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Home Numeracy and Preschoolers' Math Skills

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Abstract. *This study explored the relationship between home numeracy practices and the development of early math skills of preschool children at Summit Integrated Laboratory Academy Inc. Specifically, it examined how different components of the home numeracy environment—such as engagement with numeracy skills, use of number books, math-related games, and real-life application activities—relate to the children's overall math performance. Data were collected from 40 parent-child pairs using a structured survey and direct skill assessments administered to the children. Descriptive statistical analysis revealed that children demonstrated high exposure to numeracy skills and number book activities but showed low engagement in numeracy-related games and real-life applications. Despite this imbalance in exposure, all children achieved advanced levels of numeracy skills, indicating strong early math development. However, correlation analysis showed no statistically significant relationship between the overall home numeracy experience and children's numeracy performance ($r = 0.073$, $p = 0.656$). These findings suggest that while home-based numeracy experiences contribute to children's learning, they may not be the sole determining factor in early mathematical development. Other elements, such as preschool instruction quality, teacher support, and individual learner characteristics, may also play crucial roles. Given these results, the study recommends initiatives such as parent education and training programs, enhanced home-school partnerships, and further research using qualitative methods to explore the contextual factors that shape home numeracy practices. Understanding these dynamics is essential for developing targeted interventions that support holistic numeracy development in early childhood, particularly in the Philippine educational setting.*

Key words: *Early Numeracy Development, Home Numeracy Experiences, Numeracy Skills, Preschoolers, Formal and Informal Numeracy, Parental Involvement, Descriptive-Correlational Research, Tacloban City, Leyte, Philippines.*

Chapter 1

THE PROBLEM AND ITS SCOPE

INTRODUCTION

Rationale

Early numeracy skills serve as a vital predictor of a child's future academic success, particularly in mathematics and problem-solving. These foundational skills begin to emerge long before formal instruction, often through everyday interactions and play within the home. These skills, which involve understanding and working with numbers, are essential for academic success and navigating daily life. Numeracy extends beyond basic arithmetic operations such as addition, subtraction, multiplication, and division. It encompasses the ability to apply mathematical understanding to solve problems, interpret data, recognize patterns, and make informed decisions in complex social settings

(Department of Education and Skills [DES], 2011). Developing numeracy skills in early childhood is crucial as this period is when children are most receptive to learning. Early math skills are built on children's natural curiosity and exploration, forming a foundation for later academic achievement (Chesloff, 2013; Harris & Petersen, 2019).

Despite the evident importance of numeracy, many learners struggle with mastering basic numeracy skills due to various factors. These include limited exposure to numeracy-focused activities, lack of reinforcement at home, and difficulties in connecting classroom learning with real-world applications. Research indicates that early numeracy skills significantly influence later mathematical proficiency. Growth in mathematical ability during kindergarten predicts math performance in subsequent years, including first and fifth grade (Jordan, Kaplan, Ramineni, & Locuniak, 2009). Additionally, early mathematical development is a stronger predictor of adolescent math achievement than preschool math skills alone (Watts, Duncan, Siegler, & Davis-Kean, 2014). These findings underscore the importance of fostering numeracy skills from the earliest stages of education.

Parental involvement plays a crucial role in children's numeracy development. Home numeracy practices, such as reading number books, counting objects, and engaging in math-related games, contribute significantly to children's numerical understanding (Eason et al., 2020; Hornburg et al., 2021). Studies suggest that children whose parents actively engage them in numeracy-related activities show greater mathematical proficiency (Munro et al., 2021). The home numeracy environment has been identified as a predictor of early numeracy skills (Napoli & Purpura, 2018), highlighting the need for collaborative efforts between schools and families to reinforce learning beyond the classroom.

Children's math proficiency at the start of formal schooling varies significantly. Research by Engel, Claessens, and Finch (2013) found that while 95% of children entering kindergarten master basic math skills such as one-to-one counting and shape recognition, only 58% can count beyond ten, and just 23% can solve simple word problems. More advanced skills, such as performing basic arithmetic operations, are achieved by only 4% of children. These statistics emphasize the urgency of strengthening early numeracy education to prevent future learning gaps. Moreover, international assessments reveal persistent challenges in mathematics education. In the Philippine context, several studies have reported that while preschoolers demonstrate potential in developing number-related skills, there remain notable gaps in their exposure to rich and diverse home numeracy experiences (Tizon & Espiritu, 2021). According to the Southeast Asia Primary Learning Metrics (SEA-PLM) 2019, Filipino learners scored lower than average in mathematics compared to their peers in neighboring countries, highlighting an urgent need to strengthen foundational skills in early childhood. This situation underscores the importance of exploring and enhancing home numeracy environments, especially in private and public early education settings.

Despite existing curricular efforts through the Department of Education's Kindergarten Curriculum Guide, which emphasizes early numeracy, much of the focus remains on formal instruction rather than on how families can reinforce these skills at home. Socioeconomic disparities, parental education levels, and limited access to learning materials further affect how math is introduced and practiced within Filipino households (Villena & Alon, 2020). The Trends in International Mathematics and Science Study (TIMSS) 2019 results indicate that the Philippines scored 297 in mathematics, significantly lower than the 358 recorded in 2003. Comparatively, Singapore led the assessment with a score of 625 (ABS-CBN News, 2020). This decline in performance highlights the necessity of enhancing numeracy education from an early stage.

Given these challenges, this study aims to assess the home numeracy experiences of preschoolers and their impact on numeracy development. Early exposure to mathematics literacy is critical for fostering strong mathematical foundations (National Association for the Education of Young Children [NAEYC], 2020). Teachers have observed that many learners exhibit poor numeracy skills, struggling with basic counting, arithmetic operations, and pattern recognition. Research has consistently shown that variations in children's numeracy skills are influenced by parental engagement and home learning environments (Clerkin & Gilligan, 2018; Fazio et al., 2014; Segers et al., 2015; Siegler, 2016;

Susperreguy et al., 2020). Parent–child activities involving basic arithmetic concepts have been linked to improved academic performance (Munro et al., 2021).

The primary objective of this research is to examine the relationship between preschoolers' home numeracy experiences and their numeracy skill development. By analyzing these factors, the study aims to propose an intervention plan to enhance numeracy learning both at home and in the classroom. The findings will be valuable to educators, parents, and policymakers in designing effective strategies to support early numeracy development. Ultimately, this research aspires to contribute to improved student performance in mathematics, ensuring that learners are well-equipped for future academic and real-world challenges.

Theoretical Background

This study is anchored on the following theories: Lev Vygotsky's Zone of Proximal Development (ZPD), Jean Piaget's Cognitive Development Theory, and The Home Numeracy Model (HNM) (LeFevre et al., 2010). This study is also supported by some legal bases such as; (DO) 12, s. 2015 "Guidelines on the Early Language, Literacy, and Numeracy Program: Professional Development Component.", (DO) 55, s. 2016 "Policy Guidelines on the National Assessment of Student Learning for the K to 12 Basic Education Program" and REPUBLIC ACT NO. 10533 "Enhancing the Philippine basic education system by strengthening its curriculum and increasing the number of years for basic education, appropriating funds therefore and for other purposes." Early childhood numeracy education has garnered significant attention in educational research as it lays the foundation for future mathematical success, problem-solving skills, and critical thinking skills that help children understand and interact with the world around them. This literature review critically examines the existing body of research that uses different theories to enhance the influence of home numeracy experiences on the numeracy skills of the preschoolers.

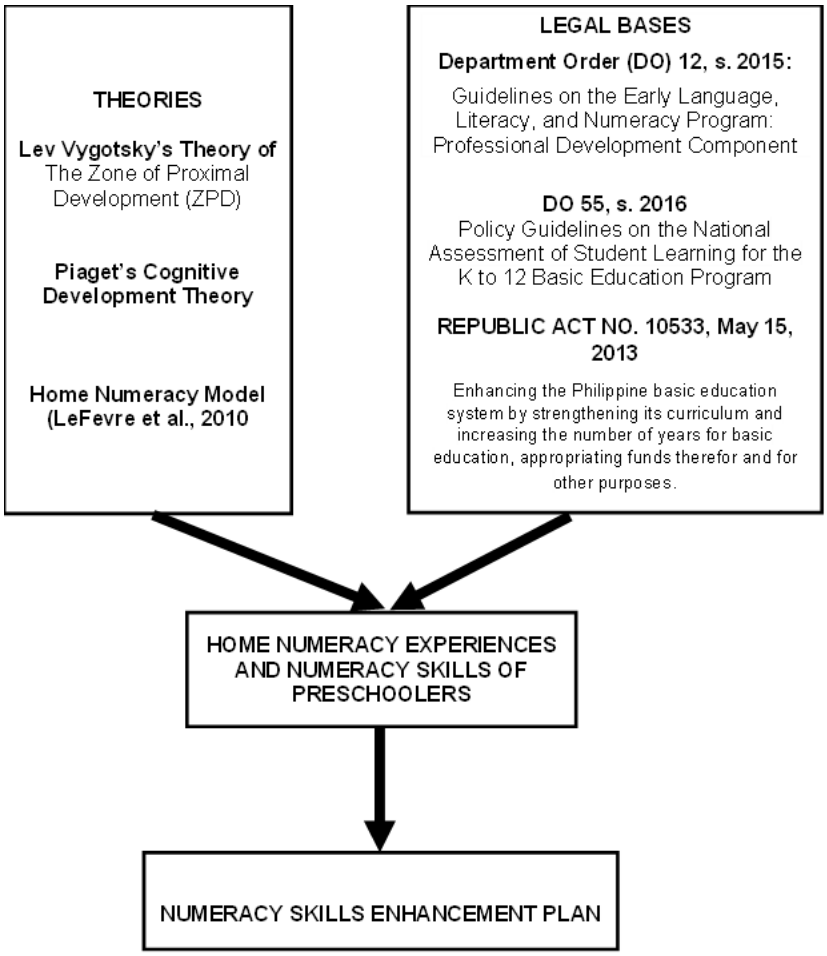

Figure 1.

