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Factors Affecting Mathematics Performance: Basis for an Intervention Plan

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ABSTRACT: Mathematics, being a highly advanced field of Science, is closely linked to success in modern society as it is considered a necessary skill. This study sought to determine the extent to which attitudes, parental influence, and self-efficacy are factors that affect learners' performance in Mathematics; to detect learners' Mathematics performance throughout the First Quarter of the School Year 2023 - 2024; to determine the significance of the relationships between factors affecting performance in Mathematics and learners' First Quarter Mathematics performance of the School Year 2023 -2024; and to find out which of the independent variable/s singly or in combination best predict/s performance in Mathematics; and also to create an intervention plan based on the study's findings. There were one hundred seventy-six (176) Grade 6 learners from the District of Laguindingan schools, Division of Misamis Oriental that participated in the survey. The instrument used was adapted and modified from Peteros et al. (2019), Silao (2018), and Dagdag et al. (2020). The data gathered were analyzed using frequency, percentage, mean, standard deviation, Pearson Moment Correlation, and multiple regression analysis. The findings of the study showed that attitude toward Mathematics is the best indicator of Mathematics performance. The researcher recommends that the DepEd officials, administrators, parents, and stakeholders work together to deal with learners' Mathematics performance. Teachers may conduct parent workshops or training sessions and counseling on how to set realistic, achievable goals based on the child's capabilities.

KEYWORDS: Attitude, Mathematics Performance, Parental Influence, Self-Efficacy

I. INTRODUCTION

Mathematics, being a highly advanced field of Science, is closely linked to success in modern society as it is considered a necessary skill. It is a subject that deals with issues requiring analysis, computation, and other mental abilities. It is a discipline that has an important effect on how society functions and how learners live their everyday lives.

The implementation of the K to 12 Curriculum in the Philippines in 2012-2013 brought about a major change in the way Mathematics was taught. The revised curriculum aims to enhance learners' critical thinking and problem-solving abilities (Masinanding, 2022). At present, statistical reports show that learners' mathematical abilities are declining. The Program for International Student Assessment (PISA) was joined by the Philippines in 2018, the entire country was shocked upon learning of the Philippines' disappointing performance, as it came in last among the 79 participating countries in reading literacy and second to last in Mathematics and scientific literacy. The responses resulted from Filipino learners' poor performance in all subject areas examined by PISA 2018 (Golla et al., 2020)

Moreover, the 2018 NAT results indicated that Filipino learners performed way below the acceptable mean percentage score in Mathematics, which is considered a low mastery level. Learners' NAT performance has been gradually falling for the past four years, placing them at low mastery or low proficiency (DepEd). In Region X, for instance, for the last five years, the Grade 6 NAT results show that the average percentage score is 38.695, which is higher than the regional score of 36.965, indicating a low proficiency level in the Department of Education (Escarlos et al., 2023). Despite efforts to improve the Mathematics Curriculum and teaching practices, Filipino learners still showed similar outcomes in Mathematics education and literacy.

The way learners feel about Mathematics affects how well they do in the subject and how frequently they engage in it. It can also be seen in how much they enjoy themselves when they work on chores associated with the subject. Positive attitudes about Mathematics are so important since they may affect learners' willingness to learn the subject and the benefits it will provide for Mathematics instruction. Similar to how a bad attitude about Mathematics might result in a bad emotional attitude toward learning the topic, learning could be hampered (Capuno et al., 2019).

Parents can be active in the home and school, and they should be very concerned about their children's goals and expectations. The main reason parents become involved is that they construct personally the parental role to include involvement in their children's education and feel good about themselves for contributing to their children's academic success (Masabo et al., 2017).

Moreover, according to Dagdag et al. (2021), self-efficacy beliefs strongly affect how people achieve their objectives, the level of effort they put forth, as well as their persistence in the midst of difficulties and pressure. Several research studies have demonstrated that some sources of self-efficacy are significantly correlated with mastery experiences. Cayubit et al. (2020) said that Mathematical self-efficacy refers to an individual's confidence in their ability to succeed in Mathematics tasks, such as problem-solving, completing arithmetic activities, and performing well in Mathematics classes.

