International Journal of Educational Studies
ISSN: 2641-533X
Volume 8, Issue 6, pp. 17-25
2025
DOI: 10.53935/2641-533x.v8i6.528

Home Numeracy Practices and Preschoolers' Mathematical Development

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ABSTRACT: *This study examined the relationship between home numeracy experiences and the mathematical development of preschoolers. Guided by a descriptive-correlational research design, the study focused on understanding how various home-based numeracy exposures relate to children's numeracy skills in early childhood. The research was anchored on the Input–Process–Output model, assessing children's engagement in home numeracy practices such as counting, reading number books, playing math-related games, and applying math in real-life situations. Findings revealed that children generally exhibited advanced levels of numeracy, particularly in identifying attributes and thinking skills. However, their exposure to number books, games, and practical math applications at home was rated low to very low. Despite these patterns, statistical analysis showed a negligible and non-significant relationship between home numeracy experiences and preschoolers' numeracy skills. This suggests that other influences, such as classroom instruction or structured Montessori activities, may play a more dominant role in shaping early math development. The study emphasizes the importance of promoting balanced and meaningful home numeracy practices to support young learners' mathematical growth and recommends increased parental involvement to reinforce the learning that takes place in school.*

Key words*: Early childhood education, home numeracy practices, mathematical development, numeracy skills, preschoolers.*

International Journal of Educational Studies
Vol. 8, No. 6, pp. 17-25
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DOI: *10.53935/2641-533x.v8i6.528*

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1. Introduction

Numeracy skills form the cornerstone of logical reasoning, problem-solving, and academic success across multiple domains (Pratiwi et al., 2024). During the preschool years, children begin to develop essential mathematical concepts such as number sense, quantity comparison, counting, and basic arithmetic operations. Numerous studies have established that early math proficiency is one of the strongest predictors of future academic achievement, often surpassing early literacy in forecasting long-term success in school (Susperreguy et al., 2020). This underscores the importance of identifying and optimizing early contributors to mathematical development. One of the most critical yet often overlooked environments that influence this development is the home (Girard et al., 2021). Preschool-aged children spend a significant portion of their

time outside of formal school settings, making the home a rich and influential learning environment (Li et al., 2025). Parents and caregivers, through both intentional and incidental interactions, can significantly shape children's understanding of numbers and patterns (Lockman et al., 2021; Scheidecker, 2023). Therefore, understanding and enhancing home numeracy experiences is central to promoting children's cognitive growth.

Home numeracy practices refer to the variety of numerical activities that occur between children and their caregivers in the home environment (Merkley et al., 2023). These practices can be classified into formal (e.g., practicing counting, solving arithmetic problems) and informal (e.g., playing board games, grocery shopping, or measuring while cooking). Recent studies have shown that these activities are positively associated with preschoolers' symbolic and non-symbolic math skills, including their ability to recognize quantities, understand number symbols, and solve simple problems (Pan et al., 2022; King & Purpura, 2021). Furthermore, operational home activities such as simple addition or subtraction are especially effective in supporting the development of mathematical fluency (Mak et al., 2024). The influence of these numeracy experiences is not limited to cognitive domains but extends to affective aspects as well (Stella, 2022). Children who are regularly exposed to positive, engaging math-related experiences at home tend to develop more favorable attitudes toward mathematics, which can further enhance their academic trajectory.

Montessori education is known for its emphasis on self-directed activity, hands-on learning, and exploration, which naturally align with informal and contextual learning an approach that complements many home-based numeracy experiences. Despite the advantages of this method, little empirical research has been conducted in the Philippines to understand how home numeracy practices intersect with Montessori pedagogy. While studies from Western and East Asian contexts have explored home numeracy and academic outcomes, Filipino children who grow up in different linguistic, socio-cultural, and educational environments may not exhibit the same patterns. Hence, it is vital to assess how parental engagement in numeracy within the Filipino household, particularly among those attending Montessori schools, influences early mathematical development. This can inform culturally responsive teaching practices and family engagement strategies in similar educational environments.

