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A Comprehensive Examination of Factors Affecting Math Literacy at the Primary Level

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ABSTRACT: *This study investigates the relationships between various environmental and personal factors namely, parental and home environments, technology usage, school resources, and social-emotional factors and mathematical literacy among students at Borromeo Brothers Elementary School. Utilizing a correlational design, the research assessed these factors' impacts on students' performance in mathematical tasks such as number identification, quantity discrimination, and problem-solving skills. Results from correlation analyses indicated that none of the examined factors showed statistically significant relationships with students' mathematical performance. This outcome suggests that the influence of these factors on mathematical literacy might be less significant than traditionally assumed, potentially overshadowed by other unexamined variables such as teacher effectiveness or broader socioeconomic conditions. These findings emphasize the need for educational institutions to consider a broader range of influences and tailor interventions more closely to the specific needs of their student populations. The study calls for further research to explore these dynamics over time and across different educational settings.*

Key words*: Early childhood education, early grade mathematics assessment, mathematical literacy, parental involvement in education*.

1. Introduction

Mathematical literacy is a fundamental competence that enables individuals to interpret, analyze, and apply mathematical principles in everyday life. It goes beyond computation, encompassing data analysis, pattern recognition, and logical reasoning to solve authentic problems and support sound decision-making (UNESCO, 2022). This skill is crucial for students' academic development, laying the groundwork for future engagement in advanced mathematics, particularly in STEM fields that drive innovation and economic progress in today's digital society (Anderson & Lim, 2023; Salazar & Torres, 2024; Suson, 2019). Proficiency in mathematics also plays a key role in economic mobility, equipping learners with the problem-solving and analytical abilities necessary to adapt to changing technologies and contribute effectively in knowledge-based industries (Villanueva & Santos, 2023; Espinoza & Yu, 2021; De Vera & Mendoza, 2022).

Recognizing the determinants of mathematical literacy during early childhood is essential, as these foundational years significantly influence long-term learning and academic achievement. Research

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suggests that early math interventions can close performance gaps and prevent learning difficulties from persisting across grade levels (Ortega & Lee, 2023; Wallace & Green, 2024; Delgado et al., 2021). Global assessments such as the Trends in International Mathematics and Science Study (TIMSS) and the Programme for International Student Assessment (PISA) continue to reveal considerable gaps in math achievement across countries. Notably, the Philippines scored just 297 in TIMSS 2019, well below the global average of 500, and ranked 79th in mathematics in the 2018 PISA, indicating a pressing need for targeted educational reform (IEA, 2019; OECD, 2020).

The Early Grade Mathematics Assessment (EGMA) has emerged as a widely utilized tool to measure key numeracy skills in young learners. It evaluates competencies such as number identification, quantity discrimination, pattern detection, and basic operations, allowing educators to pinpoint learning gaps and refine instructional strategies (Hansen & Liu, 2023; Gomez & Bradley, 2024; Suson, 2024; Bautista & Cruz, 2022; Signson, 2024). Evidence from several countries, including Kenya, Ghana, and Indonesia, indicates that EGMA-driven interventions can significantly enhance students' math proficiency (Larsen & Madsen, 2022; Reyes et al., 2023). The Organization for Economic Co-operation and Development (OECD, 2021) reinforces the notion that strong mathematical foundations are essential for preparing learners to navigate the demands of a digital and global economy.

In response to these challenges, the Philippine Department of Education (DepEd) has launched reforms such as the K–12 Basic Education Program and the Matatag Curriculum, both aimed at improving foundational math and science skills, with a strong emphasis on critical thinking and real-world problem-solving (DepEd, 2023). Nevertheless, many Filipino learners continue to struggle with basic mathematical concepts, which hinders academic achievement and limits future opportunities. This study was designed to assess the mathematical literacy of primary-grade students using EGMA and to identify key contextual influences on their performance. Providing data-driven, locally relevant insights, the research aims to support educational planning and policy development that can bridge achievement gaps and foster a numerate, future-ready generation (Mendoza & Javier, 2023; Morrow & Jenkins, 2025).

