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Factors Affecting the Mathematics Proficiency of the Grade 10 Students: A Discriminant Analysis

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Abstract: ***This study aimed to identify the main factors that affect the mathematics skills of Grade 10 students at Pulot National High School for the 2024-2025 school year. It focused on determining students' level of mathematics proficiency, examining the status of high and low proficient students in terms of study habits, learning problems, teacher relationships, parents' attitudes towards mathematics, and the learning environment. The study also looked for significant differences between high and low proficient students based on these factors and identified which factors had the greatest impact on mathematics skills. The research involved sixty-two Grade 10 students, evenly split between high and low proficiency groups. A questionnaire employing a 5-point Likert scale was utilized to gather data on the predictor variables. Mean and standard deviation described proficiency levels and related factors, while a t-test assessed significant differences between the two groups. Discriminant analysis identified the most significant factors. The results showed that most students had low mathematics proficiency. Low-performing students had neutral study habits, moderate learning problems, and positive relationships with teachers and the learning environment, much like high-performing students. However, a significant difference was found in parents' attitudes towards mathematics, which was the key factor affecting proficiency. Other factors did not show significant differences. The study suggests different targeted actions, such as remedial classes, improved teacher training, and programs to encourage positive parental attitudes toward mathematics. It also recommends further research on other grade levels to confirm these findings and support effective ways to improve math skills.***

Keywords: ***Mathematics Proficiency, Discriminant Analysis, Grade 10, Mathematics, Predictor Variables.***

I. INTRODUCTION

Mathematics skills have very important role in academic achievement and the development of general thinking skills in students. These skills are important for logical reasoning, problem-solving ability, and analytical thinking. Different studies in education show that math achievement is influenced by a variety of factors such as cognitive, emotional, teaching, and environmental factors. Understanding these factors is vital for improving how students learn math.

Though there is a growing amount of research on math achievement, only a few studies focus on rural secondary schools in the Philippines, especially in provinces like Abra. Most of the extant researches are centered in urban or higher education setting and thus cannot be generalized to junior high school students in the countryside. Moreover, no local research has been done using discriminant analysis to identify the most significant factors affecting the mathematics proficiency of Grade 10 students. This shows the need for a clear, data-driven analysis that can categorize students by their skill levels and identify the factors that distinguish high performers from low performers.

In view of these gaps, this study aims to identify the major contributing factors that affect the math proficiency of Grade 10 students at Pulot National High School, Lagayan, Abra. The study will assess the students' level of proficiency and compare the high and low proficiencies of the students with respect to study habits, learning difficulties, teacher-student relationship, parental attitude towards math, and learning environment. It will also identify which of these factors greatly influence students' math proficiency.

II. REVIEW OF RELATED LITERATURE

Various international and global assessments consistently show significant variations in mathematics performance across different countries, strongly influenced by contextual factors. Students' success in mathematics relates to their socioeconomic status, access to learning resources, and the quality of education systems [1]. Research shows that students from disadvantaged backgrounds often face challenges that limit their academic chances and performance in mathematics [2].

Besides socio-economic factors, emotional and cognitive factors are also major factors of math learning. Math anxiety is one of the most studied factors, which negatively affects students' performance by interfering with working memory and problem-solving. Studies have found that high levels of math anxiety were associated with low math achievement [3].

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Students who believe in themselves are more likely to take on difficult tasks, keep trying to solve problems, and do well in school. Conversely, students with low self-efficacy tend to avoid difficult math tasks [4].

Instructional practices and classroom environments are other important factors that contribute to mathematics achievement. Clear instruction, formative feedback, and student-centered learning approaches are examples of effective teaching strategies that have been demonstrated to significantly enhance student achievement. Teacher effectiveness and feedback are among the most influential factors affecting student learning outcomes [5]. Additionally, positive teacher–student relationships and supportive classroom environments boost motivation, engagement, and confidence in learning mathematics.

Mathematics proficiency is a long-standing concern in basic education in the Philippines. Only a small number of learners have achieved proficiency in mathematics. Many learners are struggling with basic skills such as computation, reasoning, and problem-solving [6]. The lack of instructional resources, large class sizes, and differences in teacher preparedness contribute to these issues. In rural areas, these issues are compounded by economic issues, geographic isolation, and limited access to educational support systems.

Local studies also highlight these challenges. Socioeconomic status continues to be a huge factor of academic performance in the Philippines, especially among students from marginalized communities [7]. A discriminant analysis of the determinants of mathematics performance among college students revealed that study habits, learning difficulties, and mathematics anxiety significantly identified high-performing students from low-performing ones, while teacher relationships, parental attitudes, and learning environments were not significant discriminators. These findings support that student-related factors may have a stronger influence on mathematics performance [8]. However, the study was conducted among college students, and therefore, further investigation is needed to determine if similar patterns exist among secondary learners in rural settings.

III.METHODOLOGY

This study used a quantitative research design using survey and discriminant analysis to determine the factors affecting the mathematics proficiency of Grade 10 students. The study aimed to determine the factors that significantly distinguish the students with high mathematics proficiency from those students with low mathematics proficiency.