While there is a growing consensus on the role of home numeracy in child development, existing research presents mixed findings. Some studies report strong positive associations between home numeracy activities and children's math skills, whereas others find weak or no significant relationships (Dowker, 2021; Purpura et al., 2020). One reason for these inconsistencies is methodological variability most studies rely heavily on parent-reported questionnaires, which can be biased due to inaccurate recall or social desirability. Additionally, the complexity of home numeracy ranging from frequency to quality and difficulty of tasks is not always captured adequately. Some researchers argue that the type and cognitive demand of activities matter more than their frequency (Girard et al., 2021). Moreover, parental factors such as attitudes toward math, math anxiety, and educational background also mediate the effectiveness of numeracy practices. Thus, there is a need for more nuanced, contextualized research that addresses these variables and applies rigorous assessment tools to understand their true impact.

Despite a strong body of international literature, several research gaps remain particularly in understanding how home numeracy operates across diverse cultural and educational contexts. The Philippines lacks localized empirical data on how family practices at home influence young learners' mathematical development. Even more scarce is research that targets students enrolled in alternative pedagogical environments like Montessori schools, where learning is individualized and child-centered. Another critical gap is the limited examination of how parental expectations, math attitudes, and emotional climate affect home numeracy practices and, in turn, children's outcomes (Cosso et al., 2022). Most studies also fail to consider the bidirectional nature of the relationship how children's own interest and aptitude in math influence the quantity and quality of parental engagement. This research aims to fill these gaps by exploring the influence of home numeracy practices among preschoolers.

This study seeks to examine the relationship between home numeracy experiences and the development of mathematical skills among preschoolers at Maria Montessori International School – Talamban Campus. It will explore both formal and informal numeracy activities and how these are shaped by parental attitudes, educational background, and socio-economic factors. A mixed-method approach will be employed to gather detailed data through surveys, child assessments, and focus group interviews. Specifically, the study will assess whether children exposed to more frequent and cognitively demanding numeracy tasks at home demonstrate stronger numerical competencies in school. The findings will contribute to the development of

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school-family collaboration strategies, support policies that advocate for early math education, and provide practical recommendations for parents on how to effectively nurture their children's mathematical abilities. Ultimately, the research aims to bridge the gap between home and school learning environments, ensuring that children receive consistent and supportive numeracy experiences during their formative years.

2. Literature Review

Understanding the level of children's exposure to home numeracy experiences has become central to early childhood education research. Recent literature emphasizes the need to assess home-based activities in four key areas: numeracy skills, number books, games, and real-life applications. According to Pan et al. (2022), parents typically engage their preschool-aged children in both formal and informal numeracy activities, including counting exercises and basic arithmetic, which positively predict math performance (Pan et al., 2022). Early exposure to number books, in particular, has been found to predict non-symbolic math skills, while engagement in number applications (e.g., measuring, budgeting) correlates with symbolic math skills (Zhang et al., 2025). Meanwhile, math-related games such as board games or counting-based activities help develop both symbolic understanding and positive attitudes toward math (Mak et al., 2024). Application-based learning, such as using math in daily life situations, reinforces abstract concepts by connecting them to real-world use. These four domains together form a robust picture of a child's exposure to home numeracy.

On the other hand, evaluating the numeracy skills of preschoolers typically includes measuring proficiency in number concepts, identifying attributes, and thinking skills. Number concepts involve understanding quantity, order, and value, which are foundational to mathematical reasoning. A study by King & Purpura (2021) found that early exposure to direct numeracy activities significantly enhances preschoolers' understanding of number systems and improves their symbolic math skills (King & Purpura, 2021). Attribute identification—such as recognizing shapes, colors, and sizes is another essential aspect of early numeracy, as it develops children's ability to classify and compare, which underpins problem-solving. Studies also suggest that thinking skills, including logical reasoning and pattern recognition, are enhanced when children are encouraged to focus spontaneously on numerical aspects in everyday tasks (Mak et al., 2024). Overall, children's math achievement is closely tied to both their home learning environment and the diversity of numeracy tasks they are exposed to, emphasizing the value of assessing each of these skill areas individually and holistically.