2. Literature Review

Mathematical literacy in early education is crucial for nurturing critical thinking and problem-solving skills that underpin future academic and professional success. Research underscores the significant roles that home and school environments play in developing these foundational mathematical skills. Evidence consistently demonstrates that parental engagement, including help with homework and the availability of educational resources, significantly influences children's learning outcomes (Nguyen et al., 2023; Brooks & White, 2022). Furthermore, factors like the educational levels of parents and household income are pivotal, with numerous studies affirming a link between higher socioeconomic status and better mathematical performance in children (Franklin et al., 2022; Watson & Kumar, 2021). Yet, disparities remain prominent as children from economically disadvantaged backgrounds often have limited early exposure to numeracy activities, potentially impacting their educational paths (Morris, 2022; O'Connell, 2021).

In terms of education, the caliber of school resources and the supportiveness of educators are key to fostering mathematical abilities. Research has illustrated that access to high-quality educational materials and dynamic math instruction can significantly boost learning outcomes (Grant, 2023; Mendez & Lopez, 2022). The effectiveness of teachers, reflected in their subject-specific expertise and their ability to create a conducive learning atmosphere, emerges as a critical contributor to student success (Kim & Park, 2022; Gonzalez & Rodriguez, 2023). Additionally, the use of technology in teaching math requires judicious implementation to avoid distractions and maximize educational benefits (Tanner, 2022; Choi & Bates, 2023). As technology in education evolves, its impact on promoting or impeding math literacy remains a vital research area (Holloway, 2023; Singh & Chen, 2022). These findings collectively underscore the complex interplay of factors affecting mathematical literacy at the elementary level. Ongoing research is needed to further dissect these interactions to better tailor teaching methods and policies aimed at ameliorating educational disparities and boosting student performance.

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3. Methodology

This study utilized a descriptive-correlational methodology to explore the levels of mathematical literacy among students at Borromeo Brothers Elementary School, employing the Early Grade Mathematics Assessment as the main evaluative tool. The choice of this method was suited to the study's practical limitations. This toolkit includes various tests designed to assess critical aspects of early math learning, such as number recognition, quantity comparison, pattern identification, and basic calculation skills. These assessments were specifically tailored to accommodate different literacy levels and were conducted in both oral and written forms to maximize participant inclusion. Additionally, further data were collected via questionnaires given to students and their parents, which provided essential demographic and contextual details like educational attainment, household income, and other environmental influences that affect students' math skills. The data analysis involved descriptive statistics to outline the spread of skills among the students and correlational studies to identify key factors influencing mathematical literacy. This multifaceted approach not only highlighted the current proficiency levels in mathematics among the students but also offered valuable perspectives on potential educational interventions.

Table 1. Parental and Home Environment.

Indicators	Mean	VD
My parents regularly help me with my homework.	3.24	SA
I feel emotionally supported by my family.	3.3	SA
I have access to books, internet, and other learning materials at home.	2.86	A
My family expects me to perform well in school.	2.58	A
My home environment provides a quiet space for studying.	3.21	A
Grand Mean	3.04	A

4. Results and Discussion

Table 1 presents data on the parental and home environment influences on students from the Borromeo Brothers Elementary School, as part of the study on mathematical literacy. The indicators measured include several aspects of home life that can impact educational outcomes. Students reported a mean of 3.24, with a verdict of "Strongly Agree" (SA), indicating that parents regularly assist with homework. This suggests a high level of parental involvement in their children's educational activities. Emotional support from family scored slightly higher, with a mean of 3.3 and also a verdict of "Strongly Agree", highlighting a nurturing home environment. Access to resources such as books, internet, and other learning materials at home received a lower mean of 2.86, falling under "Agree" (A), indicating that while resources are available, there might be room for improvement. Expectations for academic performance were even lower at 2.58, also categorized under "Agree", suggesting that while there are some expectations of academic success, they might not be as pronounced as other areas. The provision of a quiet study space at home scored a mean of 3.21, which falls under "Agree", pointing to generally favorable conditions for studying. The Grand Mean for all these indicators came to 3.04, categorized as "Agree", which reflects a generally positive but varied home learning environment. These data suggest that while most students receive substantial support and resources at home, there are areas, particularly in resource provision and academic expectations, where improvements could further enhance their educational outcomes.