The researcher observed that low Mathematics performance is noticeable within the classroom. Learners' negative attitudes or beliefs about Mathematics hindered their progress. Several learners are uninterested and unwilling to participate in the subject. The attitude of the learners affects their Mathematics performance. In addition, learners lack confidence in their problem-solving abilities, resulting in feelings of frustration and discouragement. Rather than feeling motivated, they have accepted the belief that they cannot succeed. Moreover, learners who do not receive sufficient feedback and support from parents have poor Mathematics performance. These factors affect learners' abilities and skills development, leading to low Mathematics achievement, weak attainment of higher-level skills, and unsatisfactory Mathematics performance.

Despite attempts to improve the curriculum and teaching methods, there is evidence showing that poor performance in Mathematics exams and consecutive failure in the subject are alarming and need to be addressed right away. Based on this insight, it is needed to address the important issues in Mathematics and improve performance in an organized manner. To stop the continuous poor performance, the Department of Education has been undertaking several interventions to increase the mathematical literacy of Filipino learners who are having difficulty learning Mathematics concepts. Furthermore, learners' attitude towards Mathematics, parental influence, and self-efficacy might explain their continued underperformance in Mathematics and provide the basis for making an intervention plan.

With these mentioned premises, the researcher is interested in determining the factors affecting the Mathematics Performance of Grades 6 learners in Laguindingan Central School, Mauswagon Integrated School, Sinai Elementary School, and Lapad Elementary School of Laguindingan District, Division of Misamis Oriental, during the School Year 2023-2024.

This research is primarily based on the Sulong Edukalidad of the Department of Education. On the same day that the PISA results were released, DepEd started implementing Sulong EduKalidad, a strategy intended to improve the country's basic education system. The Sulong EduKalidad Program includes four clusters of intervention activities called KITE (K to 12 Curriculum Review and Updating, Improvement of the Learning Environment, Teacher Upskilling and Re-skilling, and Engagement of Stakeholders). Before the Philippines participates in PISA 2021 again, intervention initiatives are hoped to be created to raise the caliber of basic education in the nation using assessment findings as guidance (Balagtas et al., 2019).

The K to 12 Mathematics Curriculum is based on various learning principles and theories, including experiential and situated learning, reflective learning, constructivism, cooperative learning, and discovery and inquiry-based learning. The current Mathematics curriculum is based on these theories. In order for Mathematics instruction to help create a fair and diverse society, it will need more than just a good curriculum and skilled teachers. It should also be supported by research that has been tested in real classrooms (Gusano, 2019).

Also, the main goal of the Mathematics K to 12 Curriculum is the development of critical thinking and problem-solving skills. That serves as the main focus of Mathematics education. Skills that can be acquired, mastered, and applied are produced by critical thinking. It is the logical analysis of concepts, suppositions, inferences, conclusions, arguments, issues, claims, attitudes, and behaviors (Alcantara et al., 2017).

After all, the teachers have a responsibility to ensure that all learners have equal access to education, as mandated by the No Filipino Child Left Behind Act of 2008. This law aims to protect and uphold the right to quality education for all citizens and encourages measures to make education accessible to everyone. To ensure quality education. This means that teachers should work to create a classroom environment where learners are treated equally and their differences are minimized (Peteros et al., 2020).

II. METHODOLOGY

This study employed a correlational analysis and causal design with documentary analysis. Data collection, tabulation, computation, analysis, interpretation, and drawing of conclusions were all necessary for this research.

A correlation analysis examines the statistical relationship between two or more variables. It quantifies the extent and direction of association but does not imply a causal link. The goal of causal design is to demonstrate the cause-and-effect

connections between variables. Documentary analysis is the methodical process of going over texts, documents, or records to gather data and obtain insights (Creswell et al., 2017).

One hundred seventy-six (176) Grade 6 learners were chosen to participate in the study as respondents, from the District of Laguindingan, Division of Misamis Oriental of the School Year 2023 - 2024. The researcher used the Slovins formula to get the total number of respondents from Laguindingan Central School, Mauswagon Integrated School, Sinai Elementary School, and Lapad Elementary School. The respondents were chosen using a simple random sampling method. According to Noor et al. (2022), simple random sampling is commonly used in quantitative research surveys, offering equal participation chances to individuals in homogeneous populations through a selection process solely based on luck. Prior to the commencement of data collection, all respondents were provided with a consent letter. The consent letters were distributed and signed by both the respondents and their parent/guardian before any data was collected.

