

# Intervention Strategies for Developing Early Reading and Numeracy Skills Among Kindergarten Pupils in Ambaguio District

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## Abstract

Developing foundational reading and numeracy skills during kindergarten is essential to children's readiness for subsequent learning. This study examined intervention strategies used to develop early reading and numeracy skills among kindergarten pupils, focusing on their extent of implementation, perceived effectiveness, and implementation challenges. A descriptive quantitative design was employed, with kindergarten teachers in Ambaguio District, Nueva Vizcaya, as respondents. A researcher-developed questionnaire covered early reading strategies, early numeracy strategies, perceived effectiveness, and implementation challenges. Data were analyzed using frequency, percentage, mean, and standard deviation. Findings showed that early reading ( $M = 3.48$ ,  $SD = 0.43$ ) and numeracy strategies ( $M = 3.43$ ,  $SD = 0.45$ ) were highly implemented. Reading ( $M = 3.51$ ,  $SD = 0.41$ ) and numeracy strategies ( $M = 3.46$ ,  $SD = 0.43$ ) were also perceived as highly effective. Storytelling and shared reading, vocabulary development, counting and number recognition, and manipulatives emerged as prominent practices. Implementation challenges ( $M = 3.05$ ,  $SD = 0.55$ ) included insufficient instructional materials, differences in pupils' readiness, limited instructional time, and difficulty providing individualized support. The findings emphasize the value of varied, interactive, developmentally appropriate, and differentiated approaches to foundational learning. The study supports Sustainable Development Goal 4 and contributes to educational sustainability by identifying instructional practices and support needs relevant to kindergarten education.

**Keywords:** Early Literacy; Early Numeracy; Intervention Strategies; Kindergarten Education; Reading Skills; Teacher Practices

## 1. Introduction

Early reading and numeracy provide essential foundations for children's subsequent academic development. Kindergarten learners develop oral language, vocabulary, phonological awareness, print knowledge, counting, number recognition, and number relationships. Effective early literacy instruction addresses multiple domains, including language, phonological awareness, print knowledge, decoding, and early writing (Herrera et al., 2021), while interventions combining language and code-related skills can improve emergent literacy outcomes (Cusiter et al., 2025). Early numeracy is similarly multidimensional. Counting, number relations, and basic arithmetic are central early competencies (D. Devlin et al., 2022), while number knowledge, relationships, and operations predict later mathematics achievement (B. L. Devlin et al., 2022). Developmentally appropriate instruction therefore requires meaningful opportunities for children to explore language, numbers, patterns, and mathematical relationships. Guided play can further support selected early mathematics outcomes by combining children's active participation with purposeful adult guidance (Skene et al., 2022). In the Philippines, foundational literacy and numeracy are priorities of curriculum reform (DepEd, 2023a). The MATATAG Kindergarten Curriculum integrates literacy, language and communication, mathematics, and other developmental domains while promoting developmentally appropriate and play-based learning (DepEd, 2023b). Against this background, the

study examined intervention strategies used to develop early reading and numeracy skills among kindergarten pupils in Ambaguio District, Nueva Vizcaya, focusing on their extent of implementation, perceived effectiveness, and implementation challenges.

Early literacy development requires coordinated attention to language, phonological awareness, print knowledge, decoding, and early writing (Herrera et al., 2021). Combined language and code interventions can support emergent literacy development, particularly among preschool children at risk for reading difficulties (Cusiter et al., 2025). Shared and dialogic reading also encourage language development and children's active participation through questions, prompts, and discussion (Noble et al., 2019; Pillinger & Vardy, 2022). Technology may supplement these approaches, with e-book and educational technology interventions showing potential for supporting early literacy when appropriately integrated into instruction (Bautista et al., 2024; Savva et al., 2022). Early numeracy encompasses counting, number relationships, arithmetic, and related mathematical competencies (D. Devlin et al., 2022). These early number competencies are associated with later mathematics performance (B. L. Devlin et al., 2022), supporting the use of counting activities, manipulatives, quantity comparisons, number games, and meaningful numerical experiences. Guided play may also enhance selected mathematics outcomes when purposeful teacher guidance is incorporated into child-centered learning (Skene et al., 2022). Appropriate assessment remains important in distinguishing perceived instructional effectiveness from children's directly measured mathematical outcomes (Outhwaite et al., 2024). Overall, the literature supports a multidimensional approach to early reading and numeracy. Shared reading, phonological activities, guided practice, manipulatives, games, and guided play serve complementary purposes and should be aligned with children's developmental needs and instructional objectives.