3. Methodology

This study employed a descriptive-correlational research design to explore the relationship between home numeracy practices and the mathematical development of preschoolers at Maria Montessori International School – Talamban Campus. The design was deemed suitable as it allowed the researcher to describe existing conditions without manipulation and to examine the statistical relationship between the independent variable (home numeracy practices) and the dependent variable (numeracy skills). The study was anchored on the Input–Process–Output (I-P-O) model, where the input included reported home numeracy activities, the process involved observation and assessment, and the output consisted of learners demonstrated numeracy competencies. A total of 52 participants were involved, comprising 50 parent-respondents and 2 teacher-respondents. Data were collected using two research instruments. First, the Survey Questionnaire for Parents, adapted from LeFevre et al. (2009), captured the frequency and nature of home numeracy engagements across four categories: numeracy skills, number books, games, and application. Second, the Numeracy Skills Checklist, based on the Department of Education's (DepEd, 2018) Kindergarten Curriculum Guide, assessed learners' performance in three domains: Number Sense, Identifying Attributes, and Thinking Skills. Teachers administered this tool through structured observation. Responses from the questionnaire were quantified using descriptive statistics such as frequency, percentage, and weighted mean. To determine the strength and direction of the relationship between the two variables, the Pearson Product-Moment Correlation Coefficient was applied, with a significance level set at 0.05. This mixed data approach ensured a reliable and objective evaluation of the influence of home learning environments on preschool mathematical development.

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4. Results

Table 1. Level of exposure of their child on the home numeracy experiences in terms of numeracy skills.

S/N	Indicators	WM	SD	Verbal Description
1	Counting objects	3.44	0.92	Very High
2	Sort things by size, color or shape	3.04	1.23	High
3	Counted down (10, 9, 8, 7 ...)	3.10	1.15	High
4	Printing numbers	2.41	1.36	Low
5	Identifying names of written numbers	3.25	0.99	Very High
	Aggregate Weighted Mean	3.05		
	Aggregate Standard Deviation			High
			1.13	

Table 1 presented the level of exposure of preschool children to home numeracy experiences in terms of numeracy skills, as reported by the parent-respondents. Among the five indicators, “counting objects” obtained the highest weighted mean of 3.44 with a standard deviation of 0.92, interpreted as Very High. This indicated that parents frequently engaged their children in counting tangible items as part of their home routines. Similarly, “identifying names of written numbers” also yielded a Very High level of exposure, with a weighted mean of 3.25. The indicators “counting down (10, 9, 8...)” and “sorting things by size, color, or shape” were rated High, with weighted means of 3.10 and 3.04, respectively. These findings suggest that parents often guided children in engaging with number sequences and classification tasks during play or daily activities. However, “printing numbers” was rated Low, having a weighted mean of 2.41 and a relatively high standard deviation of 1.36, indicating less consistent practice across households. The data revealed that numeracy skill development at home was primarily focused on oral and visual learning activities that could be naturally integrated into daily interactions, such as sorting toys, counting snacks, or reading number symbols aloud. These practices may have been easier for parents to model or facilitate, especially for those with limited teaching experience or time constraints. On the other hand, writing numbers required more structured time, supervision, and materials, which could explain its lower frequency. Additionally, some parents may have viewed writing as a task reserved for school instruction rather than home-based reinforcement. This variation in activity types implied that although children were regularly engaged in foundational math tasks at home, their exposure to fine motor-based numeracy tasks such as printing numbers was less emphasized. This has implications for the development of symbolic representation skills and early written numeracy fluency, both of which are essential in formal schooling. The findings underscored the importance of balanced numeracy engagement, where oral, visual, and written number tasks are all practiced to support holistic mathematical development. The researcher observed that while parents made conscious efforts to expose their children to counting and number recognition, there was a tendency to deprioritize writing tasks, possibly due to limited resources, confidence, or time. These insights highlight the need for awareness-raising and capacity-building initiatives that empower parents to support numeracy learning more comprehensively, particularly in developing their child’s writing and symbol formation skills at an early age.