Theoretical/Conceptual Framework

Lev Vygotsky's theory of Zone of Proximal Development (ZPD) is a theory that emphasizes the role of social interaction and cultural tools in participation and learning. It suggests that children learn numeracy skills through guided scaffolding from parents and caregivers. In an early childhood education setting, the **Zone of Proximal Development (ZPD)** is essential in fostering numerical skills at home by emphasizing guided learning through caregiver support. Parents and educators can scaffold children's mathematical development by engaging them in meaningful, everyday numerical activities, such as counting toys, sorting objects, measuring while cooking, or recognizing numbers in books and games. By providing appropriate assistance—like modeling counting strategies, asking guiding questions, or encouraging problem-solving—adults help children progress from basic number recognition to more complex skills like addition and subtraction. Play-based activities, such as board games or puzzles,also offer structured yet enjoyable opportunities for numerical learning within the ZPD. As children gain confidence, caregivers gradually reduce their support, fostering independent problem-solving and a deeper understanding of numerical concepts. This guided, interactive approach ensures that home learning complements early childhood education, reinforcing foundational math skills in a natural and engaging way. Furthermore, in early childhood numeracy, Lev Vygotsky's Zone of Proximal Development (ZPD) highlights the space between what a child can do independently and what they can achieve with guidance, emphasizing that learning occurs most effectively within this zone of potential development. Furthermore, the Zone of Proximal Development (ZPD) highlights the importance of parents providing appropriate support to help children develop mathematical understanding.

Jean Piaget's cognitive development theory which posits that children progress through distinct stages of cognitive development is crucial for understanding early childhood numeracy skills, emphasizing the importance of developmentally appropriate learning experiences. His theory, particularly the preoperational stage (ages 2-7), highlights key cognitive processes that influence early mathematical understanding.

Piaget's Cognitive Theory also serves as a cornerstone for understanding children's cognitive growth and the acquisition of mathematical concepts during their formative years. Additionally, Piaget posited that children progress through distinct stages of cognitive development, including the sensorimotor, preoperational, concrete operational, and formal operational stages, each characterized by specific cognitive structures and developmental milestones. In the context of numeracy education, Piaget's theory highlights the importance of providing developmentally appropriate learning experiences that align with children's cognitive abilities at each stage of their development. By understanding the cognitive processes involved in assimilation and accommodation, educators can tailor instructional strategies to promote meaningful and lasting learning outcomes in numeracy education.

The Home Numeracy Model (HNM) (LeFevre et al., 2010) is a conceptual framework that links the home numeracy environment (HNE) to children's numeracy skills, suggesting that both formal and informal numeracy activities at home can influence a child's mathematical development. This theory highlights that the frequency and quality of numeracy experiences at home, emphasizing also the role of parents and caregivers directly influence preschoolers' numerical abilities.

This model suggests that children's early mathematical development is not solely dependent on formal education but also on the numeracy experiences they receive at home. Additionally, this model refers to the frequency, quality, and nature of numeracy-related activities in the home, plays a crucial role in supporting early mathematical learning. According to the HNM, formal numeracy activities—such as practicing counting, solving arithmetic problems, and engaging in structured number games—have a direct impact on children's numeracy knowledge. These activities provide explicit instruction and structured learning experiences that contribute to early numerical understanding. In contrast, informal numeracy experiences, such as discussing prices while shopping, measuring ingredients while cooking, or talking about time and distances in daily life, support mathematical thinking in a more indirect manner, helping children develop an intuitive sense of numbers and quantitative relationships. Furthermore, a home numeracy environment in early childhood education is crucial

because it lays the foundation for future mathematical success, enhances problem-solving skills, and promotes a positive attitude towards math.

Legal Basis

This is to determine the relevance of the study to the government thrust. The major sources of related legal bases are laws and department directives such as circulars, orders, memoranda, etc. These laws and department directives serve as the legal basis for the paradigm of the study. In presenting the legal bases, the researchers have to arrange the chronologically from recent to past and the relevance of each legal basis is explained. No explanation of the legal basis relevant to the present study is unscientific.

In addition to the theoretical framework, legal basis such as Department Order (DO) 12, s. 2015: Guidelines on the Early Language, Literacy, and Numeracy Program: Professional Development Component -- aims to improve reading and numeracy skills of Kindergarten to Grade 3 students through a sustainable and cost-effective professional development system for teachers.

(DO) 12, s. 2015 aims to help children be successful in learning to read, write, and count as these skills are essential in school and later in life. One of the best predictors of school success is the level of a child's progress in these foundational skills. Although reading, writing, and number abilities increase as children grow, the early childhood years, from birth to age eight, comprise the most important period for language, literacy, and numeracy development. The ability to read, write, and count does not develop naturally, or without careful planning and instruction. The components of the early language, literacy, and numeracy program are the establishment of baseline data, pupil's profile, language used by learners, existing and functional reading and numeracy program, and support mechanisms at the ground level, materials development, development of classroom-based (formative) assessment protocol for literacy and numeracy skills, and professional development of teachers and school heads. These guidelines shall cover the professional development component of the program.

The next legal basis is the DO 55, s. 2016 Policy Guidelines on the National Assessment of Student Learning for the K to 12 Basic Education Program outlines the framework for assessing student learning within the K to 12 system, including assessment types, test development, and accommodations for learners with special needs. It introduces different national assessments at key stages of learning: the **Early Language, Literacy, and Numeracy Assessment (ELLNA)** for Grade 3, the **National Achievement Test (NAT)** for Grades 6, 10, and 12, and **Exit Assessments** for Senior High School (SHS) graduates to determine their readiness for higher education, employment, or entrepreneurship. The policy also includes the **Accreditation and Equivalency (A&E) Test** for out-of-school youth and adult learners seeking formal education equivalency. These assessments measure knowledge, 21st-century skills, and real-world learning applications using standardized tests in both paper-based and digital formats. Furthermore, the results serve as a basis for tracking student progress, evaluating teacher and school performance, and informing curriculum and policy improvements. By ensuring a structured and data-driven approach to assessment, this policy aims to enhance the quality of education in the Philippines, making learning more relevant and responsive to national and global demands.

The last legal basis is the Republic Act No. 10533, also known as the Enhanced Basic Education Act of 2013, which aims to strengthen the Philippine basic education system by increasing the number of years to 12 (K-12), including kindergarten, six years of elementary, four years of junior high, and two years of senior high school. Republic Act No. 10533 (Enhanced Basic Education Act of 2013) directly supports the development of numeracy skills by strengthening mathematics education across all grade levels in the K to 12 curriculum. It emphasizes a spiral progression approach, where mathematical concepts are introduced early and developed progressively from basic to complex levels. This ensures that students build a strong foundation in numeracy, problem-solving, and critical thinking skills necessary for real-life applications.

Additionally, the law promotes contextualized and integrative learning, meaning that numeracy is taught in ways that connect to real-world situations, making it more relevant and meaningful for students. The use of the mother tongue as the medium of instruction in early grades (Kindergarten to

Grade 3) also enhances numeracy comprehension by allowing learners to grasp mathematical concepts in their first language before transitioning to English. Furthermore, Senior High School (SHS) introduces specialized tracks, including the Science, Technology, Engineering, and Mathematics (STEM) track, which deepens students' mathematical and analytical skills. Through these provisions, RA 10533 ensures that Filipino students are numerically literate and prepared for higher education, employment, and lifelong learning.

Numeracy skills in early childhood serve as the foundation for later academic success in mathematics. According to Aunio & Räsänen (2016) and Torbeyns, et al. (2015), early number skills refer to basic numerical abilities that children develop through formal and informal experiences. Formal experiences include structured teaching, such as counting exercises and number identification, while informal experiences involve real-life applications, such as measuring ingredients while cooking or playing board games with numbers. Studies further indicate that formal numeracy experiences predict symbolic arithmetic skills, whereas informal experiences relate to non-symbolic arithmetic (Soto-Calvo et al., 2019). Additionally, LeFevre et al. (2010) found that both formal and informal numerical activities significantly influence preschoolers' mathematical development.