Locally, the study focused on kindergarten instructional practices in Ambaguio District, Nueva Vizcaya. Rather than assuming particular literacy or numeracy deficiencies among pupils, it examined the strategies teachers use within the defined educational context. Nationally, foundational literacy and numeracy are priorities of the revised Philippine curriculum (DepEd, 2023a). The MATATAG Kindergarten Curriculum integrates language, literacy and communication, mathematics, and other developmental domains, while DepEd has provided professional development to support its implementation (DepEd, 2023b, 2024). Kindergarten resources likewise address alphabet knowledge, oral language, listening comprehension, numbers, number sense, and other foundational competencies (DepEd, 2025). Globally, foundational learning remains an educational concern. UNICEF (2022) identifies reading and numeracy as fundamental building blocks for future learning, while the World Bank (2022) emphasizes foundational reading in addressing learning poverty. These priorities reinforce the importance of strengthening literacy and numeracy during the early years.

The study was anchored in Vygotsky's Sociocultural Theory, which emphasizes the role of social interaction and guided participation in children's cognitive development (Vygotsky, 1978). Through the Zone of Proximal Development, children can accomplish increasingly complex tasks with appropriate assistance and scaffolding. The theory is relevant to early literacy and numeracy strategies involving teacher modeling, questioning, prompting, guided practice, shared reading, guided play, small-group activities, and manipulatives. Conceptually, the study examined teachers' reading and numeracy intervention strategies in terms of their extent of implementation, perceived effectiveness, and implementation challenges. Perceived effectiveness represented teachers' professional assessment of the strategies rather than direct evidence of causal improvement in pupil achievement.

Existing research provides substantial evidence on early literacy interventions, shared reading, early number competencies, and guided play (Cusiter et al., 2025; B. L. Devlin et al., 2022; Herrera et al., 2021; Skene et al., 2022). However, international findings do not necessarily describe how such strategies are implemented within particular Philippine school districts. The study therefore addressed a contextual gap by examining the intervention strategies used by kindergarten teachers in Ambaguio District, their extent of implementation, perceived effectiveness, and implementation challenges. The findings may provide a basis for instructional planning, professional development, resource provision, and future intervention research within the local educational context.

The study aligns with Sustainable Development Goal 4: Quality Education, which promotes inclusive and equitable quality education and lifelong learning opportunities. Strengthening foundational reading and numeracy during kindergarten supports children's preparation for subsequent schooling, while identifying implementation challenges can guide improvements in instructional support. The study contributes to educational, social, and institutional sustainability by identifying instructional practices that can support foundational learning within regular kindergarten education. Evidence on intervention practices and implementation challenges can inform teacher development, instructional supervision, and resource allocation, supporting sustained improvements in early education (DepEd, 2024; UNICEF Philippines, 2023).

## **2. Material and methods**

### **2.1 Research Design**

The study employed a descriptive quantitative research design to examine intervention strategies for developing early reading and numeracy skills among kindergarten pupils. It assessed the extent of implementation of reading and numeracy strategies, their perceived effectiveness, and challenges encountered in their implementation. The descriptive approach was appropriate because the study examined existing instructional practices without manipulating classroom conditions.

### **2.2 Locale of the Study**

The study was conducted in Ambaguio District, Nueva Vizcaya, Philippines, covering kindergarten education across schools within the district, including Hamhahamaan Elementary School. The district provided the setting for examining strategies used to develop foundational literacy and numeracy competencies.

### **2.3 Respondents of the Study**

The respondents consisted of kindergarten teachers from schools within Ambaguio District. They were selected because they were directly involved in planning and implementing classroom activities for developing foundational reading and numeracy skills. The study focused on their instructional practices, perceptions of effectiveness, and challenges encountered in implementing the strategies.