Table 2. Level of exposure of their child on the home numeracy experiences in terms of number books.

S/N	Indicators	WM	SD	Verbal Description
6	Connect-the-dot” activities	2.33	1.35	Low
7	Using number activity books	2.48	1.24	Low
8	Reading number storybooks	2.27	1.33	Low
	Aggregate Weighted Mean	2.36		
	Aggregate Standard Deviation			Low
			1.31	

Table 2 presented the level of exposure of preschool children to home numeracy experiences in terms of number books. This component included three indicators: “connect-the-dot activities” with a weighted mean of 2.33 and a standard deviation of 1.35, “using number activity books” with a weighted mean of 2.48 and a standard deviation of 1.24, and “reading number storybooks”, which received the lowest mean of 2.27 with a

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standard deviation of 1.33. All three indicators were interpreted as Low based on the scale used. The aggregate weighted mean for this component was 2.36, with an aggregate standard deviation of 1.31, indicating that, on average, children were only occasionally exposed to printed number-related materials at home. These findings suggested that although parents may recognize the importance of print-based learning tools, the actual frequency of engaging children with number books remained limited. Several factors may have contributed to this result. First, access to educational resources such as activity books and number-themed storybooks may be limited for some families due to financial constraints or lack of availability. Second, parents may prioritize oral and hands-on numeracy experiences, perceiving them as more practical or easier to facilitate. Additionally, reading number- related books may require more time, literacy proficiency, and intentionality from parents, especially if the books are in English or contain abstract concepts unfamiliar to the child.

The low level of exposure to number books had notable implications for early numeracy development. Print materials not only reinforce number recognition and counting but also support the integration of literacy and math two core domains in early childhood education. Limited engagement with number books may reduce children's opportunities to develop vocabulary related to mathematical concepts, recognize numerical symbols in context, and make connections between text and quantity. This gap may affect how well children transition into more formal math instruction in preschool or kindergarten settings. The researcher observed that while some parents likely attempted to use printed numeracy materials, the practice was inconsistent and generally infrequent across households. This pattern highlighted the need to encourage families to integrate number books into their daily routines, promote shared reading experiences that include math content, and provide accessible resources whether physical or digital that support early numeracy through literacy-based strategies. Strengthening this component of home numeracy practice could enhance children's engagement with numbers in both narrative and structured learning formats.

Table 3. Level of exposure of their child on the home numeracy experiences in terms of games

S/N	Indicators	WM	SD	Verbal Description
9	Playing card games	1.65	1.37	Very Low
10	Making collections	1.92	1.35	Low
11	Playing board games with die or spinner	1.40	1.30	Very Low
12	Being timed	2.52	1.38	High
	Aggregate Weighted Mean	1.87		
	Aggregate Standard Deviation			Low
			1.35	

Table 3 presented the level of exposure of preschool children to home numeracy experiences in terms of games. Among the four indicators, only "being timed" received a high rating, with a weighted mean of 2.52 and a standard deviation of 1.38. The other indicators were rated significantly lower: "making collections" had a weighted mean of 1.92 (Low), while "playing card games" and "playing board games with die or spinner" were rated Very Low, with weighted means of 1.65 and 1.40, respectively. The aggregate weighted mean for this component was 1.87, interpreted as Low, indicating that preschool children were not regularly exposed to numeracy-rich play activities at home.