Research indicates that children's early numeracy skills are significantly influenced by their home numeracy environment, which includes activities such as playing number-related games, counting objects, and engaging in discussions about numbers (Skwarchuk, Sowinski, & LeFevre, 2014). Thus, parental attitudes toward numeracy are also crucial, as positive attitudes enhance children's engagement and proficiency in numeracy tasks. This aligns with Vygotsky's Zone of Proximal Development (ZPD), which suggests that children acquire numeracy skills through guided participation and scaffolding provided by parents and caregivers.

Building on previous research, Skwarchuk et al. (2014) introduced the Home Numeracy Model, which differentiates between formal and informal home numeracy activities. Formal home numeracy activities, such as teaching children simple sums, printing numbers, and engaging in mental math, are linked to early symbolic knowledge. This includes counting, ordinal knowledge, and digit naming. Informal home numeracy activities, such as exposure to number games, were associated with non-symbolic math skills, such as object addition. Parents play a key role in their children's cognitive and academic development by fostering a home numeracy environment (HNE) that supports early numeracy skills (Kleemans et al. 2012; Skwarchuk et al. 2014).

While home numeracy activities positively contribute to children's numeracy outcomes, differences arise based on activity type, children's age, and targeted numeracy skills (Dunst et al., 2017; Thompson et al. 2017). Formal numeracy experiences involve a didactic focus, where parents intentionally select activities to teach specific mathematical skills, such as mental addition or numeral recognition (LeFevre et al. 2009). Parents' reports of formal numeracy activities have been associated with preschoolers' general numeracy outcomes (Thompson et al. 2017; Zippert & Ramani, 2017) and counting skills (Manolitsis et al., 2013). For kindergarteners, formal activities are linked to applied problem-solving skills (del Río, Susperreguy, Strasser, & Salinas, 2017), symbolic number knowledge (Skwarchuk et al., 2014), and arithmetic fluency in early elementary years (LeFevre et al., 2009). The complexity of formal numeracy activities also influences learning outcomes, with advanced activities, such as mental math and solving simple sums, showing stronger associations with numeracy skills (Skwarchuk et al., 2014).

In contrast, informal numeracy activities involve incidental learning of numerical or mathematical concepts. Examples include playing board games with numerical elements, engaging in card games, or cooking activities that involve measurement and estimation. While these activities provide opportunities for children to develop numeracy skills, learning mathematics is not their primary focus (Skwarchuk et al., 2014; Sonnenschein et al., 2012).

However, the distinction between informal and formal home numeracy activities has been debated due to challenges in establishing construct validity. Additionally, both types of activities have been found to predict similar math skills, raising concerns regarding their predictive validity in relation to later math performance (Elliott & Bachman, 2018; Huntsinger et al. 2016; LeFevre et al., 2009;

Susperreguy et al., 2020). Some researchers have chosen to combine formal and informal home numeracy activities into an overall score or focus on a single category (Elliott & Bachman, 2018). Nonetheless, Susperreguy et al. (2020) found that both types of home numeracy activities uniquely predicted children's performance, suggesting that they should be examined separately. Despite these debates, parents are encouraged to integrate both formal and informal numeracy activities, as they collectively contribute to children's long-term mathematical development Susperreguy et al. (2020).

In conclusion, the integration of theoretical frameworks, empirical studies, and existing models provides a comprehensive understanding of home numeracy experiences and preschoolers' numeracy skills. By establishing connections between these elements, this research aims to explore the significant relationship between home numeracy experiences and numeracy skills, contributing to the development of strategies for enhancing early mathematical learning.

THE PROBLEM

Statement of the Problem

This research assessed the influence of home numeracy experiences on the numeracy skills of the preschoolers at **Summit Integrated Laboratory Academy Inc.** in Tacloban City, Leyte for school year 2024-2025 as basis for a proposed numeracy skills enhancement plan.

Specifically, it sought answers to the following queries:

1. As reported by the parent-respondents, what is the level of exposure of their child on the home numeracy experiences in terms of:

1. numeracy skills,
2. number books,
3. games, and
4. application?

2. What is the level of numeracy skills of the preschoolers in terms of:

1. numbers,
2. identifying attributes,
3. thinking skills?

3. Is there a significant relationship between the home numeracy experiences and the numeracy skills of preschoolers?
4. Based on the findings, what numeracy skills enhancement plan can be crafted?

Statement of the Null Hypotheses

Based on the objectives of the study, the following null hypotheses will be tested at 0.05 level of significance:

Ho: There is no significant relationship between the home numeracy experiences and the numeracy skills of preschoolers.

Significance of the Study

DepEd Officials. This study will serve as guide as they shape the policy, professional development, support systems, and advocacy efforts that directly impact programs that emphasize early numeracy development, integrating parental involvement in foundational learning strategies.

School Administrators. They play a significant role in implementing numeracy programs that strengthen home-school partnership, encouraging parents to engage in meaningful numeracy activities with their children. Their leadership, resource allocation decisions, commitment to professional development, and facilitation of collaboration and communication efforts are essential for supporting children’s numeracy skills.

Teachers. They can use insights from the study to tailor their teaching methods to align with the home numeracy experiences of their students, making lessons more relatable and effective. This will also emphasize the importance of teacher-parent collaboration, encouraging educators to guide parents on how to integrate numeracy into daily home activities.

Preschoolers. This study is highly significant for preschoolers as it provides essential insights into how early numeracy experiences at home shape their mathematical development. Understanding this relationship helps ensure that children receive the foundational skills needed for future academic success.

Researchers. The experience of conducting this study will help the researcher grow professionally by acquiring skills required needed to conduct a research study. Moreover, the results of this study will be the contribution of the researcher to early childhood education towards home numeracy experiences of preschoolers to which this study is conducted.

Future Researchers. This study will serve as the basis of the study of future researchers who will be dealing with similar studies concentrating on the same variables focused in this study.

RESEARCH METHODOLOGY

This chapter described the design used by the researcher, the profile of the respondent and flow of the study as well as the environment and school where the research is conducted to. It also contains the explanation on how the data will be gathered and what are the instrument used for this study.

Design

This research study utilized descriptive correlation design which, defined by authors like McBurney & White (2009) and Curtis et al. (2016), seeks to describe relationships between variables without attempting to manipulate or infer causal relationships.

The primary goal is to describe and quantify the relationships that exist between two or more variables within a population. Unlike experimental designs, descriptive-correlational research does not involve manipulating or controlling any variables.

Researchers observe and measure naturally occurring relationships between variables. The focus is on identifying the strength and direction of the association between variables, not on establishing cause-and-effect relationships.

It determined the numeracy skills of the kindergarten pupils in Summit Integrated Learning Academy Inc. for school year 2024-2025.

Flow of the Study

The study followed an Input-Process-Output (IPO) system model in gathering the essential data needed in the study. Figure2 illustrated the process of the data gathering.

The first stage determined the input of the study, such as the profile and the numeracy skill of the kindergarten pupil in Summit Integrated Learning Academy Inc. for school year 2024-2025.

The second stage is the process of the study. It incorporated the following tasks: the researcher transmitted the necessary documentation before the data gathering, including the letter allowing the study's conduct and the respondents' consent form. Having approved, the researcher distributed the questionnaire to the respondents to ensure that all parts of the questionnaire will be completed. The researcher then tallied, organized, summarized, interpreted, and analyzed the data results. Appropriate statistical tools were used in the treatment of data.

The last stage was the formulation of the output of the study. The researcher came up with an intervention plan that addresses the needs of the kindergarten students in enhancing their numeracy skills.