Table 2. Technology-Related Factors.

Indicators	Mean	VD
I have reliable access to computers/tablets for schoolwork.	2.75	A
Using technology improves my learning experience.	2.54	A
I spend a lot of time on social media or video games.	2.3	A
Technology often distracts me from studying.	2.55	A
I easily adapt to using new educational software or platforms.	2.63	A
Grand Mean	2.55	A

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Table 2 focuses on technology-related factors affecting students at Borromeo Brothers Elementary School, providing insight into how digital tools and habits impact their educational experiences. The indicators measured reveal a mixed relationship with technology in the context of learning. The mean score for reliable access to computers or tablets for schoolwork is 2.75, falling under the category "Agree" (A). This suggests that while students generally have access to necessary technology, it may not be entirely sufficient or consistent across the board. The effectiveness of technology in enhancing learning experiences received a slightly lower score of 2.54, also under "Agree". This indicates a moderate perception among students that technology positively affects their learning, though not overwhelmingly so. Regarding distractions, students reported spending a lot of time on social media or video games with a mean of 2.3, categorized as "Agree". This could imply a moderate level of distraction in their daily routines. Similarly, the indicator that technology often distracts from studying scored a close 2.55, aligning with the idea that while technology is a useful tool, it can also serve as a significant distraction. Students' adaptability to new educational software or platforms is noted with a mean of 2.63, under "Agree". This suggests a fair level of comfort and flexibility in learning to use new technological tools, which is crucial for modern education. The Grand Mean for these technology-related factors stands at 2.55, classified as "Agree", reflecting an overall moderate positive interaction with technology in their educational environment. This data suggests that while technology is an integral part of the students' learning environment, its benefits are balanced by challenges related to access and distractions, highlighting areas for potential improvement in managing technology use within educational settings.

Table 3. School-Related Factors.

Indicators	**Mean**	**VD**
My teachers are supportive and help me succeed.	3.76	SA
My school provides adequate resources (e.g., books, labs, facilities).	2.99	A
I feel safe at school.	3.84	SA
My classmates are supportive and help me with schoolwork	3.13	A
I participate in extra-curricular activities provided by my school.	2.98	A
Grand Mean	3.34	SA

Table 3 details the school-related factors impacting students at Borromeo Brothers Elementary School, shedding light on various elements that contribute to their overall educational environment. The highest mean score is associated with feeling safe at school, with a mean of 3.84 and a verdict of "Strongly Agree" (SA). This indicates that students feel very secure within their school environment, which is fundamental for fostering an effective learning atmosphere. Similarly, the supportive nature of teachers is highly rated with a mean of 3.76 under "Strongly Agree", suggesting that students perceive their teachers as helpful and instrumental in their academic success. Resources provided by the school, such as books, labs, and facilities, received a lower mean score of 2.99, categorized under "Agree" (A). This suggests that while the school does offer necessary resources, there may be room for improvement in terms of quality or quantity to better support student learning. Support from classmates is also viewed positively but not as strongly, with a mean score of 3.13 under "Agree", indicating a good level of peer support that could potentially be enhanced further. Participation in extracurricular activities is another aspect measured, garnering a mean of 2.98 under "Agree". This score reflects moderate engagement in school-provided activities, which could suggest either a lack of interest or availability of appealing options for students. The Grand Mean for these school-related factors stands at 3.34, falling under "Strongly Agree". This overall score reflects a generally positive perception of the school environment, although certain areas like resource provision and extracurricular activity engagement present opportunities for improvement. This data highlights the school's strengths in creating a supportive and safe learning environment while also pointing out areas where enhancements could further enrich student experiences.