The results suggested that while some parents may have occasionally involved their children in activities that included timing (such as races or timed tasks), most of the other game-based numeracy engagements were infrequent. One possible explanation is that many parents might not recognize the mathematical value embedded in everyday games. Traditional card and board games, although simple, require counting, sequencing, and number recognition skills foundational to numeracy development. The low engagement with such activities might also stem from the absence of these materials at home, limited time for play due to parental workload, or a general preference for digital entertainment over physical games. This low level of exposure had important implications for children's holistic mathematical development. Game-based numeracy activities are widely recognized in early childhood education for their capacity to support a broad range of cognitive and socio-emotional skills. These games not only encourage cognitive flexibility, such as shifting between tasks or adjusting strategies, but also foster executive functions like working memory and attention control. In particular, games that involve counting, number sequencing, dice rolling, or collecting

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items introduce fundamental math concepts in ways that are developmentally appropriate, highly engaging, and memorable. In addition to supporting cognitive development, such games cultivate social-emotional learning by reinforcing turn-taking, cooperation, and rule-following skills that are crucial for group learning and peer interactions in formal school settings. Importantly, they also stimulate problem-solving abilities, as children learn to think critically, make predictions, and develop strategies for success. These are foundational behaviors that form the basis for mathematical reasoning and logic in later schooling. A lack of engagement in numeracy-rich play may limit children's opportunities to explore math concepts in real-time, low-pressure environments that encourage experimentation and inquiry. Without frequent exposure to these informal yet powerful learning contexts, children may develop a narrower understanding of numbers as abstract and procedural rather than as tools for play, decision-making, and exploration. Furthermore, playful learning environments are highly effective in promoting positive attitudes toward mathematics. When children experience math as fun, collaborative, and rewarding, they are more likely to develop intrinsic motivation, confidence, and a willingness to persevere through challenging tasks. These early dispositions toward learning math have long-term effects on academic performance and self-efficacy. Therefore, the minimal use of game-based numeracy activities in the home setting could negatively influence not only skill acquisition but also a child's emotional orientation toward the subject. The researcher observed that structured numeracy games were not consistently integrated into home routines, and when they occurred, they were more likely to be spontaneous or incidental (e.g., timing a task) rather than planned learning experiences. This highlighted the need for raising awareness among parents regarding the educational value of simple games and encouraging their integration into family activities. Supporting parents with ideas for low-cost or no-cost math games could help increase children's exposure to engaging and enriching numeracy experiences at home.

Table 4. Level of exposure of their child on the home numeracy experiences in terms of application.

S/N	Indicators	WM	SD	Verbal Description
13	Having your child wear a watch	1.78	1.27	Low
14	Measuring ingredients when cooking	1.47	1.41	Very Low
15	Using calendars and dates	2.00	1.41	Low
16	Talking about money when shopping (e.g., "which costs more?")	2.31	1.48	Low
17	Playing with calculators	1.68	1.47	Very Low
	Aggregate Weighted Mean	1.85		
	Aggregate Standard Deviation			Low
			1.41	

Table 4 presented the level of exposure of preschool children to home numeracy experiences in terms of application, which referred to real-life tasks that incorporated mathematical concepts. Among the five indicators, "talking about money when shopping (e.g., 'which costs more?')" received the highest weighted mean of 2.31 with a standard deviation of 1.48, interpreted as Low. This was followed by "using calendars and dates" (WM = 2.00, SD = 1.41), and "having your child wear a watch" (WM = 1.78, SD = 1.27), both of which also fell under the Low category. The indicators "playing with calculators" (WM = 1.68, SD = 1.47) and "measuring ingredients when cooking" (WM = 1.47, SD = 1.41) received the lowest mean scores, both interpreted as Very Low. The aggregate weighted mean for this component was 1.85, indicating an overall Low level of exposure to application-based numeracy activities in the home. These results revealed that most children were seldom engaged in activities that involved applying math concepts to real-world scenarios. One possible explanation is that many parents may not intentionally involve their children in household routines that involve math, such as cooking, budgeting, or time management, assuming that such tasks are either too advanced or unrelated to early learning. Additionally, parents may not be aware that these daily tasks present valuable opportunities to reinforce mathematical thinking in practical, contextualized ways. The low use of tools like calculators or watches could also reflect a lack of familiarity, access, or perceived necessity in the home environment.