The study was conducted at Pulot National High School, Pulot, Lagayan, Abra School Year 2024-2025. The study used total enumeration of the population and was limited to Grade 10 students of the school for the school year. The students were categorized into two groups based on their first-quarter grades: high proficiency and low proficiency, in accordance with DepEd Order No. 31, S. 2012 [9], as shown in the table below:

Level of Proficiency	Equivalent Numerical Value	Division of Groups
Beginning	74% and below	Low Proficiency
Developing	75% - 79%	
Approaching Proficiency	80% - 84%	
Proficient	85% - 89%	High Proficiency
Advanced	90% and above	

The parents and students' response to the different predictor variables were analyzed using an adapted teacher-made questionnaire by Ragaza, K. V. (2024) from University of the Visayas, Cebu City, Philippines. The study participants used a 5-point Likert scale: "Strongly Disagree," "Disagree," "Neutral," "Agree," and "Strongly Agree."

The researchers formally sought permission from the Principal of Pulot National High School to conduct the study. The respondents answered the questionnaire after approval and the researchers immediately collected and tallied the responses. The data were then carefully analyzed and interpreted to derive meaningful insights. This orderly and systematic approach allowed for efficient data collection allowing the researchers to obtain accurate and comprehensive findings for the study.

The following statistical tools were used in the treatment of data:

1) Mean ($\bar{X}$) was used to describe the level of proficiency of the respondents. It is also used to describe the status of the respondents in relation to the different factors affecting their proficiency in mathematics.

DepEd Order No. 31, S. 2012 was used to determine the proficiency of the respondents. The level of proficiency of the students uses the following numerical values:

Level of Proficiency	Equivalent Numerical Value	Descriptive Rating
Beginning	74% and below	Low Proficiency
Developing	75% - 79%	
Approaching Proficiency	80% - 84%	
Proficient	85% - 89%	High Proficiency
Advanced	90% and above	

The following numerical values are also used in describing the status of the respondents with regard to the different factors affecting their mathematics proficiency:

Study Habits

Range of Mean	Descriptive Equivalent
1.00 - 1.80	Strongly Disagree or Very Unsatisfactory
1.81 - 2.60	Disagree or Unsatisfactory
2.61 - 3.40	Neutral
3.41 - 4.20	Agree or Satisfactory
4.21 - 5.00	Strongly Agree or Very Satisfactory

Learning Problem

Range of Mean	Descriptive Equivalent
1.00 - 1.80	Strongly Disagree or Very High
1.81 - 2.60	Disagree or High
2.61 - 3.40	Neutral or Moderate
3.41 - 4.20	Agree or Low
4.21 - 5.00	Strongly Agree or Very Low

Teacher Relationship, Parents Attitude Towards Mathematics, and Learning Environment

Range of Mean	Descriptive Equivalent
1.00 - 1.80	Strongly Disagree or Very Negative
1.81 - 2.60	Disagree or Negative
2.61 - 3.40	Neutral
3.41 - 4.20	Agree or Positive
4.21 - 5.00	Strongly Agree or Very Positive

2. Standard Deviation (SD**)** was used to determine how spread out the values in a data set are around the mean (average) of the respondents' status concerning the different factors affecting their proficiency in mathematics.
3. t-Test: Two Samples Assuming Equal Variance was used to determine the significant difference between high and low proficient students in mathematics on the five factors affecting their mathematics proficiency.
4. Discriminant Analysis was used to determine the overall significant difference between the groups based on the five factors affecting their mathematics proficiency and to identify the factors that most discriminate between high and low proficient students.

IV. RESULTS AND DISCUSSION

TABLE I
Level of Proficiency of Grade 10 Students in Mathematics

Groups	No. of Students	Mean	Descriptive Rating
84% and below	31	79	Low Proficiency
85% and Above	31	88	High Proficiency
Total/Average	62	84	Low Proficiency

Norm:

Range of Mean	Descriptive Rating
84% and below	Low Proficiency
85% and Above	High Proficiency

The table shows that students have different levels of math proficiency. They were divided into two groups based on their scores: those who scored 84% or lower (Low Proficiency) and those who scored 85% or higher (High Proficiency). This grouping helps us see how students' skills are spread out.

The Low Proficiency Group (84% and below) has 31 students averaging 79, showing that many of the respondents are struggling with math and not meeting the expected grade-level standards. The High Proficiency Group (85% and above) has 31 students averaging 88, indicating a strong understanding of math. Even though these students are meeting or exceeding expectations, the class average is 84, indicating that most students are still in the Low Proficiency group. This shows there is a lot of room for improvement. These students may need extra support and resources, especially in problem-solving and applying math concepts.

Poor math achievement is associated with poor study habits such as disorganization and lack of review [10]. Negative parental attitudes toward mathematics, such as a lack of support and involvement, are also associated with poor child math performance [11]. Low math performance is associated with limited resources in learning environments such as schools without technology tools or instructional resources [12]. Disengagement and low math performance, including low emotional and academic support, are also associated with low positive teacher-student interactions [13].

TABLE II
Status of the Highly Proficient and Lowly Proficient Students in Mathematics with Regards to Study Habits

Indicators	Low-Proficiency Students			High-Proficiency Students		
	Mean	SD	DE	Mean	SD	DE
I only study during exam days/weeks.	3.68	1.38	Agree	2.23	0.87	Disagree
I study every day.	3.23	0.79	Neutral	3.61	0.79	Agree
I study monthly.	3.16	0.99	Neutral	2.94	1.01	Neutral
I study in case of emergency.	2.84	0.99	Neutral	2.97	1.20	Neutral
I do not study.	2.52	1.16	Disagree	1.65	0.93	Strongly Disagree
I do my assignments regularly.	3.45	0.84	Agree	3.74	0.84	Agree
I exert more effort when I do difficult assignment.	3.42	0.61	Agree	4.03	0.82	Agree
I spend my vacant time in doing assignments or studying my lesson.	3.42	0.71	Agree	3.71	0.92	Agree
I study the lessons I missed if I was absent from the class.	3.16	0.88	Neutral	3.58	0.98	Agree
I study and prepare for the quizzes and tests.	3.71	0.85	Agree	4.29	0.63	Strongly Agree
I study harder to improve my performance when I get low scores.	3.61	0.75	Agree	4.10	0.78	Agree
During school time, I spend less time with friends to concentrate more on my studies.	3.06	0.80	Neutral	3.55	0.84	Agree
I prefer to finish my studies and homework first before watching any TV shows etc.	3.29	1.05	Neutral	3.90	0.86	Agree
I see to it that extracurricular activities do not hamper my studies.	3.58	1.29	Agree	3.45	0.87	Agree
I have specific place of study at home which I remain clean and orderly.	3.58	0.87	Agree	3.94	0.84	Agree
Average	3.31	0.27	Neutral	3.45	0.34	Satisfactory