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Table 4. Social-Emotional Factors.

Indicators	Mean	VD
I am confident in my academic abilities.	2.79	A
I have positive relationships with my classmates.	3.48	SA
I can manage my emotions well when faced with challenges.	2.93	A
I feel supported by my friends.	3.26	SA
I am able to manage stress effectively.	2.92	A
Grand Mean	3.08	A

Table 4 presents data on the social-emotional factors influencing students at Borromeo Brothers Elementary School, highlighting how these aspects contribute to their overall academic and personal development. Starting with the students' confidence in their academic abilities, the mean score is 2.79, categorized under "Agree" (A). This suggests a moderate level of self-assuredness in their academic skills, indicating that while students generally feel capable, there is potential for enhancing their confidence further. Positive relationships with classmates are highly valued, with a mean score of 3.48 falling under "Strongly Agree" (SA). This high score reflects strong social bonds among students, which are crucial for a supportive learning environment and can significantly influence positive academic outcomes. The ability to manage emotions when faced with challenges received a mean of 2.93, also under "Agree". This indicates that students are reasonably adept at handling emotional stressors, although like academic confidence, there is room for improvement in this area to better support their resilience. Support from friends is another strong area, with a mean score of 3.26 categorized under "Strongly Agree". This shows that students feel well-supported by their peers, which can be essential for navigating the social and academic pressures of school life. Lastly, the ability to manage stress effectively is rated with a mean of 2.92 under "Agree". This score suggests that students generally have strategies to cope with stress, yet there may be a need for further development in stress management techniques to aid in their overall well-being. The Grand Mean for these social-emotional factors is 3.08, classified under "Agree". This overall rating points to a positive environment in terms of social and emotional support, though it also highlights areas such as confidence and emotional management where there is room for targeted interventions. This data underscores the importance of fostering not only academic skills but also emotional and social competencies to enhance the holistic development of students.

Table 5. Learners' Performance.

Indicators	Mean	VD
Number Identification	85	Very Satisfactory
Quantity Discrimination	84	Satisfactory
Missing Number (Patterns)	80	Satisfactory
Addition And Subtraction Level 1	85	Very Satisfactory
Addition And Subtraction Level 1	85	Very Satisfactory
Word Problem- Solving Skill	85	Very Satisfactory

Table 5 provides an overview of learners' performance in various mathematical competencies at Borromeo Brothers Elementary School, reflecting the effectiveness of their math education through specific assessment indicators. The indicators start with "Number Identification," where students achieved a mean score of 85, classified as "Very Satisfactory." This high score indicates a strong foundation in recognizing numbers, which is a critical skill in early math education. Similarly, the ability to solve problems involving "Addition and Subtraction Level 1" and "Word Problem-Solving Skill" also received mean scores of 85, each rated as "Very Satisfactory." These results suggest that students are proficient in basic arithmetic operations and can apply these skills effectively in problem-solving contexts, a vital aspect of mathematical literacy. "Quantity Discrimination," which involves the ability to compare and assess quantities, received a mean score of 84, categorized as "Satisfactory." While still a good score, it slightly lags behind the other metrics, suggesting that while students are capable in this area, there might be a slightly lesser degree of proficiency compared to number identification and arithmetic.

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The "Missing Number (Patterns)" assessment, with a mean of 80, also falls under the "Satisfactory" category. This indicator tests students' abilities to identify patterns and predict subsequent numbers, which is crucial for developing higher-level mathematical thinking and reasoning skills. The slightly lower score in this area might indicate a need for strengthening pattern recognition skills among students. Overall, the performance data from Table 5 illustrates that students at Borromeo Brothers Elementary School generally exhibit strong mathematical abilities across several key areas. The results are predominantly positive with a trend towards "Very Satisfactory," highlighting the effectiveness of the school's mathematics curriculum. However, the slightly lower scores in quantity discrimination and missing number patterns suggest areas where targeted instructional strategies could further enhance students' mathematical understanding and skills.