This limited exposure had important implications for children's numeracy development. Application-based activities bridge the gap between conceptual understanding and real-life problem-solving, allowing young learners to see how mathematics is embedded in daily living. Activities like measuring ingredients

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support skills in quantity comparison and estimation; using a calendar enhances temporal awareness and sequencing; while talking about prices or comparing amounts introduces basic concepts of value, decision-making, and arithmetic. Without consistent opportunities to engage in such tasks, children may develop mathematical skills in isolation, detached from real-life relevance and utility. This disconnect may hinder their ability to apply math knowledge flexibly across various contexts, which is a key goal of early childhood education. The researcher observed that while parents may support formal or structured numeracy tasks, there was limited intentionality in incorporating math into everyday household routines. This highlighted the need to guide and empower parents to recognize and utilize everyday experiences as valuable teaching moments.

Table 5. Level of numeracy skills of the preschoolers in terms of numbers.

Level	f	%
Advanced	50	96.15
Intermediate	2	3.85
Beginner	0	0.00
Total	52	100.00

The results presented in Table 5 indicate that the vast majority of preschoolers demonstrate a high level of numeracy proficiency in terms of number skills. Specifically, 96.15% (n = 50) of the learners were rated at the Advanced level, suggesting that they consistently exhibited mastery and independence in tasks such as number recognition, counting, and understanding quantity. Only 3.85% (n = 2) of the children were classified as Intermediate, indicating developing proficiency with occasional need for guidance. Notably, no learners fell into the Beginner category, implying that all students showed at least some level of readiness and competency in number-related tasks. This overwhelmingly positive distribution suggests that the preschoolers have a strong foundational understanding of numbers, which is likely influenced by a combination of effective classroom instruction and enriched numeracy exposure at home. The results further support the notion that early and consistent engagement with number concepts whether formal or informal can lead to advanced mathematical development in the preschool years.

Table 6. Level of numeracy skills of the preschoolers in terms of identifying attributes.

Level	f	%
Advanced	52	100.00
Intermediate	0	0.00
Beginner	0	0.00
Total	52	100.00

The findings in Table 6 reveal that 100% (n = 52) of the preschoolers achieved an Advanced level in the domain of identifying attributes. This indicates that all learners consistently demonstrated mastery in recognizing and differentiating characteristics such as size, shape, color, length, and other observable properties. The absence of respondents in both the Intermediate and Beginner levels signifies a uniformly high performance across the entire group. Such results suggest that activities designed to develop attribute recognition an essential component of early mathematical thinking are effectively integrated into the school's curriculum and likely reinforced at home. This outcome also reflects the Montessori approach's emphasis on sensory-based and hands-on learning materials, which naturally support the development of sorting, classifying, and comparing skills. Overall, the data strongly indicates that the learners possess a solid foundation in identifying attributes, a skill that plays a crucial role in more complex mathematical reasoning and problem-solving.

Table 7. Level of numeracy skills of the preschoolers in terms of thinking skills.

Level	f	%
Advanced	51	98.08
Intermediate	1	1.92
Beginner	0	0.00
Total	52	100.00

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The data presented in Table 7 shows that the majority of preschoolers demonstrated highly developed thinking skills within the domain of early numeracy. Specifically, 98.08% (n = 51) of the learners were classified as Advanced, indicating consistent mastery in cognitive tasks such as sequencing, pattern recognition, problem-solving, and logical reasoning. Only 1.92% (n = 1) of the students fell into the Intermediate category, showing developing proficiency and occasional need for guidance. These results suggest that the preschoolers are not only acquiring basic mathematical knowledge but are also able to apply higher-order thinking processes to analyze and solve numeracy-related challenges. The findings may be attributed to both the structured classroom activities aligned with the Montessori method and the reinforcement of problem-solving experiences at home. Overall, the data reflects a strong cognitive readiness among the learners for future mathematical learning.