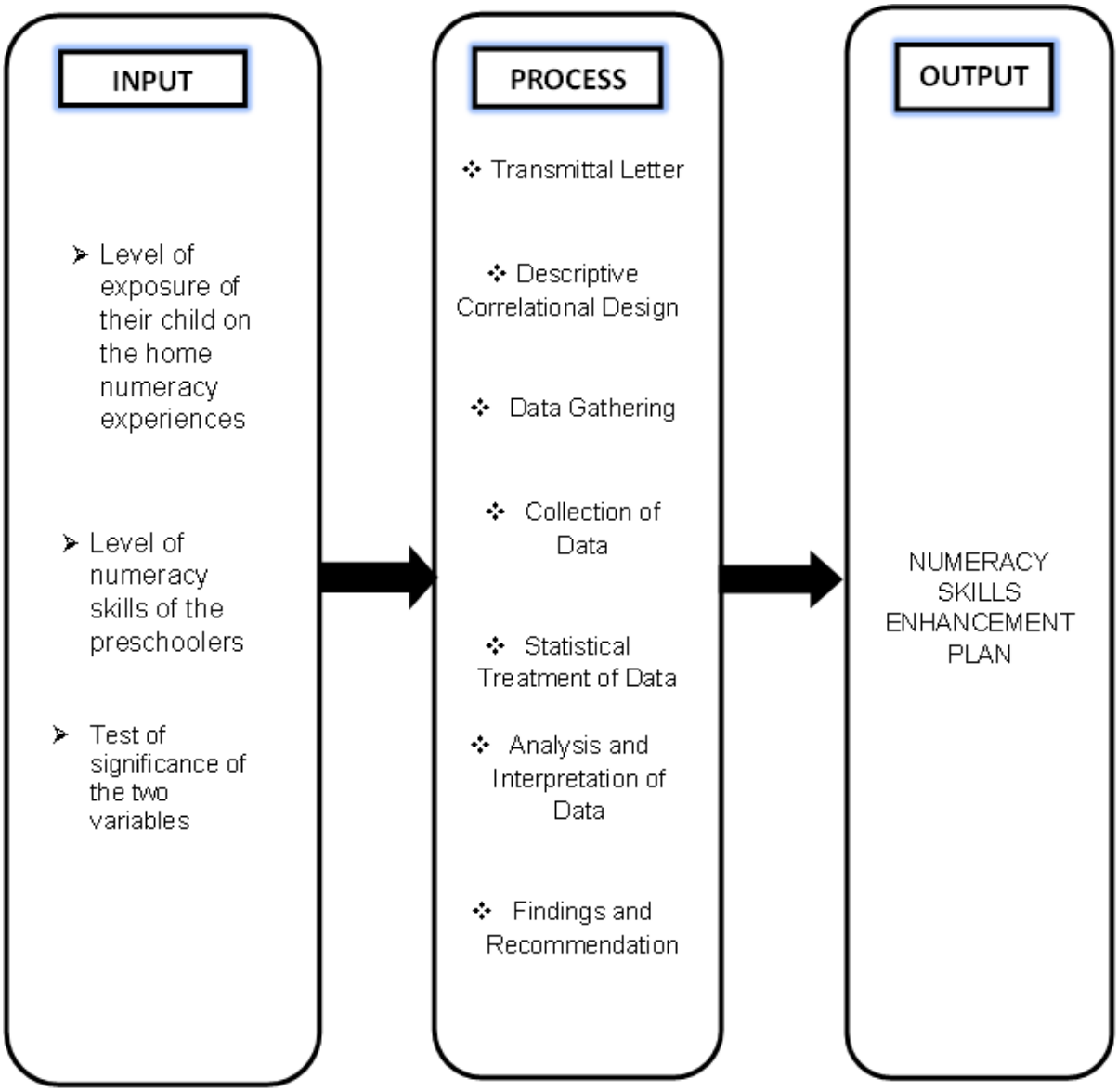

Figure 2.

Flow of the Study

Environment

The study was conducted at Summit Integrated Laboratory Academy Inc. (SILAI), a progressive and inclusive private educational institution situated in Fatima Village, Tacloban City, Leyte, specifically located at 6274+59V. Established in 2018, SILAI has swiftly established a reputation for providing quality and child-centered education in the region. The school caters to learners from the toddler level up to Grade 6, making it a full-service early childhood and elementary institution.

One of the defining characteristics of SILAI is its commitment to inclusive education. As an inclusive school, SILAI opens its doors to children with diverse learning needs, including those with special educational needs (SEN). This philosophy of inclusivity is embedded in the school's policies, instructional design, and classroom management practices, ensuring that every child receives the necessary support to thrive academically, socially, and emotionally.

The institution has a dedicated teaching force composed of 18 professional teachers, each equipped with the competencies to facilitate developmentally appropriate, differentiated, and inclusive instruction. These educators are trained to recognize individual learner differences and are committed to fostering a nurturing and supportive learning environment.

SILAI is also known for maintaining a safe, structured, and engaging learning environment, with classrooms designed to be stimulating, accessible, and adaptable to both typical learners and those

with additional needs. The school adopts modern teaching methodologies, including inquiry-based and play-based learning, which are aligned with the current best practices in early childhood and elementary education.

Figure 3

Location Map of the Research Environment

Its location within a peaceful residential community in Fatima Village also contributes to the conducive learning atmosphere, away from the distractions and noise of busy urban settings. This environment allows children to learn in a calm and secure setting, supported by a collaborative school community that includes administrators, teachers, parents, and external support providers.

Overall, Summit Integrated Laboratory Academy Inc. presents a rich and dynamic educational environment that values academic excellence, inclusivity, innovation, and holistic child development—making it an ideal setting for educational research focused on young learners and inclusive practices.

Respondents

The respondents for this research were the kindergarten students of Summit Integrated Laboratory Academy Inc. The distribution of the respondents in this study is presented in Table 1 below.

Table 1. Distribution of the Respondents

Name of Schools	N	Percentage
Summit International Learning Academy Inc.	40	100.00
Total	**40**	**100**

Table 1 showed the number of respondents surveyed for the study. There were 40 students in SILAI total enumeration of respondents was used.

Instrument Description

This study made use of a survey questionnaire to gather the needed information in the study.

The instrument is composed of two parts. Part one is a set of questions that determined the profile of the respondents as to their name, age, and gender. Part two consists of statements describing activities of the parents and the child that helps him/her develop him/her numeracy skills. Respondents were asked to select one of the five options for each statement, utilizing a 5-point Likert Scale to indicate the level of occurrence. The questionnaire was on a five (5) – point scale: 4-Almost Daily, 3- Few Times a Week, 2-Once a Week, 1-Less than a Week but a few times a month, and 0-Did not Occur. All collected data were strictly compiled with the provisions of the Data Privacy Act, guaranteeing the utmost confidentiality of gathered information.

Data Gathering Procedure

Preliminary Stage. The researcher sent a letter to the Office of the Principal, Subject Area Coordinator, and the parents of the pupils to ask permission to conduct the study. Upon receipt of approval, the researcher arranged the schedule to meet the respondents and personally administered the survey.

Data Gathering Stage. On the scheduled day, the researcher facilitated an orientation regarding the research. Salient issues like the purpose of the study, its procedure, and how the confidentiality of the respondents was protected will be discussed. Administration of the survey questionnaires followed right after the orientation. Instructions were given on how to answer the survey questionnaires. Assistance was also provided while the respondents were answering the survey questionnaires, and enough time was given to answer the said questionnaires. Retrieval of the questionnaires followed.

Post Data Gathering Stage. The researcher tallied, organized, summarized, interpreted, and analyzed the results. Appropriate statistical tools were used in the treatment of data. An intervention plan was proposed to address the needs of the preschool students studying at Summit International Learning Academy Inc.

Statistical Treatment of the Data

After data collection, the data gathered underwent different statistical treatments with the aid of the statistician. To arrive at reliable results, the following statistical tools were used:

Frequency Count. This tool was used to determine the number of preschoolers who belong to a certain numeracy level.

Percentage. This tool was used to determine the proportion of the learners who fall into a specific category in the numeracy skills in relation to the total number of respondents.

Weighted Mean. This tool was used to determine the level of exposure of their child on the home numeracy experiences…

Pearson Product-Moment Correlation Coefficient (PPMCC). This statistical tool was used to test the significance of the relationship between the home numeracy experiences and the numeracy skills of the preschoolers.

Scoring Procedure

Data that were collected through survey questionnaires were calculated and interpreted according to the following procedures:

To determine the respondents' **home numeracy experiences** the following numerical and descriptive ratings were used:

Scale	Numerical Rating	Descriptive Rating	Verbal Interpretation
4	3.21-4.00	Highly Exposed	The preschoolers consistently engage with numbers and math concepts at home. They frequently count objects, recognize patterns, and participate in number-related activities with enthusiasm and understanding.
3	2.41-3.20	Exposed	The preschoolers have regular opportunities to interact with numbers and math concepts at home. They show a developing understanding of counting, basic shapes, and simple measurement through everyday activities.
2	1.61-2.40	Moderately Exposed	The preschoolers have some exposure to numbers and math concepts at home, but may not consistently engage in related activities. They may require more focused encouragement and support to develop their numeracy skills.
1	0.81-1.60	Less Exposed	The preschoolers have limited opportunities to interact with numbers and math concepts at home. They may need more exposure to counting, sorting, and other foundational numeracy activities to build their understanding.
0	0.00-0.80	Not Exposed	These preschoolers have minimal to no interaction with numbers or math concepts in their home environment. They will require a focused introduction to basic numeracy skills and concepts to begin building a foundation.

DEFINITION OF TERMS

To provide clarity on the terms used in this study, the following terms are operationally defined:

Application. This refers to the practical use of the developed numeracy skills enhancement plan by teachers in their classroom instruction.

Development. This refers to the process of designing and creating the numeracy skills enhancement plan, including the selection of activities, resources, and evaluation methods.

