggests that while spending more time studying directly enhances performance, fostering a positive attitude also plays a key role in amplifying this effect. Other variables, such as parental education and socio-economic status, appear to influence performance independently of learners' attitudes.

Research supports the critical role of attitudes in education. For example, Ashby and Schoon (2020) highlighted that both socio-demographic factors and attitudes contribute to academic success, but their interplay is often complex. Furthermore, Kpolovie et al. (2024) emphasized the importance of study habits and time management in achieving academic excellence, consistent with the observed mediation effect of study hours in this study.

Summary

The study highlights various demographic and socio-economic factors of Grade 4 learners. The majority of the learners are female, constituting 62.6% of the sample, while males represent 37.4%. The highest educational attainment of the learners' parents varies widely: the largest group (30.7%) reached the elementary level, followed by high school-level parents at 25.8%. College graduates account for 10.3%, indicating a lower proportion of parents attaining higher education.

Regarding family income, the majority of households (84.8%) earn P5,000 or below monthly, suggesting financial constraints for most families. Only 2.1% of households earn above P20,000. Family size data shows that 63.5% of the learners come from families with 3 to 4 siblings, while fewer families have larger or smaller sibling counts.

The study reveals that many Grade 4 learners face limitations in accessing educational resources, such as computers and the internet, which are critical for modern learning. Most learners study for an average of 1 hour daily, reflecting a moderate level of engagement with academics. While a significant portion of students maintain a neutral or positive attitude towards Mathematics, a notable minority exhibit a negative perspective, potentially affecting their performance and interest in the subject.

The regression analysis highlights a significant relationship between the predictors and Grade 4 learners' academic performance in mathematics. The correlation coefficient (R) of 0.703 suggests a strong positive association, while the R Square value of 0.494 indicates that 49.4% of the variation in academic performance is explained by the model's predictors. The Adjusted R Square value of 0.470 confirms the model's competence in accounting for the variance while considering its complexity. The standard error of the estimate, at 3.081, reflects moderate variability in the data, suggesting the presence of some unexplained factors affecting performance.

The ANOVA results demonstrate that the regression model is statistically significant in predicting the dependent variable. With an F-ratio of 20.396 and a significance value of .000 ($p < 0.05$), the analysis confirms that the combination of predictors included in the model accounts for a substantial proportion of the variance in the dependent variable.

The regression analysis identified several significant predictors of Grade 4 learners' academic performance in mathematics. Key socio-demographic factors such as gender ($\beta = 1.697$, $p = 0.000$) and parental educational attainment—mother's education ($\beta = 0.521$, $p = 0.000$) and father's education ($\beta = 0.569$, $p = 0.000$)—positively influenced achievement. Educational resources, including the number of books at home ($\beta = 0.352$, $p = 0.007$), computer availability ($\beta = 1.757$, $p = 0.019$), and internet access ($\beta = 2.353$, $p = 0.000$), were significant contributors to performance.

Additionally, daily study hours (β = 1.229, p = 0.001) and prior academic performance (β = 0.579, p = 0.000) strongly correlated with better outcomes. However, monthly family income (β = -0.088, p = 0.634) and the number of siblings (β = 0.025, p = 0.820) were not statistically significant predictors, indicating minimal influence on mathematics achievement in this sample.

The ANOVA results demonstrate that learners' attitudes towards mathematics significantly influence their academic performance. The regression model produced a sum of squares for regression of 134.702 and a mean square of 134.702, with an F-value of 7.672, significant at p = 0.006. These findings indicate that attitude accounts for a meaningful proportion of the variance in mathematics performance among Grade 4 learners.

The regression analysis indicates that learners' attitudes towards mathematics significantly predict their academic performance. The standardized beta coefficient (β) of 0.943, with a p-value of 0.006, confirms a statistically significant positive relationship. This finding suggests that fostering a positive attitude towards mathematics contributes substantially to better academic outcomes for Grade 4 learners.

Conclusions

1. The data indicates a predominantly female student population and families with limited financial resources. Parental education levels show significant diversity, but higher education attainment is relatively low among parents. These factors likely influence the educational opportunities and challenges faced by the learners. Large family sizes and low-income levels may further impact the resources available for education.
2. The study reveals that many Grade 4 learners face limitations in accessing educational resources, such as computers and the internet, which are critical for modern learning. Most learners study for an average of 1 hour daily, reflecting a moderate level of engagement with academics. While a significant portion of students maintain a neutral or positive attitude towards mathematics, a notable minority exhibit a negative perspective, potentially affecting their performance and interest in the subject.
3. The analysis demonstrates that the predictors in the model significantly influence learners' academic performance in Mathematics, with nearly half of the variance explained by the independent variables. The strong correlation and moderately low standard error underscore the model's reliability while highlighting potential areas for improvement in identifying additional factors contributing to performance variability.
4. The ANOVA results demonstrate that the regression model is statistically significant in predicting the dependent variable. With an F-ratio of 20.396 and a significance value of .000 ($p < 0.05$), the analysis confirms that the combination of predictors included in the model accounts for a substantial proportion of the variance in the dependent variable.
5. The study underscores the importance of individual, familial, and resource-related factors in shaping academic performance. Gender differences, parental education levels, and access to educational resources significantly enhance mathematics achievement. Additionally, consistent study habits and prior success are crucial determinants. Conversely, factors such as family income and sibling count had negligible effects, suggesting their limited relevance in this context.
6. The analysis confirms that attitude is a significant predictor of mathematics achievement. A positive attitude towards the subject contributes to improved academic performance, highlighting the importance of fostering favorable perceptions and engagement with mathematics among learners.
7. The analysis establishes attitude as a crucial factor influencing academic performance in mathematics. A positive attitude significantly enhances learners' success in the subject, underscoring its importance in educational interventions aimed at improving outcomes.

Recommendations

Based on the findings, the following recommendations are forwarded.

1. Implement programs such as financial assistance, school subsidies, or feeding programs to alleviate the burden on families with limited income.
2. Develop initiatives aimed at sustaining the interest and performance of female learners while ensuring balanced gender inclusivity.
3. Provide specific support mechanisms, such as scholarships or school supplies, to learners from larger families to reduce the strain on household resources.
4. Raise awareness about the importance of education, family planning, and sustainable livelihood practices to address systemic socio-economic challenges.
5. Schools and local governments should provide additional mathematics books and promote resource-sharing programs to ensure equitable access for learners with fewer books at home.
6. Implement study skills workshops and programs to encourage consistent and effective study habits, particularly for students studying less than 1 hour per day.
7. Conduct engaging mathematics-related activities, such as math clubs, competitions, and interactive lessons, to foster a positive attitude and interest in the subject.

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