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Norm:

Range of Mean	Descriptive Equivalent (DE)
1.00 - 1.80	Strongly Disagree or Very Unsatisfactory
1.81 - 2.60	Disagree or Unsatisfactory
2.61 - 3.40	Neutral
3.41 - 4.20	Agree or Satisfactory
4.21 - 5.00	Strongly Agree or Very Satisfactory

The table indicates that low-proficiency students have a mean score of 3.31 with a standard deviation of 0.27, implying neutral study habits with some variability in responses. High-proficiency students have a slightly higher average mean of 3.45 and a standard deviation of 0.34, indicating slightly more consistent and positive study habits. The overall average suggests that, although both groups have positive attitudes toward studying, high-proficiency students have more structured and proactive study habits.

Low proficiency students study reactively, such as only during exams (mean = 3.68, SD = 1.38, Agree) or study monthly or in case of an emergency (mean = 3.16, SD = 0.99, Neutral). Compared to high proficiency students, they are less likely to study regularly or prepare for tests regularly, as shown in statements such as “I do not study” (mean=2.52, SD=1.16, Disagree). They do put effort when facing difficult assignments (mean = 3.42, SD = 0.61, Agree), but their overall study routine is irregular.

High-proficiency students show more consistent and positive study habits. It is shown that they are likely to study every day (mean = 3.61, SD = 0.79, Agree), regularly complete assignments (mean = 3.74, SD = 0.84, Agree), and prepare thoroughly for tests (mean = 4.29, SD = 0.63, Strongly Agree). They also show perseverance, putting more effort in difficult assignments (mean = 4.03, SD = 0.82, Agree). The lower standard deviations in most of these areas indicate that high-proficiency students have more structured and disciplined study routines, which contribute to their academic success. Similar behaviours are reported by both groups for external influences (spending time with friends, extracurricular activities) with neutral to positive responses.

Success in mathematics is influence by good study habits and self-directed learning. Higher performing students often use structured strategies like planning and regular review that led to increased performance [10], [14]. Lower-performing students usually struggle with self-regulation, showing irregular preparation and limited strategy use, which results in poorer outcomes [14]. Parental attitudes and involvement also influence achievement. When students are positively engaged, they tend to have higher motivation and better performance in mathematics [11, 12].

Table III
Status of the Highly Proficient and Lowly Proficient Students in Mathematics with Regards to Learning Problems

Indicators	Low-Proficiency Students			High-Proficiency Students		
	Mean	SD	DE	Mean	SD	DE
Lack of Study Habits	3.19	1.59	Neutral	2.68	1.00	Neutral
Teacher Factor	1.84	0.92	Strongly Disagree	1.87	1.10	Disagree
I hate Math	2.23	0.91	Disagree	1.71	0.96	Strongly Disagree
Peer Pressure	2.45	0.94	Disagree	2.13	0.83	Disagree
Family Problem	2.45	1.34	Disagree	2.39	1.31	Disagree
I can acquire what is being imparted in class this year.	3.32	1.06	Neutral	3.45	1.01	Agree
I can solve anything if I try hard enough.	3.10	0.96	Neutral	3.77	0.83	Agree
If I practiced every day, I could develop almost any skill.	3.55	1.04	Agree	3.97	0.69	Agree
Once I have decided to achieve something that is important to me, I keep trying to achieve it, even if it is harder than I thought.	3.97	0.90	Agree	4.32	0.64	Strongly Agree
I am assured that I will accomplish the areas that I set for myself.	3.68	0.89	Agree	3.71	0.77	Agree
Average	2.98	0.42	Moderate	3.00	0.29	Moderate

Norm:

Range of Mean	Descriptive Equivalent (DE)
1.00 - 1.80	Strongly Disagree or Very High
1.81 - 2.60	Disagree or High
2.61 - 3.40	Neutral or Moderate
3.41 - 4.20	Agree or Low
4.21 - 5.00	Strongly Agree or Very Low

The table shows that Low and High proficiency students have similar results in learning problems with both groups showing moderate levels of agreement. Low-proficiency students have an average mean score of 2.98 with a standard deviation of 0.42, demonstrating a moderate level of agreement with some variability in responses. High-proficiency students have a little bit higher average mean of 3.00 with a standard deviation of 0.29, showing a similar moderate response but with more consistency.