The analysis and interpretation of the data were aided by the following statistical tools. The data were collected, tabulated, and analyzed using different statistical tools. In order to assess the levels of Mathematics performance in terms of attitudes toward Mathematics, parental influence, Mathematics self-efficacy, and learners' First-quarter performance, Problems 1 and 2 utilized descriptive statistics (frequency and percentage, mean and standard deviation). Problem 3 applied the Pearson Product-Moment Correlation Coefficient (r) to investigate the important factors that impact performance in Mathematics. Lastly, Problem 4 utilized Multiple regression to identify which of the independent variable/s singly or in combination, best predict/s performance in Mathematics.

III. RESULTS AND DISCUSSION

Problem 1. To what extent do the following factors affect Mathematics Performance as perceived by the learners in terms of:

- 1.1. attitudes towards Mathematics;
- 1.2. parental influence;
- 1.3. Mathematics self-efficacy?

Table 1: Overall extent of factors affecting Mathematics performance

Variables	Mean	SD	Description	Interpretation
Attitudes towards Mathematics	3.05	0.90	Agree	Observed
Parental Influence	3.03	0.90	Agree	Observed
Mathematics Self-Efficacy	3.06	0.91	Agree	Observed
Overall	3.05	0.90	Agree	Observed

Note: 4.50 - 5.00 Highly Observed 3.50 - 4.49 Moderately Observed 2.50 – 3.49 Observed

1.50 - 2.49 Less Observed 1.00 – 1.49 Least Observed

Table 1 presents the overall extent of factors affecting Mathematics Performance with an overall Mean of 3.05 with SD=0.90, indicated as Agreed and interpreted as Observed. This means that respondents were significantly affected by their attitude towards Mathematics, parental Influence, and Mathematics self-efficacy. A positive attitude can boost enjoyment, accomplishment, and self-confidence, all of which can result in better Mathematics performance. Parental involvement in a learner's Mathematics education is linked to improved Mathematics performance. Learners who have a high self-efficacy of their abilities are more likely to be driven to learn and to persevere in the face of difficult situations. This implies that a positive attitude stimulates curiosity, cultivates a growth mindset, and creates a love of learning. Learners who have a high degree of mathematical self-efficacy frequently achieve higher performance levels in the subject. These learners are also more inclined to take on difficult tasks and persevere through them. Positive parental influence can also support higher achievement in Mathematics.

According to a different study, learners who had a positive attitude toward Mathematics performed better academically and had stronger problem-solving skills (Owens & Maschinski, 2017). Moreover, parents can support and encourage their children as they develop their mathematical problem-solving skills. Becoming a strong mathematical problem-solver has a higher chance of success in other academic fields. Parental involvement and effective parenting practices in supporting children's cognitive development are also important for children living in impoverished environments (Wang et al., 2018)

On the other hand, cultural differences in mathematical self-efficacy can also have an impact on performance. It's possible that families and communities in individualistic cultures don't give their children as much support or encouragement. However, these children also value learning and doing well in school, which is linked to higher levels of mathematical self-efficacy (Xu & Corno, 2018).

Problem 2. What is the learners' Mathematics performance throughout the First Quarter of the School Year 2023 – 2024?

Table 2 displays the outcomes of learners' performance in Mathematics for the First Quarter of the School Year 2023-2024 with an average Mean of 87.23 with SD= 3.26 indicated as Very Satisfactory. There were 83 (47.16%) respondents who met the rating 80-84 referred to as Satisfactory performance. This means that nearly half of the respondents have a positive track with their learning in Mathematics. The respondents get good grades by studying hard and actively participating in class discussions. They typically approach learning with positivity. Better performance in Mathematics can result from having an in-depth knowledge of mathematical concepts and principles. This implies learners who get satisfactory grades in Mathematics are capable of understanding complex concepts and solving problems. Believing in oneself, developing a positive attitude, and listening to parents' guidance will help them achieve satisfactory grades in the subject. The collaborative relationship of learners, teachers, and parents improves learners' Mathematics performance. The continuous guidance of parents and the effective teaching strategies of teachers help learners get higher grades in every subject.