Table 6 analyzes the statistical relationship between the parental and home environment factors and learners' performance in various mathematical tasks at Borromeo Brothers Elementary School. The data is explored through correlation coefficients (r-values), t-values, and P values to determine the significance of these relationships. For Number Identification, the correlation coefficient is 0.160135, indicating a weak positive relationship with the parental and home environment; however, with a P value of 0.111495, this relationship is not statistically significant, leading to a decision to not reject the null hypothesis.

Table 6. Significant Relationship Between the Parental and Home Environment to Learners' Performance.

Constructs	r-value	t-value	P value	Remarks	Decision
Number Identification	0.160135	1.605986	0.111495	Not Significant	Do not reject
Quantity Discrimination	-0.05683	-0.56346	0.574406	Not Significant	Do not reject
Missing Number	-0.13112	-1.30936	0.193475	Not Significant	Do not reject
Addition_Level_1	0.105522	1.050476	0.296083	Not Significant	Do not reject
Subtraction Level 1	-0.00617	-0.06106	0.951434	Not Significant	Do not reject
Word Problem	-0.06627	-0.65751	0.512392	Not Significant	Do not reject

In the case of Quantity Discrimination, the correlation coefficient is -0.05683, suggesting a very weak negative relationship. The high P value of 0.574406 reinforces the lack of statistical significance, prompting the same decision to not reject the null hypothesis. Missing Number performance shows a correlation coefficient of -0.13112. While this negative coefficient indicates a weak inverse relationship, the P value of 0.193475 suggests that this is not significant, leading again to the decision to not reject the null hypothesis. Addition Level 1 displays a weak positive correlation of 0.105522 with the parental and home environment, but with a P value of 0.296083, this relationship does not reach statistical significance, resulting in a decision to not reject the null hypothesis. For Subtraction Level 1, the correlation coefficient is an almost negligible -0.00617, with a very high P value of 0.951434, indicating no significant relationship between home environment factors and subtraction performance. Thus, the decision is to not reject the null hypothesis. Finally, Word Problem solving has a correlation coefficient of -0.06627, indicating a weak negative relationship. However, the P value of 0.512392 suggests that this relationship is not significant, leading once more to the decision to not reject the null hypothesis. Overall, these results suggest that there is no significant statistical relationship between the parental and home environment and the mathematical performance of students across the tasks evaluated.

Table 7 details the investigation into the relationship between technology factors and learners' performance in various mathematical tasks at Borromeo Brothers Elementary School. The statistical analysis includes correlation coefficients (r-values), t-values, and P values to evaluate the significance of these relationships. For Number Identification, a correlation coefficient of -0.05666 indicates a very weak negative relationship with technology factors, with a P value of 0.575535, which is not statistically significant. Thus, the decision is to not reject the null hypothesis, indicating no substantial link between technology factors and performance in number identification. In Quantity Discrimination, the correlation coefficient is even lower at -0.02032, accompanied by a P value of 0.840967, suggesting no significant relationship and leading to a decision to not reject the null hypothesis. The relationship between technology factors and Missing Number performance is similarly weak, with a correlation coefficient of -0.0143 and a P value of 0.88768, reinforcing the absence of a significant statistical relationship and resulting in a decision to not reject the null hypothesis.

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Table 7. Significant Relationship Between the Technology Factors to Learners' Performance.