Games. This refers to the educational digital or physical games used as tools to reinforce and practice numeracy concepts, specifically those incorporated into the numeracy activities.

Home Numeracy Experiences. This refers to the frequency and type of numeracy-related activities that children engage in at home, as reported by parents or guardians, and how these activities support their numeracy development**.**

Number Books. This refers to the children's literature with a focus on numerical concepts, counting, and mathematical problem-solving, used as a resource in numeracy activities.

Numeracy Skills. This refers to a child's demonstrated ability to understand and apply numerical concepts, including counting, comparing quantities, basic arithmetic operations, and problem-solving involving numbers, as measured by a standardized numeracy assessment.

Numeracy Skills Enhancement Plan. This refers to a structured set of activities, resources, and assessment tools designed to improve children's numeracy skills within a specific timeframe, as developed within this research.

Numeracy Activities. This refers to the specific, planned tasks or exercises designed to promote the development of numeracy skills, including but not limited to counting, sorting, measuring, and problem-solving, as implemented within the study.

Teacher's Performance. This refers to the teacher's ability to effectively implement the numeracy skills enhancement plan, as measured by observations, self-reports, and student numeracy gains.

Chapter 2

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

This chapter presented the data gathered from the respondents, followed by a thorough analysis and interpretation in relation to the research objectives. The main focus of this chapter is to examine the level of exposure of children to home numeracy experiences, particularly in the development of foundational numeracy skills.

Level of Exposure to Home Numeracy Experiences

The early home environment significantly influences a child's mathematical development. Through daily routines and informal interactions, parents provide essential opportunities for young children to engage with numeracy concepts such as counting, sorting, and recognizing numbers. These early experiences form the foundation of school readiness and are linked to later academic achievement in mathematics (LeFevre et al., 2009; Zippert & Rittle-Johnson, 2020). Understanding the level of exposure to such experiences allows educators and researchers to assess the extent of support children receive at home in developing early numeracy skills. The following section presents data on the frequency of specific numeracy-related activities as reported by parents, highlighting which skills are most and least emphasized within the home setting.

Level of Exposure to Numeracy Skills

This component of the study focused on evaluating the level of exposure of preschool children to basic numeracy skills within the home environment. It explored five key indicators that reflect common, everyday math-related practices: counting objects, sorting items by size, color, or shape, counting down from a number, printing numbers, and identifying the names of written numbers. These foundational activities are considered essential for the development of number sense, early classification and pattern recognition, as well as the ability to associate numerical symbols with their meanings.

Exposure to such numeracy experiences at home plays a vital role in shaping children's early mathematical understanding and readiness for formal schooling. As children engage in these activities, they begin to internalize fundamental concepts necessary for more advanced mathematical

learning. This component is particularly significant to the study, as it directly aligns with the primary objective of examining how the home numeracy environment influences the development of preschoolers' numeracy skills. A higher frequency of engagement in these practices is expected to contribute positively to children's cognitive growth and academic preparedness in mathematics.

Home numeracy experiences are crucial in shaping a child's foundational understanding of mathematics. These everyday interactions—such as counting objects, sorting items, and recognizing numbers—support early mathematical thinking and prepare children for formal schooling (LeFevre et al., 2009; Mutonyi et al., 2023). Table 2 presented the level of children's exposure to selected numeracy-related activities at home, as assessed through weighted means (WM) and standard deviations (SD).

Table 2. **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	3.25	0.71	Very High
2	Sort things by size, color or shape	3.00	0.85	High
3	Counted down (10, 9, 8, 7 ...)	3.15	0.80	High
4	Printing numbers	2.70	0.99	High
5	Identifying names of written numbers	3.05	0.90	High
Aggregate Weighted Mean		**3.03**		**High**
Aggregate Standard Deviation			**0.85**	

Legend:3.25-4.00-Very High; 2.50-3.24-High; 1.75-2.49-Low;1.00-1.74-Very Low

As showed in Table 2, the counting objects is the most practiced numeracy activity at home with 3.25 weighted mean and standard deviation of 0.7, indicated a High level of exposure. This suggests that many preschoolers frequently practice one-to-one correspondence—a critical early math skill supported by home routines such as counting toys or snacks (Sarnecka & Carey, 2008). Other indicators such as counting down**,** identifying numbers, and sorting objects, were also rated High, with weighted means ranging from 3.00 to 3.15. These skills help foster symbolic understanding, classification, and early sequencing (Ginsburg, Lee, & Boyd, 2008).

Printing numbers, though slightly lower (WM = 2.70), still falls within the High category, showing that number writing is present but may require more support or resources at home. Overall, the aggregate weighted mean of 3.03 reflected a High level of exposure, indicating that most children are regularly involved in foundational math activities at home. This supports the findings of Zippert and Rittle-Johnson (2020), who emphasized the importance of daily math interactions in shaping early numeracy development.

The data revealed that children generally received high exposure to numeracy experiences at home, particularly in activities involving counting and sorting**.** According to Sarnecka and Carey (2008), frequent object-counting helps young learners build one-to-one correspondence and understand quantity. The study found that children whose parents frequently engaged them in operational numeracy activities, such as counting objects and learning simple sums, demonstrated better arithmetic performance and growth in number comparison skills by the end of kindergarten. These findings underscore the persistent relations between the HNE and the development of children's mathematical skills (Susperreguy et al. 2020).

However, activities involving written numbers**,** such as printing and identifying written numerals, are slightly less emphasized and show greater variability among households. The study found that these written numeracy activities were less frequently practiced compared to other numeracy activities and showed significant variability across households. This suggests that while some families engage regularly in written numeracy activities, others do so infrequently or not at all, leading to disparities in children's exposure to written numerals (Hart et al. 2021).

Level of Exposure to Number Books

The second component examined the level of exposure of preschool children to number books as an integral aspect of their home numeracy experiences. This component included three indicators: engaging in "connect-the-dot" activities, using number activity books, and reading number-focused storybooks. These activities reflected both structured and narrative-based learning approaches that incorporate numerical concepts into early literacy and play.

Number books served as valuable tools in supporting the development of early mathematical understanding by combining visual, verbal, and tactile modes of learning. Through repeated exposure to such materials, children are given opportunities to recognize number symbols, count in context, and relate quantities to real-world scenarios. This component is vital to the study as it highlights how informal and playful encounters with math-related books at home may contribute to children's conceptual foundations in numeracy and their long-term engagement with mathematical learning.

According to Purpura and Napoli (2015), shared book reading that incorporates mathematical content can significantly enhance children's early numeracy skills and promote positive attitudes toward math. Assessing the extent to which children are exposed to number books at home provides insight into how families integrate numeracy into early literacy practices. The table below presents the level of children's exposure to number books as part of their home numeracy environment.

Table 3. 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	2.60	1.01	High
7	Using number activity books	2.75	1.03	High
8	Reading number storybooks	2.53	1.04	High
Aggregate Weighted Mean		**2.63**		**High**
Aggregate Standard Deviation			**1.03**	

As showed in Table 3, all three indicators under this component received High verbal descriptions, with weighted means ranging from 2.53 to 2.75. The highest rated activity was using number activity books (WM = 2.75), interpreted as High, followed by connect-the-dot activities (WM = 2.60), rated as High, and reading number storybooks (WM = 2.53), interpreted as High. These results indicated that parents or caregivers often provided numeracy-rich reading materials and tasks, supporting symbolic and sequential number learning in enjoyable ways.

According to Purpura, Schmitt, and Ganley (2017), structured number book activities can scaffold early number comprehension by linking numerals with concepts through visual representation and storytelling. Despite some variability in standard deviation—indicating differences in access or frequency—the aggregate weighted mean *of 2.63* suggests that preschoolers have a High level of exposure to number books in the home setting. This supports prior findings that numeracy-related reading interactions are effective predictors of mathematical readiness (Cheung et al., 2021; Zippert & Rittle-Johnson, 2020).

The findings in Table 3 indicated that children experienced a high level of exposure to numeracy-related activities involving number books within the home setting. These typically involve tracing, matching, and problem-solving tasks that are structured to develop early numeracy in a hands-on way. Despite the popularity of this activity, the standard deviation of 1.03 suggests inconsistency in its use across different households. The study found that interactive code-focused home literacy experiences, such as engaging with number books and related activities, had significant longitudinal relationships with the development of counting and number transcoding skills. These relationships were independent of language and nonverbal abilities, highlighting the unique contribution of home numeracy experiences to early mathematical development (Soto-Calvo et al. 2021).

Exposure to numeracy experiences involving number books, including activity books, connect-the-dot exercises, and number storybooks, was also found to be high, though the data showed greater

variability among households in this area. The use of structured materials like number activity books was more common than the use of narrative-based resources like number storybooks.