Low-proficiency students have relatively neutral views on academic and external factors. For instance, they express mild opinions on the "Teacher Factor" (mean = 1.84, SD = 0.92, Strongly Disagree), and their frustration with math (mean = 2.23, SD = 0.91, Disagree). Despite struggling with challenges, such as peer pressure (mean = 2.45, SD = 0.94, Disagree) and family problems (mean = 2.45, SD = 1.34, Disagree). Their belief in their ability to acquire knowledge is neutral (mean = 3.32, SD = 1.06), indicating some uncertainty and a lack of consistent academic engagement. High-proficiency students showed more positive attitude towards learning and personal growth. They believe that knowledge can be acquired (mean= 3.45, SD= 1.01, Agree) and problems can be solved with enough effort (mean= 3.77, SD= 0.83, Agree). It also demonstrated that they value practice and perseverance as evidenced in their higher agreement to statements such as “If I practiced every day, I could develop almost any skill” (mean= 3.97, SD= 0.69, Agree) and “Once I have decided to achieve something, I keep trying” (mean= 4.32, SD= 0.64, Strongly Agree). The lower standard deviations reflected more significant confidence and self-assurance, which provide to their academic success.

Both groups had similar retorts regarding external challenges, with peers and family problems not being significant barriers to their success High-proficiency students tend to have higher self-efficacy and consistent study habits that are structured and contribute to success. Self-regulated learning strategies like goal setting and time management are associated with improved academic outcomes, as students who self-regulate their learning tend to do better in mathematics [15].

TABLE IV
Status of the Highly Proficient and Lowly Proficient Students in Mathematics with Regards to Teacher Relationship

Indicators	Low-Proficiency Students			High-Proficiency Students		
	Mean	SD	DE	Mean	SD	DE
My teacher has a good relationship with the students and co-teachers.	4.23	0.55	Strongly Agree	4.45	0.56	Strongly Agree
My teacher shows smartness, confidence and firmness in making decisions regarding mathematics.	4.13	0.75	Agree	4.35	0.74	Strongly Agree
My teacher Imposes proper discipline and is not lenient in following the prescribed rules.	4.26	0.67	Strongly Agree	4.03	0.90	Agree
My teacher has an appealing personality and has a good sense of humour.	3.94	0.84	Agree	4.00	0.80	Agree
My teacher is open to suggestions and opinions and is worthy of praise.	3.94	0.98	Agree	4.29	0.63	Strongly Agree
My teacher explains the objectives of the lesson clearly at the start of the lesson.	4.45	0.56	Strongly Agree	4.48	0.50	Strongly Agree
My teacher has mastery of the subject matter.	4.13	0.87	Agree	4.29	0.58	Agree
My teacher is organized in presenting the lessons by systematically following the course outline.	3.77	1.24	Agree	4.26	0.80	Strongly Agree
My teacher is updated with the present trends, relevant to the subject matter.	3.65	1.18	Agree	4.03	0.59	Agree
My teacher uses various strategies, teaching aids/devices and techniques in presenting the lessons.	4.10	0.89	Agree	4.26	0.76	Strongly Agree
My teacher provides support for all students.	4.32	0.69	Strongly Agree	4.52	0.50	Strongly Agree
My teacher has a positive attitude daily.	3.65	1.15	Agree	3.77	0.66	Agree
My teacher presents the information in a way that is easy to understand.	4.42	0.71	Strongly Agree	4.39	0.61	Strongly Agree
My teacher cares about my academic and social well – being.	3.68	1.20	Agree	4.10	0.69	Agree
My teacher is sensitive to all students.	2.71	1.25	Neutral	2.58	1.26	Disagree
Average	3.96	0.54	Positive	4.12	0.38	Positive

Norm:

Range of Mean	Descriptive Equivalent (DE)
1.00 - 1.80	Strongly Disagree or Very Negative
1.81 - 2.60	Disagree or Negative
2.61 - 3.40	Neutral
3.41 - 4.20	Agree or Positive
4.21 - 5.00	Strongly Agree or Very Positive

The table shows the status of low-proficiency and high-proficiency students in mathematics terms of their teacher relationships. The results reveals that both groups report generally positive results, with high-proficiency students showing slightly more favourable responses among the indicators. Low-proficiency students have an average mean score of 3.96 with a standard deviation of 0.54, showing positive perceptions but with some variability in responses. By comparison, high-proficiency students had a slightly higher average mean of 4.12 with a standard deviation of 0.38, indicating more consistent and positive perceptions of their teacher relationships.

Low-proficiency students have overall positive relationships with their teachers, scoring high in most areas. As reflected, they strongly agree that their teacher has a good relationship with students and co-teachers (mean = 4.23, SD = 0.55), imposes proper discipline (mean = 4.26, SD = 0.67), and provides support for all students (mean = 4.32, SD = 0.69). It is also re[ported that they strongly agree that their teacher explains the objectives of the lessons clearly (mean = 4.45, SD = 0.56) and has mastery over the subject matter (mean = 4.13, SD = 0.87). Even so, their perception of the teacher's sensitivity to all students is neutral (mean = 2.71, SD = 1.25). This signify that while they value their teacher's relationship, there may be some concerns in regards to sensitivity toward individual student needs.

High-proficiency students generally report even more positive views of their teacher relationship, as seen in higher mean scores. They strongly agree with statements about the teacher's ability to promote a good relationship with students (mean = 4.45, SD = 0.56), show confidence in decision-making (mean = 4.35, SD = 0.74), and provide excellent support (mean = 4.52, SD = 0.50). Additionally, high-proficiency students report that their teacher is organized (mean = 4.26, SD = 0.80) and uses effective strategies and techniques (mean = 4.26, SD = 0.76). Like the low-proficiency group, they also report a neutral response regarding the teacher's sensitivity to all students (mean = 2.58, SD = 1.26). The higher consistency in the answers of high-proficiency students is manifested in their lower standard deviations across most indicators.