Table 8. Test of relationship between the home numeracy experiences and the numeracy skills of preschoolers.

Variables	r-value	Strength of Correlation	p - value	Decision	Remarks
Home Numeracy Experiences and The Numeracy Skills	0.088	Negligible Positive	0.535	Do not reject Ho	Not Significant

Note: *significant at p<0.05 (two-tailed).

The results in Table 8 present the outcome of the Pearson Product-Moment Correlation analysis conducted to examine the relationship between home numeracy experiences and the numeracy skills of preschoolers. The computed r-value of 0.088 indicates a negligible positive correlation, suggesting that while there is a slight upward trend between the two variables, the relationship is extremely weak and practically insignificant. Furthermore, the corresponding p-value of 0.535 is well above the significance threshold of 0.05, leading to the decision to not reject the null hypothesis (Ho). This implies that, based on the data collected from the 52 participants, there is no statistically significant relationship between the frequency or type of home numeracy activities and the measured numeracy skills of preschool children in this sample. These findings may suggest that other factors such as classroom instruction, school-based enrichment, or individual cognitive development could be playing a more dominant role in influencing preschoolers' mathematical abilities in this particular setting.

5. Discussion

The findings of this study reveal that despite high levels of numeracy proficiency among the preschoolers particularly in domains such as number recognition, attribute identification, and thinking skills the correlation between home numeracy experiences and numeracy skills was found to be negligible and statistically insignificant. This result diverges from a substantial body of international research which has demonstrated positive relationships between home numeracy practices and children's early math development. For instance, Pan et al. (2022) found that both formal and informal numeracy activities at home significantly predicted children's mathematical abilities, particularly in Chinese preschoolers (Pan et al., 2022). Similarly, longitudinal research by Zhang et al. (2025) showed that home engagement with number books and application-based activities had long-term effects on symbolic and nonsymbolic math skills (Zhang et al., 2025). Therefore, the absence of a significant relationship in the present study may point to contextual differences in instructional quality, school-based interventions, or possibly limitations in how home numeracy was measured or practiced in the local setting.

One plausible explanation for the disconnect observed in this study is that home numeracy practices were not uniformly high across all domains, with particularly low engagement in areas such as number books, game-based numeracy, and real-life application activities. As supported by Dowker (2021), not all numeracy practices are equally impactful; the effectiveness of home numeracy often depends on the complexity, consistency, and intentionality of the activities provided (Dowker, 2021). Furthermore, Mak et al. (2024) emphasized that parental expectations and attitudes mediate the impact of home numeracy on outcomes like spontaneous focusing on numerosity a precursor to abstract mathematical reasoning (Mak et al., 2024). If parents in this study lacked awareness or confidence to implement cognitively challenging or structured math tasks at home, the quality of home numeracy engagement may not have been sufficient to produce measurable

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effects on school performance. Hence, the results highlight the need for parent education and targeted interventions to strengthen the depth and consistency of home numeracy practices, especially in integrating math learning into everyday routines.

6. Conclusion

The study concluded that preschool learners demonstrated strong foundational numeracy skills particularly in number recognition, attribute identification, and thinking skills indicating that they had achieved key developmental milestones in early mathematics. However, parent-reported data revealed generally low exposure to diverse home numeracy experiences, especially in areas involving number books, games, and real-life applications. While basic tasks like counting and sorting were commonly practiced, more engaging and experiential activities were less frequent. Despite these home practices, no significant relationship was found between their frequency and the children's numeracy performance, suggesting that factors such as high-quality classroom instruction, the structured Montessori environment, and learner readiness may have had a more pronounced influence. Overall, the study highlighted that while home numeracy engagement holds potential, its impact depends on meaningful implementation and alignment with school-based learning, underscoring the need for stronger home-school collaboration in supporting early mathematical development.

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International Journal of Educational Studies
Vol. 8, No. 6, pp. 17-25
2025
DOI: *10.53935/2641-533x.v8i6.528*

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