Level of Exposure to Games

This component focused on the level of exposure of preschool children to numeracy-based games as part of their home numeracy experiences. It included indicators that reflect how often parents engage their children in interactive and playful activities that incorporate mathematical thinking. These games often involve counting, number recognition, matching, and simple problem-solving—all of which foster children's motivation and conceptual understanding of numbers in a low-pressure environment. According to Ramani and Siegler (2008), board games and math-related play serve as effective tools for building number sense and reinforcing numeracy skills in early learners. These types of playful engagements are crucial, as they make math both enjoyable and meaningful, encouraging children to explore numerical concepts through everyday family interactions.

Table 4. 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	1.98	1.12	Low
10	Making collections	2.35	1.10	Low
11	Playing board games with die or spinner	1.76	1.23	Low
12	Being timed	2.33	1.25	Low
Aggregate Weighted Mean		**2.10**		**Low**
Aggregate Standard Deviation			**1.18**	

As showed in Table 4, all four indicators under this component were rated as Low, with weighted means ranging from 1.76 to 2.35. The indicator "making collections" received the highest mean (WM = 2.35), suggesting that some children are exposed to classification or grouping activities. Meanwhile, "playing board games with dice or spinners" received the lowest mean (WM = 1.76), indicating limited engagement in structured number-based play.

These findings highlighted a potential gap in the home numeracy environment: while direct instruction in counting and number recognition is more common, playful, game-based numeracy is less emphasized. According to Ramani and Siegler (2008), such games are not only enjoyable but also effective in developing number line estimation, counting fluency, and strategic thinking in young children. The aggregate weighted mean of 2.10, classified as Low, suggests that many preschoolers may be missing out on the benefits of math learning through games.

The data suggested that numeracy experiences through games are not commonly integrated into children's home learning environments. Despite the known benefits of using games to reinforce mathematical thinking, such as improving counting skills, pattern recognition, and logical reasoning, parents or caregivers may lack awareness**,** access, or confidence to facilitate such activities effectively. According to Zippert and Rittle-Johnson (2020), while parents frequently engage in basic numeracy activities like counting and number recognition, they less often incorporate game-based activities such as board games or card games that involve numerical concepts. This suggests that parents may lack awareness or confidence in using games as tools for numeracy development.

The researcher observed that numeracy-based games are underutilized in many homes as a learning tool. Despite their proven benefits for cognitive and social development, these games are not frequently integrated into preschoolers' daily routines. This may be due to parents' lack of awareness regarding the educational value of play or limitations in time, resources, or game availability.

Level of Exposure to Application

This component examined how frequently preschool children were exposed to real-life applications of numeracy in the home environment. It focused on practical activities such as using calendars, telling time, reading prices or labels, and discussing numbers in daily conversations—experiences that bridge abstract math concepts with concrete, everyday situations. According to Aunio and Niemivirta (2010), applying numeracy in routine contexts helps children internalize mathematical

concepts by making them relevant and functional. Such engagements enhance problem-solving skills and mathematical reasoning, which are essential for success in later academic stages. By integrating math into authentic tasks, children develop a deeper understanding of numbers beyond rote learning, reinforcing the value of numeracy as a life skill.

Table 5. 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	1.79	1.26	Low
14	Measuring ingredients when cooking	1.78	1.25	Low
15	Using calendars and dates	2.05	1.21	Low
16	Talking about money when shopping (e.g., "which costs more?")	2.15	1.29	Low
17	Playing with calculators	1.89	1.13	Low
Aggregate Weighted Mean		**1.94**		**Low**
Aggregate Standard Deviation			**1.23**	

As showed in Table 5, all indicators under the Application component were rated as Low, with weighted means ranging from 1.78 to 2.15. The highest-rated item, talking about money when shopping (WM = 2.15), indicates that some families occasionally incorporate mathematical dialogue in real-life decisions. Conversely, measuring ingredients when cooking (WM = 1.78) and wearing a watch (WM = 1.79) had lower weighted means, pointing to limited opportunities for children to practice time and measurement skills at home. These findings align with the observations of Vandermaas-Peeler et al. (2012), who noted that while parents may recognize the importance of academic skills, they often overlook the value of everyday interactions that support applied numeracy. The aggregate weighted mean of 1.94, classified as Low, suggests a clear gap in how math is applied in daily routines within many households.

The data showed that applied numeracy experiences are underutilized in the home environment. Despite being easily embedded in daily routines (e.g., shopping, cooking, using a calendar), parents may not recognize these moments as opportunities for numeracy development. The consistently low mean scores across all indicators suggest that functional math skills are not being actively developed through day-to-day household activities. This research examined the home math environment and found that while parents frequently engaged in basic numeracy activities like counting and number recognition, they less often incorporated applied numeracy activities such as measuring ingredients during cooking or discussing money while shopping. The study suggests that parents may not recognize everyday situations as opportunities to develop their children's numeracy skills (Zippert and Rittle-Johnson, 2020).

Summary of the Level of Exposure of Kindergarten Pupils to Home Numeracy Experiences

The summary table consolidated the data on the overall level of exposure of preschool children to home numeracy experiences as reported by parent-respondents. It presented the aggregate weighted means and standard deviations for the four main components of the Home Numeracy Survey Questionnaire: numeracy skills, number books, games, and application. Each component reflected a distinct dimension of how mathematics was introduced, practiced, and applied in the home setting. As emphasized by LeFevre et al. (2009), early numeracy development is significantly shaped by the frequency and quality of math-related interactions between caregivers and children. Understanding the level of exposure in each domain is essential for identifying which aspects of home support are well-developed and which require further reinforcement.

Table 6. Summary on the level of exposure of their child on the home numeracy experiences

Components	WM	SD	Verbal Description
Numeracy Skills	3.03	0.85	High
Number Books	2.63	1.03	High
Games	2.10	1.18	Low
Application	1.94	1.23	Low
Grand Mean	**2.43**		**Low**
Grand Standard Deviation		**1.07**	

As showed in Table 6, the highest levels of exposure were recorded in the Numeracy Skills component (WM = 3.03, High), followed by Number Books (WM = 2.63, High). This indicated that parents tend to prioritize foundational numeracy tasks and the use of number-related reading materials. However, exposure significantly declined in the Games (WM = 2.10) and Application (WM = 1.94) components, both rated as Low. These areas represented more interactive and contextual forms of numeracy learning that are less frequently practiced at home.

The grand mean of 2.43, categorized as Low, suggests that while some basic numeracy experiences are being offered, overall exposure remains insufficient. This echoes the findings of Kleemans et al. (2012), who stressed that limited variety in home numeracy practices may hinder the development of higher-order math skills in young learners. Moreover, the relatively high standard deviation (1.07) indicates substantial variability among households in terms of how often and how effectively numeracy experiences are implemented.

Based on the summary results, the researcher observed that preschool children are moderately exposed to home numeracy experiences, with a stronger emphasis on basic skills and materials but limited engagement in applied and play-based numeracy. This imbalance may stem from a lack of parental awareness or confidence in facilitating math through games or real-life activities. While parents recognize the importance of early math skills, they may not consistently embed math in daily routines like cooking, shopping, or timekeeping.

These findings highlighted the need for parent education initiatives that emphasize the role of informal, play-based, and contextualized math exposure. Equipping families with simple strategies to incorporate numeracy into everyday experiences can help nurture children's mathematical thinking in a more holistic and engaging manner, ultimately supporting their long-term academic success.

LEVEL OF NUMERACY SKILLS

This component of the study focused on assessing the level of exposure of preschool children to basic numeracy skills as part of their home numeracy experiences. Early numeracy skills—such as counting, sorting, recognizing numbers, and understanding patterns—form the foundation for mathematical learning in later years (Jordan et al., 2006; LeFevre et al., 2009). These informal learning opportunities at home help children build number sense, symbolic understanding, and spatial awareness even before they enter formal schooling. To measure this, parents were asked how often their children engaged in five specific numeracy-related activities: counting objects, sorting by size or color, counting down, printing numbers, and identifying written number names. The results from this section provide insight into how frequently these foundational skills are fostered within the home environment.

Level of Numeracy Skills of Preschoolers in terms of Numbers

This section aimed to assess the preschoolers' level of proficiency in basic number-related skills, a core component of early mathematical development. Numerical understanding—such as recognizing numbers, counting in sequence, and identifying quantities—is considered a critical foundation for later mathematical achievement (Jordan et al., 2006; Baroody, 2004). Early exposure to number concepts enables children to build number sense, which is essential for understanding operations, measurement, and problem-solving in the primary grades. In this study, children's number skills were classified into three levels: Beginner, Intermediate, and Advanced, based on their performance in

tasks involving number recognition and basic counting. The data presented in Table 7 provides an overview of how well-prepared the preschoolers are in terms of numerical literacy as they transition into formal schooling.