Research demonstrates the importance of strong teacher-student relationships for student success in mathematics. Higher-performing students demonstrate better relationships with their teachers, which correlates with improved academic performance [16]. When students see their teachers as supportive, they are more likely to engage and achieve better outcomes [17].

TABLE V
Status of the Highly Proficient and Lowly Proficient Students in Mathematics with Regards to Parents Attitudes Towards Mathematics

Indicators	Low-Proficiency Students			High-Proficiency Students		
	Mean	SD	DE	Mean	SD	DE
My child is good at mathematics.	1.65	1.15	Strongly Disagree	2.87	0.93	Disagree
The challenge of mathematics problems appeals to my child.	2.39	0.83	Disagree	3.16	1.00	Neutral
Mathematics is hard for my child, even when he/she studies.	4.35	1.03	Strongly Agree	3.37	0.83	Neutral
My child likes solving mathematics problems.	3.13	0.83	Neutral	3.48	0.44	Agree
My child does not have much interest in mathematics.	2.71	0.73	Neutral	2.32	0.59	Disagree
My child looks forward to mathematics class.	2.97	0.74	Neutral	2.73	0.56	Neutral
My child would like to study mathematics in more detail than he/she does now.	3.39	0.87	Neutral	3.91	0.66	Agree
My child enjoys discussing mathematics	2.48	0.95	Disagree	3.32	0.95	Neutral

problems.						
Answering questions in mathematics class makes my child nervous.	2.81	0.74	Neutral	2.77	0.69	Neutral
When my child can't immediately solve a mathematics problem, he/she sticks with it until a solution is reached.	3.16	0.81	Neutral	3.58	1.03	Agree
My child would rather have someone give him/her the solution to a difficult mathematics problem than have to work it out for himself/herself.	3.10	0.69	Neutral	2.93	1.08	Neutral
My child will need mathematics for his/her future career.	4.71	0.58	Strongly Agree	4.65	0.63	Strongly Agree
My child believes that mathematics is useful in everyday life.	3.87	0.75	Agree	4.12	0.62	Agree
Knowing mathematics will help my child be successful in life.	4.48	0.98	Strongly Agree	4.51	0.60	Strongly Agree
My child frequently uses a calculator for calculations in everyday life.	4.23	1.24	Strongly Agree	3.15	0.47	Neutral
Total/Average	3.29	0.38	Neutral	3.39	0.36	Neutral

Norm:

Range of Mean	Descriptive Equivalent (DE)
1.00 - 1.80	Strongly Disagree or Very Negative
1.81 - 2.60	Disagree or Negative
2.61 - 3.40	Neutral
3.41 - 4.20	Agree or Positive
4.21 - 5.00	Strongly Agree or Very Positive

The table shows the state of low-proficiency and high-proficiency students in mathematics in terms to their parents' attitudes towards mathematics. The results show that both groups of students have parents with mostly neutral towards mathematics, but with prominent differences in perceptions. Low-proficiency students have an average mean score of 3.29 with a standard deviation of 0.38, showing a neutral attitude towards mathematics. High-proficiency students have a slightly higher average mean score of 3.39 with a standard deviation of 0.36, suggesting a similar but slightly more positive and consistent outlook.

Parents of low-proficiency students incline to have more negative or neutral perceptions of their child's relationship with mathematics. As presented, they strongly disagree that their child is good at mathematics (mean = 1.65, SD = 1.15, Strongly Disagree) and believe that mathematics is difficult for their child, even when they study (mean = 4.35, SD = 1.03, Strongly Agree). Moreover, parents of low-proficiency students report that their child does not show much interest in mathematics (mean = 2.71, SD = 0.73, Neutral) and is not particularly excited about solving problems (mean = 3.13, SD = 0.83, Neutral). Even with these challenges, parents acknowledge the importance of mathematics to their child's future career (mean = 4.71, SD = 0.58, Strongly Agree). They also agree that mathematics is useful in everyday life (mean = 3.87, SD = 0.75, Agree).

Parents of high-proficiency students incline to have a more favourable outlook on their child's ability and interest in mathematics. These parents report a greater level of agreement that their child likes solving math problems (mean = 3.48, SD = 0.44, Agree) and that their child would like to study mathematics in more detail (mean = 3.91, SD = 0.66, Agree). They also agree that their child is persistent when faced with difficult problems (mean = 3.58, SD = 1.03, Agree) and believes in the usefulness of mathematics in daily life (mean = 4.12, SD = 0.62, Agree). However, high-proficiency students' parents are less likely to believe that their child frequently uses a calculator in everyday life (mean = 3.15, SD = 0.47, Neutral). Overall, these students' parents have a more optimistic view of their child's engagement with mathematics, which could support the students' high proficiency.

Parental attitudes and involvement are important predictors of students' mathematics performance. A study finds that greater parental support and involvement are associated with higher mathematics achievement, whereas low involvement is associated with poorer outcomes [18].