Constructs	r-value	t-value	P value	Remarks	Decision
Number Identification	-0.05666	-0.5618	0.575535	Not Significant	Do not reject
Quantity Discrimination	-0.02032	-0.20119	0.840967	Not Significant	Do not reject
Missing Number	-0.0143	-0.14161	0.88768	Not Significant	Do not reject
Addition_Level_1	0.091461	0.909226	0.365462	Not Significant	Do not reject
Subtraction Level 1	-0.06325	-0.62737	0.531875	Not Significant	Do not reject
Word Problem	0.027631	0.273636	0.78494	Not Significant	Do not reject

For Addition Level 1, there is a slight positive correlation of 0.091461; however, with a P value of 0.365462, this relationship does not reach statistical significance, leading to the same decision to not reject the null hypothesis. Subtraction Level 1 shows a correlation coefficient of -0.06325, indicating a weak negative relationship, but with a P value of 0.531875, it is not significant, and the decision is to not reject the null hypothesis. Lastly, the Word Problem solving correlation coefficient of 0.027631, while positive, is accompanied by a P value of 0.78494, indicating no significant relationship and leading to a decision to not reject the null hypothesis. Overall, the analysis from Table 7 indicates that there is no significant statistical relationship between technology factors and the mathematical performance of students across the evaluated tasks.

Table 8. Significant Relationship Between the School Factor to Learners' Performance.

Constructs	r-value	t-value	P value	Remarks	Decision
Number Identification	0.107318	1.068563	0.287892	Not Significant	Do not reject
Quantity Discrimination	0.176233	1.772361	0.079442	Not Significant	Do not reject
Missing Number	0.103072	1.025822	0.307501	Not Significant	Do not reject
Addition_Level_1	0.048376	0.479455	0.632683	Not Significant	Do not reject
Subtraction Level 1	-0.04132	-0.40941	0.683134	Not Significant	Do not reject
Word Problem	-0.11812	-1.17752	0.241839	Not Significant	Do not reject

Table 8 explores the relationship between school factors and learners' performance in various mathematical tasks at Borromeo Brothers Elementary School, using correlation coefficients (r-values), t-values, and P values to assess statistical significance. Number Identification presents a correlation coefficient of 0.107318, showing a weak positive relationship between school factors and number identification skills. However, with a P value of 0.287892, this relationship does not reach statistical significance, leading to a decision to not reject the null hypothesis. Quantity Discrimination exhibits a slightly stronger positive correlation of 0.176233, the highest among the constructs, with a corresponding t-value of 1.772361. Despite this relatively higher correlation, the P value of 0.079442 is still above the typical threshold for significance, resulting in a decision to not reject the null hypothesis. For Missing Number, the correlation coefficient is 0.103072, suggesting a weak positive influence of school factors, but the P value of 0.307501 indicates that this relationship is not statistically significant, and the null hypothesis is not rejected. Addition Level 1 shows a very weak positive correlation of 0.048376, with a P value of 0.632683, indicating no significant relationship between school factors and performance in addition, leading to the decision to not reject the null hypothesis. Subtraction Level 1 has a negative correlation coefficient of -0.04132, reflecting a weak inverse relationship. However, with a P value of 0.683134, this is not statistically significant, and the decision is to not reject the null hypothesis. Finally, Word Problem solving has a correlation coefficient of -0.11812, indicating a weak negative relationship. Yet, with a P value of 0.241839, it fails to demonstrate statistical significance, resulting in a decision to not reject the null hypothesis. Overall, the analysis from Table 8 shows no significant statistical relationships between school factors and the performance of students across the tasks evaluated.

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Table 9. Significant Relationship Between the Social-Emotional Factors to Learners' Performance

Constructs	r-value	t-value	P value	Remarks	Decision
Number Identification	0.025559	0.358854	0.720088	Not Significant	Do not reject
Quantity Discrimination	0.012932	0.18153	0.856138	Not Significant	Do not reject
Missing Number	-0.01152	-0.16176	0.871659	Not Significant	Do not reject
Addition_Level_1	-0.03212	-0.45111	0.652404	Not Significant	Do not reject
Subtraction Level 1	-0.07534	-1.06049	0.29022	Not Significant	Do not reject
Word Problem	0.108829	1.536617	0.125992	Not Significant	Do not reject