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

Level	F	%
Advanced	40	100.00
Intermediate	0	0.00
Beginner	0	0.00
Total	**40**	**100.00**

The data from Table 7, all 40 preschool participants (100%) were classified under the Advanced level of numeracy skills in terms of number proficiency. This indicated that the preschoolers demonstrated strong competency in recognizing, counting, and using numbers appropriately for their age group. The absence of students in the Intermediate or Beginner categories suggests that most children in the sample have already acquired essential numerical knowledge prior to entering formal education. This may be attributed to consistent home exposure to numeracy practices, as reported in earlier tables, particularly in activities involving counting and identifying numbers. These findings are aligned with research by Aunio and Niemivirta (2010), which emphasizes that early exposure to structured number tasks significantly enhances children's numerical fluency and readiness for school-based mathematics.

However, this result must be considered in light of the limited exposure to broader numeracy contexts such as games and real-life applications. While number skills are well-developed, there is room to expand and enrich the home numeracy environment to support deeper, more conceptual mathematical thinking. The findings revealed that children whose parents engaged them in frequent operational numeracy activities, such as learning simple sums, demonstrated better arithmetic performance and growth in both nonsymbolic and symbolic number comparison by the end of kindergarten.

Additionally, parents' familiarity with number-related games was a predictor of their children's arithmetic skills and growth in nonsymbolic number comparison. These results underscore the significance of enriching the HNE with diverse numeracy experiences, including games and real-life applications, to foster deeper and more conceptual mathematical thinking in children (Susperreguy et al, 2020).

The researcher notes that the high level of number proficiency may be closely linked to the frequency of parent-child interactions around counting and number recognition, as previously highlighted in the home numeracy exposure results. Activities such as counting objects during play, identifying numbers in everyday settings, and engaging in number-related conversations may have significantly contributed to these outcomes. Moreover, the consistency of responses across all participants implies that early numeracy is being prioritized by families in the community or educational interventions may already be in place.

However, while the results are promising, the uniformity of advanced proficiency may also suggest a limitation in the sensitivity of the assessment tool used—it may not have adequately distinguished among varying levels of higher-order number understanding. Further diagnostic assessments might be needed to capture more nuanced differences in numerical ability among preschoolers.

Level of Numeracy Skills of Preschoolers in terms of Attributes

This part of the study focused on evaluating preschoolers' understanding of attributes such as size, color, and shape—key elements in developing classification and pattern recognition skills. Attribute recognition is a foundational skill in early mathematics, as it supports logical thinking, sorting, and the ability to make comparisons, all of which are critical to later math problem-solving (Clements & Sarama, 2007).

According to NAEYC (2010), engaging young children in activities that involve grouping, matching, and sorting by attributes helps them recognize relationships among objects and enhances their

reasoning ability. The classification levels used in this section—Beginner, Intermediate, and Advanced—reflected the children's ability to identify and work with different object attributes. Table 8 presented the frequency and percentage distribution of preschoolers according to their level of proficiency in this area.

Table 8. Level of numeracy skills of the preschoolers in terms of identifying attributes

Level	F	%
Advanced	40	100.00
Intermediate	0	0.00
Beginner	0	0.00
Total	**40**	**100.00**

The data showed that all 40 preschoolers (100%) in the study are categorized at the Advanced level in terms of their ability to identify attributes. None of the children were found to be at the Intermediate or Beginner levels. This outcome is notable and suggests that identifying attributes is a particularly strong skill among this group of preschoolers.

This reflected both the effectiveness of early learning environments and the developmental appropriateness of this skill for children at this stage. The result suggests that attribute identification is a well-supported and successfully nurtured area of early numeracy development.

This finding aligned with the study by Seo and Ginsburg (2004)**,** who emphasized that young children's spontaneous categorization and sorting behavior in play environments plays a foundational role in building early numeracy. Children who frequently engaged in sorting tasks develop stronger mathematical reasoning and are better prepared for more formal instruction.

Additionally, Susperreguy et al. (2020) reported that the home numeracy environment, especially informal activities like comparing and sorting, positively predicts the development of early mathematical skills in children. Their findings supported the conclusion that consistent exposure to attribute-based tasks at home and school contributes to high-level skill acquisition.

The data from Table 8 highlights that all participants have achieved advanced proficiency in identifying attributes, reflecting a high level of readiness in this specific numeracy domain. This uniform result may indicate that attribute-based activities—such as sorting toys, matching colors, and identifying shapes—are widely practiced at home or in early learning settings. It is possible that the prevalence of such activities in both play-based and instructional environments has led to mastery among the children.

However, the researcher also notes that the absence of variation in the data may suggest a need to reassess the sensitivity of the assessment criteria. The tasks used may not have been sufficiently complex to differentiate among varying degrees of attribute recognition skills. Future assessments could incorporate more challenging classification tasks or require children to explain their reasoning to better capture subtle differences in understanding.

Level of Numeracy Skills of Preschoolers in terms of Thinking Skills

This section aimed to assess the preschoolers' cognitive flexibility and logical reasoning in relation to numeracy, commonly referred to as mathematical thinking skills. These include the ability to compare quantities, recognize patterns, understand simple sequences, and make predictions—skills that are critical for problem-solving and abstract reasoning (Sarama & Clements, 2009). Developing such thinking skills at an early age prepares children for more complex mathematical concepts by encouraging them to observe, question, and reason about mathematical relationships in their environment. As recommended by the National Association for the Education of Young Children (NAEYC, 2010), early numeracy programs should provide children with frequent opportunities to explore patterns, relationships, and problem-solving tasks. The table that follows presents the levels of thinking skills observed among the preschool participants, categorized as Beginner, Intermediate, or Advanced.

Table 9. Level of numeracy skills of the preschoolers in terms of thinking skills

Level	F	%
Advanced	40	100.00
Intermediate	0	0.00
Beginner	0	0.00
Total	**40**	**100.00**

The data from Table 9 showed that 100% of the preschoolers in the study achieved an Advanced level in numeracy skills related to thinking skills. None of the children were categorized as intermediate or beginner, indicating a uniformly high level of cognitive development in this specific domain. This table clearly illustrated that all participating preschoolers exhibited advanced thinking skills in numeracy, highlighting a strong cognitive foundation for future academic success in mathematics. This emphasized the importance of sustaining and enriching learning environments that challenge children to reason, question, and solve problems — both in the classroom and at home.

According to Clements and Sarama (2020) that early math learning is most effective when it integrates cognitive and metacognitive thinking, rather than rote practice alone. They emphasized that children who are encouraged to think about their thinking (i.e., metacognition) perform better in numeracy tasks that require reasoning and flexible problem-solving.

RELATIONSHIP BETWEEN HOME NUMERACY EXPERIENCES AND NUMERACY SKILLS OF PRESCHOOLERS

This section explored the relationship between preschoolers' home numeracy experiences and their numeracy skills. Home numeracy practices—such as counting objects, using number books, engaging in math games, and applying mathematical concepts in daily life—are known to play a crucial role in shaping children's early mathematical development (LeFevre et al., 2009; Skwarchuk et al., 2014). By examining the statistical association between the level of home numeracy exposure and children's actual numeracy performance, this study seeks to determine whether frequent, meaningful interactions with mathematics at home translate into stronger early math competencies. Establishing this relationship is essential for understanding how family environments contribute to school readiness and for guiding the development of targeted interventions to support children's mathematical learning from an early age.

This section discussed the relationship between home numeracy experiences and numeracy skills of the preschoolers as determined through the use of Pearson Product-Moment Correlation Coefficient (PPMCC).

Table 10. 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	0.073	Negligible Positive	0.656	Do not reject Ho	Not Significant

*significant at $p<0.05$ (two-tailed)

Table 10 presented the results of a correlational analysis examining the relationship between home numeracy experiences and the numeracy skills of preschoolers. The Pearson correlation coefficient (r-value) is 0.073, which indicated a negligible positive correlation. This means that while there is a slight positive trend between the two variables, the association is extremely weak.

The p-value of 0.656 is significantly higher than the threshold of 0.05, indicating that the observed relationship is not statistically significant. Therefore, the null hypothesis (Ho), which states that there is no significant relationship between the two variables, is not rejected.

The data in Table 10 concluded that there is no statistically significant relationship between home numeracy experiences and preschoolers' numeracy skills within the sample studied. The correlation is negligible and not meaningful, indicating that other factors may be more influential in shaping early numeracy development. This finding highlights the complexity of early learning and suggests that while the home environment plays a role, it may not always directly translate into measurable skill differences without considering broader contextual variables.

This result is supported by the study of Zippert and Rittle-Johnson (2020)**,** which found no significant association between the frequency of home math activities and young children's numerical or patterning skills. Their research, conducted on a large and diverse sample of 5- to 6-year-olds, concluded that the frequency of home math experiences did not predict variations in children's early math abilities. These findings suggest that other factors such as the quality of interactions, parental beliefs about mathematics, or formal instruction may have a more pronounced influence on early numeracy development. Therefore, while the home environment remains a valuable context for learning, its effect may not always be directly observable in standardized skill assessments, especially if not complemented by meaningful engagement and instructional quality.