TABLE VI
Status of the Highly Proficient and Lowly Proficient Students in Mathematics with Regards to Learning Environment

Indicators	Low-Proficiency Students			High-Proficiency Students		
	Mean	SD	DE	Mean	SD	DE
Create safe learning environments to enhance learning through consistent implementation of policies, guidelines, and procedures.	3.58	1.01	Agree	3.90	0.89	Agree
Maintain learning environments that promote fairness, respect and care to encourage learning.	4.39	0.66	Strongly Agree	4.23	0.79	Strongly Agree
Manage classroom structure to engage students individually or in groups in exploration, discovery, and meaningful hands-on activities in a variety of physical learning settings.	3.90	0.82	Agree	3.77	0.87	Agree
Maintain supportive learning environments that encourage and inspire students to participate, cooperate and collaborate in lifelong learning.	3.97	0.69	Agree	4.26	0.80	Strongly Agree
Lead and empower colleagues in promoting learning environments that effectively motivate learners to achieve quality outcomes by assuming responsibility for their own learning.	3.87	0.94	Agree	3.68	0.82	Agree
Total/Average	3.94	0.61	Positive	3.97	0.72	Positive

Norm:

Range of Mean	Descriptive Equivalent (DE)
1.00 - 1.80	Strongly Disagree or Very Negative
1.81 - 2.60	Disagree or Negative
2.61 - 3.40	Neutral
3.41 - 4.20	Agree or Positive
4.21 - 5.00	Strongly Agree or Very Positive

The table reveals the status of low-proficiency and high-proficiency students in mathematics with regards to the learning environment. Both groups had a positive view of the learning environment, but experienced it slightly differently. Low-proficiency students gave an average mean score of 3.94, with a standard deviation of 0.61, indicating a positive view with moderate variability in responses. High-proficiency students gave a slightly higher average mean score of 3.97, with a standard deviation of 0.72, indicating a similarly positive but slightly more variable perception of the learning environment.

Low-proficiency students generally perceive their learning environment positively, with an average mean of 3.94. As reflected, they agree that the learning environment is safe and promotes learning through consistent implementation of policies (mean = 3.58, SD = 1.01, Agree) and that it maintains fairness, respect, and care to encourage learning (mean = 4.39, SD = 0.66, Strongly Agree). Students also agreed that the learning environment empower them to explore and discover through hands-on activities (mean = 3.90, SD = 0.82, Agree) and motivates them to participate and collaborate in lifelong learning (mean = 3.97, SD = 0.69, Agree). However, students are not as confident that the classroom can engage them in meaningful learning activities

when compared to high-proficiency students.

High-proficiency students also show a positive learning environment, with a slightly higher average score of 3.97. They strongly agree that the learning environment is supportive, with fairness, respect, and care (mean = 4.23, SD = 0.79, Strongly Agree) and that it encourages lifelong learning (mean = 4.26, SD = 0.80, Strongly Agree). They also viewed the classroom as structured to promote individual and group engagement in exploration and hands-on activities (mean = 3.77, SD = 0.87, Agree).

Their responses showed a relatively stronger perception of the learning environment as inspiring and motivating, which supports their academic achievement.

The learning environment provides an important role in students' math achievement. A positive correlation between a supportive and safe classroom climate and higher levels of engagement and improved academic achievement has been demonstrated [12]. Research on classroom climate has demonstrated strong relationships between students' perceptions of supportive learning environments and improved academic achievement [19].

TABLE VII
Summarized Data on the Status of the Respondents in Mathematics

Indicators	Low-Proficiency Students			High-Proficiency Students		
	Mean	SD	DE	Mean	SD	DE
Study habits	3.31	0.27	Neutral	3.45	0.34	Satisfactory
Learning Problems	2.98	0.42	Moderate	3.00	0.29	Moderate
Teacher Relationship	3.96	0.54	Positive	4.12	0.38	Positive
Parents Attitudes Towards Mathematics	3.29	0.38	Neutral	3.39	0.36	Neutral
Learning Environment	3.94	0.61	Positive	3.97	0.72	Positive

The table summarizes the status of low and high-proficiency students in mathematics across several indicators. The two groups differ in their perceptions of study habits, teacher relationships, and learning environments, with high-proficiency students reporting more positive outcomes. As regards to study habits, low-proficiency students have a mean score of 3.31, indicating neutral study habits with some variability (SD = 0.27). High-proficiency students indicated slightly better study habits (mean=3.45, SD=0.34), but still had some variation in their routines. Both groups indicated moderate issues with learning problems, low-proficiency students had a mean score of 2.98 (SD=0.42) and high-proficiency students were at 3.00 (SD=0.29), indicating a slightly higher consistency of learning difficulties among low-proficiency students.

Another factor where high-proficiency students report more positive perceptions is teacher relationship. The low-proficiency students (mean = 3.96, SD = 0.54) have positive views of the relationship with their teachers with responses indicating moderate variability. The high-proficiency students report even more positive relationships (mean = 4.12, SD = 0.38) with a higher mean and lower variability, indicating an experience that is more consistently positive. Regarding the attitudes of parents on mathematics, both groups report neutral perceptions. The low-proficiency students have a mean of 3.29 (SD = 0.38) while the high-proficiency students report a slightly higher mean of 3.39 (SD = 0.36), indicating similar levels of consistency in their views of their parents' attitudes.

Both groups have positive perceptions of the learning environment, while the mean score of high-proficiency students is slightly higher. Low-proficiency students have a mean score of 3.94 (SD = 0.61) for their learning environment, while high-proficiency students have a slightly better score of 3.97 (SD = 0.72), showing a more positive perception overall. However, the higher standard deviation of high-proficiency students may indicate that their experiences may be more variable, but the overall perception is still positive.

Overall, the two groups have similar experiences, but high-proficiency students tend to report consistent and slightly more positive perceptions for all indicators.