According to the study by Pajares and Miller (2017), numerous studies have examined the connection between attitudes and performance in Mathematics. Learners with a positive outlook in Mathematics do better in their academics, rather than those learners having negative attitudes.

However, the range 75-79 described as Fairly Satisfactory, got the lowest frequency of 18 (10.23 %) in the First Quarter of Mathematics Performance during School Year 2023- 2024. This means that some respondents may have performed better in another area but not in Mathematics. There are some reasons why learners could receive poorer grades, including having a negative attitude about the subject, low self-confidence, lack of understanding and motivation, and inadequate support from their parents. It is important to note that every learner is unique, and there may be other individual factors that can contribute to lower grades.

Scale	Range	Frequency	Percentage	Mean	SD
5	90 – 100 (Outstanding)	24	13.64	87.23	3.26
4	85 – 89 (Very Satisfactory)	51	28.97	87.23	3.26
3	80 – 84 (Satisfactory)	83	47.16	87.23	3.26
2	75 – 79 Fairly Satisfactory)	18	10.23	87.23	3.26
1	Below 75 (Did not meet Expectations)	0	0.00	87.23	3.26
Total		176	100.00		

Table 2: Overall learners' Mathematics performance

For learners, knowing what they are good at and where they need improvement helps them concentrate on getting better and guides future efforts. Do not hesitate to seek help and support from teachers and parents when facing challenges. As educators, it is our responsibility to take a holistic approach to learners' success. Supports and understands not only topperforming learners but also those who may be facing difficulties. This implies that it is essential to identify the specific challenges each learner faces and provide appropriate support and guidance to help them improve their Mathematics performance. Teachers should give reinforcement and provide an intervention that improves learners' performance in Mathematics. Teachers should also encourage the active participation of parents during parent-teacher conferences so that they can monitor their child's progress.

Based on Johnson and Descartes (2017), parents significantly impact their children's academic achievement. The task of parenting is intricate and requires a wide range of specialized behaviors, each of which can have an impact on a child's development on its own. Research has shown that parents are often mentioned as the most important and powerful socialization agents during childhood. Also, Briones et al. (2022) noted that although laziness is a common problem in today's generation, parents who support their children positively impact their academic performance. Learners' environment and personal characteristics influence their capacity to enhance their academic performance. The accomplishments of students can be significantly increased by offering social support, encouragement, and parental involvement.

Problem 3. Is there a significant relationship between factors affecting performance in Mathematics and learners' First-quarter Mathematics performance of the School Year 2023 -2024?

Variables	r-value	p-value	Level of Correlation	Decision	Interpretation	
Attitude Towards Mathematics	0.5962	0.0000	Moderate Positive	Reject Ho	Significant	
Parental Influence	0.3238	0.0128	Low Positive	Reject Ho	Significant	
Math Self-Efficacy	0.5647	0.0000	Moderate Positive	Reject Ho	Significant	
Note: Circlificant if commuted Displays is loss than 0.05						

Table 3: Test Correlation between factors that affect Mathematics performance

Note: Significant if computed P-value is less than 0.05.

Table 3 shows the results of a correlation test that examines the factors that affect performance in Mathematics in the First Quarter of the School Year 2023-2024. When it comes to attitude towards Mathematics, the R-value is 0.5962 with p-value=0.000, indicated as Moderate Positive, and significant at the p-value of less than 0.05. This shows strong evidence to reject the null hypothesis. This means that learners' attitudes towards Mathematics correlate with their performance in Mathematics during the First Quarter. The respondents apply Mathematics inside and outside the classroom. They also appreciate the usefulness of Mathematics in their daily lives. This implies that a positive attitude can increase a learner's motivation to excel in Mathematics. When learners find Mathematics interesting and enjoyable, they are more likely to invest time and effort in learning. Doing Mathematical tasks with enthusiasm and putting in the necessary efforts to understand concepts, practice problem-solving skills, and improve their skills.

Guinocor et al. (2020) pointed out that learning can occur in different quantities and at different levels depending on how learners approach their studies. A strong correlation has been observed between the degree of study orientation exhibited by learners and their Mathematics performance. Learners who approach learning with a negative mindset may perform poorly in Mathematics.