### **2.4 Sample and Sampling Procedure**

Total enumeration was employed because the target population consisted of a specific group of kindergarten teachers within the district. Teachers assigned to kindergarten classes in Ambaguio District were included, while teachers handling other grade levels were excluded. This approach provided broad representation of kindergarten instructional practices within the defined research setting.

### **2.5 Research Instrument**

The study utilized a structured researcher-developed questionnaire based on the research objectives and related literature on early literacy and numeracy. The instrument covered early reading strategies, early numeracy strategies, perceived effectiveness, and implementation challenges. Reading items included phonological awareness, letter and print recognition, vocabulary development, storytelling and shared reading, language games, guided practice, and differentiated or small-group instruction. Numeracy items included counting and number recognition, quantity comparison, number relationships, manipulatives, mathematics games, guided play, patterns, and contextualized numerical activities. A four-point Likert scale measured implementation from 1 (Not Implemented) to 4 (Highly Implemented). Perceived effectiveness ranged from 1 (Not Effective) to 4 (Highly Effective), while implementation challenges ranged from 1 (Not Encountered) to 4 (Highly Encountered). The instrument underwent content review to ensure alignment of the items with the objectives and constructs examined.

### **2.6 Data Gathering Procedure**

Permission to conduct the study was coordinated with the appropriate school authorities before administration of the research instrument. The purpose of the study and instructions for answering the questionnaire were communicated to the respondents. Participation was voluntary, and completed questionnaires were checked for completeness before responses were coded and organized for statistical analysis. Personally identifiable information was excluded from the analytical dataset, and responses were treated confidentially.

### **2.7 Data Analysis Techniques**

Descriptive statistics were used to analyze the data. Frequency and percentage summarized categorical information, while mean and standard deviation determined the extent of implementation, perceived effectiveness, and implementation challenges. Mean scores of 3.26–4.00 were interpreted as Highly Implemented/Highly Effective/Highly Encountered; 2.51–3.25 as Implemented/Effective/Encountered; 1.76–2.50 as Less Implemented/Less Effective/Less Encountered; and 1.00–1.75 as Not Implemented/Not Effective/Not Encountered. Descriptive ranking was used to identify the most prominent strategies and challenges.

### **2.8 Ethical Considerations**

Ethical principles governing educational research were observed throughout the study. Participation was voluntary, informed consent was obtained, and respondents were informed of their right to withdraw without penalty or professional disadvantage. Confidentiality and privacy were maintained through anonymous and aggregated data management. No personally identifiable information was included in the reporting of findings.

### 3. Results and Discussion

#### 3.1 Intervention Strategies for Developing Early Reading Skills

##### 3.1.1 Extent of Implementation of Early Reading Strategies

Early reading strategies were highly implemented, with an overall mean of 3.48 (SD = 0.43). Storytelling and shared reading received the highest rating (M = 3.72, SD = 0.39), followed by vocabulary-building activities (M = 3.61, SD = 0.42) and letter and print recognition (M = 3.55, SD = 0.45). Phonological awareness activities were also highly implemented (M = 3.46, SD = 0.47). Language games (M = 3.39, SD = 0.48), guided reading (M = 3.35, SD = 0.46), and differentiated or small-group instruction (M = 3.28, SD = 0.51) remained within the highly implemented category. The findings indicate an emphasis on interactive and language-rich instruction. This corresponds with evidence that early literacy development involves language, phonological awareness, print knowledge, decoding, and related competencies (Herrera et al., 2021). Shared reading also provides opportunities for vocabulary and oral-language development through meaningful teacher-child interaction (Noble et al., 2019; Pillinger & Vardy, 2022).

#### 3.2 Intervention Strategies for Developing Early Numeracy Skills

##### 3.2.1 Extent of Implementation of Early Numeracy Strategies

Early numeracy strategies were highly implemented, with an overall mean of 3.43 (SD = 0.45). Counting and number recognition received the highest rating (M = 3.68, SD = 0.40), followed by manipulatives and concrete materials (M = 3.57, SD = 0.43), mathematics games (M = 3.49, SD = 0.45), and pattern activities (M = 3.44, SD = 0.46). Quantity and number relationships obtained a mean of 3.38 (SD = 0.47), while guided play obtained 3.29 (SD = 0.50). Contextualized numerical problem solving received the lowest rating (M = 3.18, SD = 0.52), interpreted as implemented. The prominence of counting, number recognition, and concrete materials is consistent with evidence identifying counting and number relationships as important dimensions of early numeracy (D. Devlin et al., 2022). Early number competencies are also associated with later mathematics achievement (B. L. Devlin et al., 2022), while guided playful experiences can support selected early mathematics outcomes (Skene et al., 2022).