The researcher observed that despite the high levels of reported exposure to numeracy-related activities in some domains (e.g., counting and identifying numbers), these practices did not significantly translate into measurable improvements in children's overall numeracy skills. This disconnect may stem from the variability in how parents implement math activities at home, including differences in instructional quality, engagement, and consistency.

Moreover, the negligible correlation might also reflect a ceiling effect in the children's performance data—such as all participants being classified at the "Advanced" level—which limits variability and statistical sensitivity. It is also possible that external factors such as prior preschool instruction, access to learning materials, or peer interaction influenced the children's numeracy development more than home practices alone.

Chapter 3

SUMMARY, FINDINGS, CONCLUSION, AND RECOMMENDATION

SUMMARY

This study employed a **descriptive-correlational research design** to explore the relationship between home numeracy experiences and the mathematical skills of preschoolers at **Summit Integrated Laboratory Academy Inc.** The main objective was to assess how frequently parents engage in home numeracy activities and how these are perceived to influence early math development. The respondents of the study included **kindergarten teachers and parents**, who were selected using **purposive sampling** based on their direct involvement in the children's learning. A **researcher-made survey questionnaire** was the primary tool for data collection. It was composed of two parts: the first part focused on measuring the frequency of home numeracy activities across four domains—**number skills** (e.g., counting, number recognition), **number books** (e.g., using storybooks or materials involving numbers), **games** (e.g., playing board or card games involving math concepts), and **real-life applications** (e.g., using numbers in cooking, shopping, or daily routines). The second part assessed the **perceived mathematical abilities of preschoolers**, such as counting, comparing quantities, and simple problem-solving. The data gathered were analyzed using **weighted mean** to determine the level of exposure and perception, **standard deviation** to identify the variability of responses, and the **Pearson Product-Moment Correlation Coefficient** to examine the strength and direction of the relationship between home numeracy practices and children's math skills. This methodological approach helped provide meaningful insights into the role of home learning environments in early numeracy development.

FINDINGS

The findings revealed that the overall level of children's exposure to home numeracy experiences was low. Among the components assessed, numeracy skills received the highest mean, interpreted as high exposure, suggesting that basic number skills are commonly practiced at home and number

books followed with under high exposure indicating moderate engagement with reading materials involving numbers. In contrast, games and applications were rated low, suggesting limited use of numeracy-related games and everyday applications in the home setting. These results highlighted a need to enhance children's numeracy development by encouraging more frequent use of interactive and practical numeracy experiences, such as games and daily-life applications.

In terms of numeracy skills, all of the respondents were already at the advanced level. There were no learners categorized under the intermediate or beginner levels. This suggests that the preschoolers possess a strong foundational understanding of numbers, which may reflect effective early numeracy instruction or supportive learning environments despite the overall low exposure to home numeracy experiences.

The analysis revealed a negligible positive correlation between home numeracy experiences and the numeracy skills of preschoolers. Therefore, the null hypothesis is not rejected, suggesting that there is no significant relationship between the level of home numeracy experiences and the numeracy skills of the preschoolers in this study.

CONCLUSION

In conclusion, this study sought to examine the level of exposure to home numeracy experiences among preschoolers and how these experiences relate to their numeracy skills. The findings revealed that while children were highly exposed to basic numeracy activities, such as counting and using number books, there was limited engagement with numeracy through games and real-life applications like cooking, shopping, and time-related activities. Despite this uneven exposure, all preschoolers in the study demonstrated advanced levels of numeracy skills across domains such as number recognition, identifying attributes, and thinking skills. However, statistical analysis indicated no significant relationship between the overall home numeracy experiences and the children's numeracy skill levels, suggesting that factors beyond the home environment may be contributing more significantly to their mathematical development. This highlights the complexity of early learning and indicates that while the home environment plays a role, it may not be the sole or strongest determinant of early numeracy competence. The results emphasize the need for a more holistic approach to early childhood education that considers not only home practices but also the quality of preschool instruction, parental involvement, socio-economic context, and access to structured learning resources.

RECOMMENDATION

Based on the findings, the caregiver or the parent should provide a wide range of meaningful numeracy experiences at home. While children are exposed to basic counting and number-related books. There is still a need to strengthen the play-based and real-life application of numeracy skills. Educators and early childhood programs should offer guidance and workshops for parents to raise awareness about the importance of incorporating everyday numeracy into home routines. School and community stakeholders may also help the parents in providing resources to support families, especially those who may lack access or confidence in facilitating such activities. Additionally, future research could explore other influential factors, such as the role of preschool instruction, parental education levels, and socio-economic background, in shaping children's numeracy development. By fostering stronger collaboration between home and school environments, we can better support the holistic development of children's early mathematical skills.

Chapter 4

OUTPUT OF THE STUDY

ACTIONS PLAN

Rationale

This comprehensive review examined how parents in various Asian countries, including the Philippines, perceive and engage in their children's early literacy and numeracy development. The study highlighted that while parents recognize the importance of early numeracy skills, they often

lack the confidence, resources, or knowledge to effectively support their children's learning at home (Cheung et. al. 2021). It emphasized the need for structured interventions, such as parent training programs and the provision of practical learning materials, to bridge this gap. Everyday opportunities such as measuring ingredients, using a calendar, or playing number-based games are often overlooked as effective learning moments. The findings underscore the significance of empowering parents and fostering collaboration with educators to create a supportive home numeracy environment, aligning well with the objectives of your proposed action plan.

By implementing a structured action plan, this gap between potential and practice can be addressed. Empowering parents through training, providing practical learning kits, and fostering collaboration with teachers will help create a more supportive and engaging home numeracy environment. Furthermore, community involvement and systematic monitoring will ensure that these efforts are sustainable and responsive to families' needs. This action plan is essential to bridge the home-school learning connection and enhance children's foundational skills in mathematics during the critical early years.

Objectives

Based on the findings of the study, the intervention plans aim: To raise awareness among parents and caregivers about the importance of home numeracy experiences in supporting their children's early mathematical development, to equip families with accessible, age-appropriate materials and activities that promote numeracy learning through play, storytelling, and real-life applications, to strengthen the collaboration between teachers and parents in monitoring and enhancing preschoolers' numeracy development both at school and at home, to increase the frequency and quality of home numeracy practices by integrating counting, measuring, comparing, and problem-solving into everyday family routines, to build community and institutional support systems that advocate for and provide resources to families in need of guidance or materials for early numeracy education, and to evaluate the effectiveness of implemented strategies and interventions in improving the home numeracy environment and children's engagement with mathematical concepts.

Scheme of Implementation

The implementation scheme provided the explicit instructions for converting the outcomes of the research into practical initiatives to extend home numeracy experiences for preschoolers. It starts with an awareness phase, where parents are familiarized with significance of aiding their children's numeracy progress at home. This is accompanied by the provision of learning materials like number books, activity sheets, and parent-friendly guides to promote active participation in numeracy activities. The strategy also included routine practice assistance by urging parents to undertake straightforward but significant math-related activities like counting, sorting, and number games. To promote progress, teachers and parents worked together in tracking children's participation and giving feedback. Lastly, an evaluation stage evaluated the effects of these home-based numeracy programs on learning outcomes for children. Such a well-structured methodology makes the research not only theoretical but also a means for real-world improvement in early childhood education practice.

Numeracy Skills Strategic Intervention Plan

Phase	Objectives	Activities	Timeline	Persons Involved	Budget Estimate	Source of Funds	Expected Output	Actual Accomplishment	Remarks
1. Awareness	To raise awareness and build understanding among parents about home numeracy practices.	Conduct an orientation, training workshop, or meeting for parents on home numeracy practices.	1st Month (1–2 days)	School head, teachers, and parents	Php 2,000.00	School Fund	Increased parents' awareness and understanding of numeracy at home.	(To be filled post-activity)	
2. Resource Sharing	To equip parents with appropriate and engaging numeracy materials.	Distribute simple numeracy materials (e.g., activity sheets, storybooks, number books).	2nd Month	Teachers, school staff	Php 3,500.00	Donations, LGU Support, PTA Fund	Parents are equipped with tools to support learning at home.	(To be filled post-distribution)	
3. Practice Support	To promote consistent numeracy-related parent-child interactions at home.	Encourage weekly numeracy-based home activities (counting, sorting, games).	2nd–3rd Month	Parents and children	Php 1,000.00	PTA Fund	Improved home engagement in numeracy activities.	(To be filled after implementation)	
4. Monitoring	To gather insights on the implementation and impact of home numeracy activities.	Collect simple feedback from parents and observe the child's progress.	Monthly	Teachers	Php 1,000.00	School funds, Teacher Initiative	Insights on what activities are most effective.	(To be filled monthly)	
5. Evaluation	To assess the overall effectiveness of the home numeracy initiative.	Evaluate the effectiveness of home numeracy efforts through child assessments.	4th Month	School administrators and teachers	Php 1,000.00	School Fund	Identify successful strategies and areas for improvement in home numeracy practices.	(To be filled after evaluation)	

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