In the same table, parental influence has the computed R-value of 0.3238 with p-value=0.0128, indicated as Moderate Positive and significant at the p-value lesser than 0.05. This shows strong evidence to reject the null hypothesis. This means that there is a correlation between parental influence and Mathematics performance during the First Quarter. Parents' encouragement inspires learners to study hard. They listen to what their parents say that a person must work hard to do something well. This way, children will learn to value hard work and understand that success often requires effort and perseverance. The help that parents give in answering some difficult problems boosts their confidence, enhances understanding, and strengthens their bond with their parents. This implies that parental influence significantly impacts learner Mathematics performance. Helping with homework, discussing school activities, or encouraging learning at home can lead to better grades and higher test scores. Parental support can help them cope with stresses in school, especially in answering difficult problems, and boost their mental health, which can help improve their academic performance.

Amponsah et al. (2019) said that parents' level of involvement has a big influence on their children's academic performance. Children are more likely to put in more effort and perform better in the classroom when their parents show an interest in their academic work, are willing to help with homework, and are ready to hold their children accountable for completing school assignments.

When it comes to Mathematics self-efficacy, the R-value is 0.5647, and the p-value=0.0000, indicated as Moderate Positive and significant at the p-value is less than 0.05. This shows strong evidence to reject the null hypothesis. This means that there is a correlation between self-efficacy in Mathematics and performance in Mathematics. Learners were eager to improve their Mathematics skills when they had confidence in their abilities. In addition, the teacher's reassurance that there is a solution for every problem motivates learners to continue learning. The positive feedback given by their teacher, like praising them, gives them confidence and inspires them to participate in the class. Telling themselves that they should solve the problem successfully boosts their confidence. This implies that self-efficacy has a significant effect on Mathematics performance. Learners believe in themselves and that their efforts will lead them to successful outcomes that help them work smartly toward achieving their goals. When learners step out of their comfort zone, this willingness promotes deeper learning and personal growth.

Masitoh (2019) revealed that to enhance learners' performance and facilitate the learning of Mathematics, learners must possess a high degree of self-efficacy. Higher expectations for one's self-efficacy and better performance subsequently lead to a greater interest in learning Mathematics. This is because mathematical self-efficacy affects mathematical performance.

	Unstandardized Coefficients			Standa	ents	
	UC		SC			
Variables	В	SE	В	t-value	Sig. (P- value)	Decision
Constant	4.4123	0.5927	0.5536	7.655	0.000	Reject Hypothesis
Attitude towards Mathematics	0.4813	0.2633	0.4337	6.433	0.000	Reject Hypothesis
Parental Influence	0.2088	0.2911	0.2463	2.802	0.0931	Accept Hypothesis
Mathematics Self-Efficacy	0.2486	0.2129	0.3851	2.906	0.0816	Accept Hypothesis

Problem 4. Which of the independent variable/s singly or in combination best predict/s performance in Mathematics? Table 4: Regression analysis on factors affecting Mathematics performance

Note: Dependent Variable = Mathematics Performance *Significant when computed p-value <0.05.*

Table 4 shows regression analysis on factors affecting Mathematics performance. The regression analysis in terms of attitude toward Mathematics performance reveals that the Beta values (β = 0.4813, t=6.433, p =0.000, p < 0.05) are found significant at the p-value lesser than 0.05. The p-value of 0.0000 which is less than 0.05, shows strong evidence to reject the null hypothesis. This means that attitude towards Mathematics best predict, among other factors, that affect Mathematics performance. Positivity toward the subject can boost motivation and effort, which will ultimately result in improved performance. Learners with positive attitudes toward Mathematics enjoy the subject, appreciate its value, and have confidence in it. Such learners are also interested in acquiring further knowledge in Mathematics. This implies that it is essential to have a positive outlook toward Mathematics because it motivates as to learn. Learners with a positive outlook toward Mathematics participate in Mathematics-related activities. They achieve better, compared to those learners with negative attitude.

Andamon and Tan (2018) conducted a study on the understanding, attitude, and ability in Mathematics of Grade 7 learners. Among the independent variables, attitude toward Mathematics is the only variable that has a significant correlation with learners' performance in the subject.