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TABLE VIII
t-Test Showing the Significant Difference Between the High and Low Proficient Students in Mathematics on the Five Variables

Factors	Mean		Mean Difference	t-computed Value	t-critical Value	t-prob. Value 0.000 ($p < 0.05$)	Decision
	Low-Proficiency Students	High-Proficiency Students					
Study habits	3.31	3.45	-0.14	-1.637	2.000	0.107	Not Significant
Learning Problems	2.98	3.00	-0.02	-0.240	2.000	0.811	Not Significant
Teacher Relationship	3.96	4.12	-0.19	-1.358	2.000	0.180	Not Significant
Parents Attitudes Towards Mathematics	3.29	3.39	-0.28	-2.909	2.000	0.005	Significant
Learning Environment	3.94	3.97	-0.03	-0.150	2.000	0.882	Not Significant

The table shows the t-test results for both significant and not significant differences between high- and low-proficiency students in mathematics across five variables. The only variable demonstrating a significant difference is parents' attitudes towards mathematics, with a mean difference of -0.28, a t-computed value of -2.909, and a p-value of 0.005, which is less than 0.05. This indicates that there is a significant difference in how high and low-proficiency students perceive their parents' attitudes toward mathematics.

For study habits, it is reported that the mean difference is -0.14, with a t-computed value of -1.637 and a p-value of 0.107, which is higher than 0.05. This result implies that there is no significant difference between the study habits of high and low proficiency students. In terms of learning problems, the mean difference is -0.02, t-computed of -0.240 and p-value of 0.811 which indicates no significant difference in the learning problems experienced by both groups.

The mean difference in teacher relationships is -0.19, t-computed value is -1.358 and p-value is 0.180 which is more than 0.05. This means that there is no significant difference in the teacher relationships of the two groups. Lastly, for the learning environment, the computed mean difference is -0.03, with a t-computed value of -0.150 and a p-value of 0.882, demonstrating a significant difference in the learning environment between high- and low-proficiency students.

Parental attitudes have great influence on students' mathematics performance. Higher academic achievement has been linked to positive parental involvement [20]. Classroom climate and teacher-student relationships are also important for mathematics achievement, and supportive teacher-student relationships have been associated with better student outcomes [12].

TABLE IX
Wilks' Lambda Test of Function(s) Showing the Overall Discriminant Analysis of the Five Factors

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.	Decision
1	.820	11.440	5	.043	Significant

The Wilks' Lambda test results indicate the overall discriminant analysis of the five factors for distinguishing between high and low-proficiency students in mathematics.

The Wilks' Lambda value of 0.820 indicates the proportion of variance in the dependent variable, proficiency level, that remains unexplained by the independent variables: study habits, learning problems, teacher relationships, parents' attitudes, and learning environment. A smaller value of Wilks' Lambda indicates a better model fit.

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The Chi-square value is 11.440 with 5 degrees of freedom (df), and the Sig.(p-value) is 0.043. As the p-value is less than 0.05, there is a statistical significance difference between the groups in the five factors. Discriminant analysis indicates that the combination of study habits, learning problems, teacher relationships, parents' attitudes, and learning environment effectively distinguishes between high- and low-proficiency mathematics students.

TABLE X
Tests of Equality of Group Means Showing the Discriminating Factors of Mathematics Performance

Variables	Wilks' Lambda	F	df1	df2	Sig.	Decision
Study Habit	.958	2.630	1	60	.110	Not Significant
Learning Problem	.999	.058	1	60	.811	Not Significant
Teacher Relationship	.970	1.843	1	60	.180	Not Significant
Parents Attitude Towards Mathematics	.873	8.731	1	60	.004	Significant
Learning Environment in Mathematics	1.000	.022	1	60	.882	Not Significant

The table presents the results of the Tests of Equality of Group Means, looking at which variables are most influential in students' proficiency in mathematics.

The Wilks' Lambda values and their associated significance levels indicate that for most factors, there is no significant difference between students with high proficiency and students with low proficiency in mathematics. The p-values for study habits (0.110), learning problems (0.811), teacher relationships (0.180), and the learning environment (0.882) are all greater than the 0.05 significance level, indicating that these factors do not have a statistically significant impact on students' mathematics proficiency.

However, parents attitudes towards mathematics stands out as a significant factor. With a Wilks' Lambda value of 0.873 and a p-value of 0.004, it is the only factor in the table that shows a statistically significant difference. This indicates the importance of parents' attitudes towards mathematics in the competence of their children. The more positive parents attitudes are, the more likely students are to perform well in mathematics.

The attitude of parents towards mathematics has a significant effect on students' academic performance. Parents' math-related beliefs and math anxiety can influence children's own attitudes and achievement in math, typically via modeling and home support behaviors [11].

Furthermore, parental involvement in mathematics learning, such as encouragement and engagement in schoolwork, is consistently associated with higher student motivation and better performance in the subject [21].

V. SUMMARY OF FINDINGS

1) Level of Proficiency of Grade 10 Students in Mathematics

The 62 respondents showed Low Proficiency overall. Among them, 31 respondents fall into the Low Proficiency category (84% and below), while 31 respondents fall into the High Proficiency category (85% and above).

2) Status of highly proficient and lowly proficient students in mathematics regarding the five variables.

The Low-Proficiency Students show neutral study habits, moderate learning problems, a positive relationship with teachers, neutral parental attitudes towards mathematics, and a positive learning environment.

The High-Proficiency Students show satisfactory study habits, moderate learning problems, a positive relationship with teachers, neutral parental attitudes towards mathematics, and a positive learning environment.

3) Significant Difference Between the High and Low Proficient Students in Mathematics on the Five Variables.

The respondents show an overall significant difference between the groups based on the five factors. The only variable showing a significant difference is parents' attitudes towards mathematics. Meanwhile, study habits, learning problems, teacher relationships, and the learning environment show no significant differences.

4) Factor with the most significant impact on students' mathematics proficiency.