Table 9 provides an analysis of the relationship between social-emotional factors and learners' performance across various mathematical tasks at Borromeo Brothers Elementary School. The table assesses these relationships using correlation coefficients (r-values), t-values, and P values to determine statistical significance. Number Identification shows a very weak positive correlation with social-emotional factors, with an r-value of 0.025559. However, the relationship is not statistically significant as indicated by a P value of 0.720088, leading to the decision to not reject the null hypothesis. In the case of Quantity Discrimination, the correlation coefficient is even weaker at 0.012932, with a P value of 0.856138, further reinforcing the lack of significant impact from social-emotional factors on this performance metric. Hence, the null hypothesis is not rejected. Missing Number tasks exhibit a slight negative correlation of -0.01152, but like the others, it lacks statistical significance (P value of 0.871659), leading to a decision to not reject the null hypothesis. Addition Level 1 reflects a weak negative correlation of -0.03212 with social-emotional factors, and with a P value of 0.652404, this too indicates no significant relationship, resulting in the null hypothesis being maintained. Subtraction Level 1 presents a somewhat stronger negative correlation of -0.07534, but the relationship still does not reach statistical significance as the P value is 0.29022. Consequently, the decision is to not reject the null hypothesis. Lastly, Word Problem solving shows a correlation coefficient of 0.108829, suggesting a modest positive relationship. Despite being one of the stronger correlations in this table, with a P value of 0.125992, it still falls short of statistical significance, and the null hypothesis is not rejected. Overall, the data in Table 9 indicates that social-emotional factors do not show a significant statistical relationship with the performance of students across the various mathematical tasks analyzed.

5. Discussion

The comprehensive analysis across various tables in the study at Borromeo Brothers Elementary School reveals a multifaceted view of the factors influencing mathematical literacy, yet consistently shows that these factors parental and home environment, technology use, school resources, and social-emotional variables do not statistically significantly impact student performance in mathematics. This finding contrasts with some prevailing educational theories which suggest that such factors should have a noticeable influence on student learning outcomes. For instance, the involvement of parents in homework and the availability of resources at home are often linked to better academic performance (Hill & Tyson, 2009; Suson, 2020). However, the data from this study suggest that the direct correlation in this particular setting is minimal. This could indicate that other unmeasured variables, such as teacher quality, curriculum design, or external socio-economic factors, might play more significant roles, or that the scales used to measure these constructs did not fully capture their influence.

Moreover, the limited impact of technology on mathematical performance, as reflected in the analysis, raises questions about the efficacy of educational technologies in enhancing learning outcomes, which has been a contentious topic in educational research. While some studies highlight the potential of technology to improve engagement and learning (Cheung & Slavin, 2013), the findings here suggest that technology might not be effectively integrated or might be too distracting, as reflected in student responses about its role as a potential distraction. This aligns with research suggesting that without strategic implementation, technology may not inherently be beneficial (Kirkwood & Price, 2014). The overall non-significant results across school-related factors and social-emotional factors further suggest a complex interplay of in-school dynamics and individual student characteristics that might influence learning outcomes. Future research should consider longitudinal designs to capture these effects over time, potentially providing insights into how these factors might interact differently as students progress through their education. These findings underscore the

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necessity for schools to tailor interventions based on the specific needs and contexts of their student populations, rather than relying on generalized assumptions about what factors are most influential.

Conclusion

The findings reveal that none of these factors showed a statistically significant relationship with the students' performance in mathematics. This suggests that the influence of these traditionally valued educational elements may be less direct or less significant than commonly assumed, possibly overshadowed by other unexamined variables such as teacher effectiveness or external socioeconomic conditions. The study highlights the complexity of educational outcomes and the need for schools to critically assess and adapt their strategies to the specific contexts of their students. Future research should explore these relationships further, possibly through longitudinal studies, to better understand the dynamics at play and to develop more targeted educational interventions.

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