In terms of parental influence, the regression analysis reveals that the Beta values (β = 0.2088, t=2.802, p = 0.0931, p > 0.05) are found insignificant at the p-value greater than 0.05. The p-value 0.0931 which is greater than 0.05 shows evidence to accept the null hypnosis. This means that parental influence does not depict performance in Mathematics. Parental influence alone might not be sufficient to improve a learner's performance if they are not interested in the subject. Parents who are involved but do not show support or understanding may not result from improved performance. Parents' lack of confidence or understanding in higher level Mathematics may also prevent them from being able to offer the required support, which lessens the likelihood that their influence will have an impact on their child's performance. This implies that parental influence their child's performance by demonstrating a positive outlook toward Mathematics, like expressing interest, curiosity, and enthusiasm when discussing Mathematics-related topics. This may inspire their children to appreciate the worth and fun of Mathematics subject.

Parents can make a big difference in their children's academic success in Mathematics by showing a positive attitude, providing support and encouragement, and actively engaging in related activities with them. However, if parents are not supportive or do not engage in their children's Mathematics education, it can impede their academic progress (Roy & Giraldo-Garcia, 2018).

Also, in Mathematics self-efficacy, the regression analysis reveals that the Beta values ($\beta = 0.2486$, t=2.906, p = 0.0816, p>0.05) are found insignificant at the p-value greater than 0.05. The p-value of 0.0816, which is greater than 0.05, shows strong evidence to accept the null hypothesis. This means that a person's belief in their ability to succeed in Mathematics does not necessarily determine their actual performance in Mathematics. A belief in one's capacity to complete a task is related to self-efficacy. Though their performance might not match their self-efficacy belief, actual mathematical performance also depends on the acquisition of particular mathematical skills and knowledge. This implies that high performance in Mathematics may not always be ensured by self-efficacy alone. Important components that also play a major role in academic success are motivation and effort. Learners with high self-efficacy might not always maintain motivation or make the required effort, which could affect the way they perform. Developing strong mathematical skills can enhance learners' belief in their abilities and boost their likelihood of achieving success in the subject.

The enthusiasm and involvement of learners in the subject can enhance their belief in their ability to succeed in Mathematics. Higher mathematical self-efficacy in learners is associated with increased motivation and engagement in the subject, which may result in improved performance (Zhang et al., 2018). Moreover, learners' self-efficacy in their mathematical

abilities is associated with how persistent they are in solving mathematical problems. When it comes to Mathematics, learners who are confident in their abilities typically persevere longer and find better solutions to problems than those who are not (Boekaerts et al., 2018).

IV. CONCLUSIONS

The results of the study lead to the following conclusions:

1. Learners who have a high-level self-efficacy in Mathematics have confidence in their capacity to comprehend and resolve mathematical problems.

2. Learners get higher grades if they believe in themselves, adopt a positive outlook, and follow their parents' advice.

3. A child's ability to effectively communicate mathematical concepts and ideas can be improved by having positive attitudes, high self-efficacy in Mathematics and parental influence.

4. Learners who have a positive attitude toward Mathematics are willing to engage in active learning, ask questions, and show an interest in grasping mathematical ideas.

V. RECOMMENDATIONS

In view of the aforementioned conclusions and findings, the following recommendations are hereby forwarded:

1. Teachers may conduct parent workshops or training sessions and counseling on how to set realistic, achievable goals based on their child's capabilities that encourage a love of learning and advance their children's general well-being by taking a balanced approach that values each child's unique growth, effort, and well-rounded education.

2. The DepEd officials, administrators, parents, and stakeholders may work together to deal with the mathematics performance of learners. Teachers may conduct remedial sessions for learners who have satisfactory grades. The teacher may create an intervention plan that caters to the learner's needs, enhances learners' positive attitudes, creates a higher level of self-efficacy, and improves parental influence.

3. The teachers may conduct a quarterly parent-teacher conference and home visitation if needed to maintain open communication with parents, stay informed about their child's progress, and discuss strategies for improvement.

4. Teachers can contribute significantly of improving their learners' Mathematics self-efficacy, creating an environment where learners feel capable, motivated, and confident in their mathematical abilities. Teachers may share strategies and resources that parents can use to support their child's learning at home.

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