The respondents show that parents' attitudes towards mathematics is a significant factor, while most other factors, including study habits, learning problems, teacher relationships, and the learning environment, do not significantly differentiate between students with high and low mathematics proficiency.

VI. CONCLUSION

1) The majority of Grade 10 students demonstrated low proficiency in mathematics, with an equal distribution between low and high proficiency groups. This indicates that many students may struggle with the subject, featuring the need for targeted support and enhanced intervention.

2) Both highly proficient and lowly proficient students exhibit similarities in learning problems, teacher relationships, and learning environment. In contrast, study habits and parental attitudes suggest that these factors could be areas to focus on in efforts to improve student proficiency.

3) The study revealed that the only significant difference between the two groups was parents' attitudes toward mathematics. This emphasizes the importance of parental involvement in building a positive attitude towards mathematics, which can have a deep impact on student achievement. Other factors did not show significant differences.

4) Parents' attitudes toward mathematics appeared to be the most significant factor affecting students' proficiency. This indicates that positive support and attitudes from parents are more crucial in improving mathematics skills than other factors such as study habits or relationships with teachers.

VII. RECOMMENDATION

1) Schools can provide different targeted interventions, such as remedial classes or tutoring, to help students who have difficulty with mathematics. Early identification of at-risk students allows for timely support.

2) Schools should concentrate on improving teacher training to address individual learning needs and create a more inclusive environment. Better communication among teachers, students, and parents will also help students succeed.

3) Schools may promote increased parental involvement by implementing programs that highlight the significance of nurturing a positive attitude towards mathematics and supporting their children's learning.

4) Parallel studies in other grade level should be undertaken on a wider scale in order to refute or support the findings of the present study.

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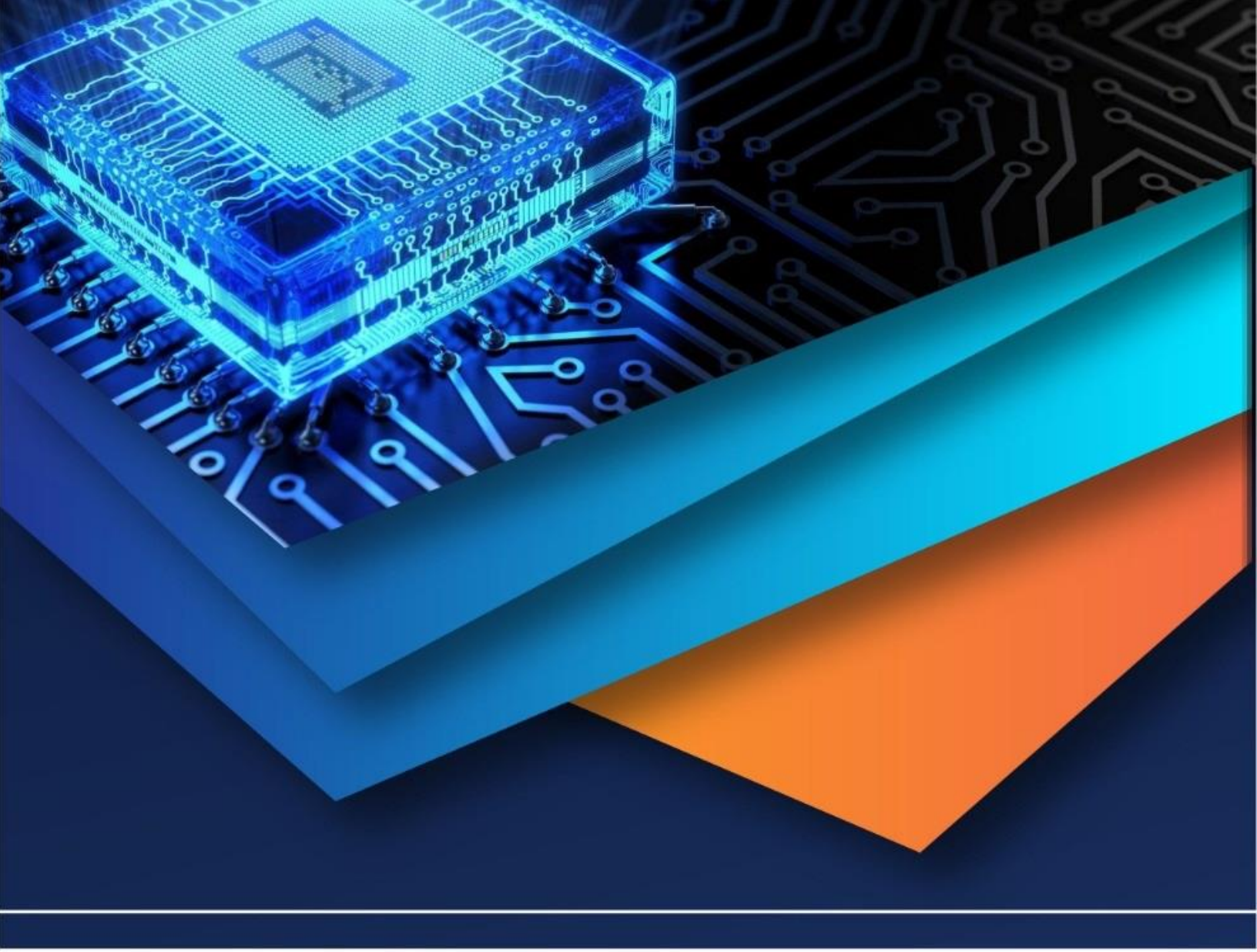

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