#### 3.3 Perceived Effectiveness of Reading and Numeracy Strategies

##### 3.3.1 Perceived Effectiveness of Early Reading Strategies

Reading strategies were perceived as highly effective, with an overall mean of 3.51 (SD = 0.41). Storytelling and shared reading obtained the highest rating (M = 3.73, SD = 0.37), followed by vocabulary-building (M = 3.62, SD = 0.40), phonological awareness (M = 3.54, SD = 0.42), and letter and print recognition (M = 3.50, SD = 0.43). Language games (M = 3.43, SD = 0.44), guided reading (M = 3.39, SD = 0.46), and differentiated or small-group instruction (M = 3.34, SD = 0.48) were likewise rated highly effective. The results reflect the perceived value of combining oral language, print exposure, phonological activities, and interactive reading experiences. Evidence supports balanced attention to language and code-related emergent literacy competencies (Cusiter et al., 2025). Technology-supported activities may also supplement these approaches when appropriately integrated into instruction (Bautista et al., 2024; Savva et al., 2022).

##### 3.3.2 Perceived Effectiveness of Early Numeracy Strategies

Numeracy strategies were perceived as highly effective, with an overall mean of 3.46 (SD = 0.43). Manipulatives and concrete materials received the highest rating (M = 3.65, SD = 0.39), followed by counting and number recognition (M = 3.61, SD = 0.41), mathematics games (M = 3.53, SD = 0.42), and pattern activities (M = 3.47, SD = 0.44). Quantity and number relationships (M = 3.41, SD = 0.45) and guided play (M = 3.34, SD = 0.47) were also highly effective. Contextualized numerical problem solving received the lowest rating (M = 3.20, SD = 0.51), interpreted as effective. The findings highlight the perceived value of concrete and active learning experiences in helping young children understand mathematical concepts. Early numeracy research supports attention to counting, number relationships, and operations (D. Devlin et al., 2022), while guided play may benefit selected mathematics outcomes (Skene et al., 2022).

#### 3.4 Challenges Encountered in Implementing Reading and Numeracy Interventions

##### 3.4.1 Implementation Challenges

Implementation challenges obtained an overall mean of 3.05 (SD = 0.55), interpreted as encountered. Insufficient instructional materials received the highest rating (M = 3.24, SD = 0.53), followed by differences in pupils' learning pace and readiness (M = 3.19, SD = 0.54), limited instructional time (M = 3.12, SD = 0.56), and difficulty providing individualized support (M = 3.08, SD = 0.57). Limited specialized professional development (M = 2.97, SD = 0.58), maintaining pupils' attention (M = 2.93, SD = 0.56), and adapting activities to different learner needs (M = 2.84, SD = 0.59) were also encountered. These findings emphasize the importance of instructional resources, differentiated support, and teacher development. UNICEF (2022) identifies teacher preparation, learning resources, and foundational competencies as important considerations in addressing early learning challenges. Philippine curriculum implementation likewise recognizes professional development as important in supporting teachers implementing the MATATAG Curriculum (DepEd, 2024).

### 3.5 Overall Pattern of Intervention Practices

#### 3.5.1 Reading and Numeracy Intervention Practices

Overall, early reading strategies were highly implemented ( $M = 3.48$ ,  $SD = 0.43$ ), as were early numeracy strategies ( $M = 3.43$ ,  $SD = 0.45$ ). Perceived effectiveness was likewise high for reading ( $M = 3.51$ ,  $SD = 0.41$ ) and numeracy ( $M = 3.46$ ,  $SD = 0.43$ ). Since no inferential comparison was conducted, the small descriptive differences between reading and numeracy scores were not interpreted as statistically significant. The overall pattern supports the use of multiple instructional approaches rather than reliance on a single strategy. Language-rich activities, shared reading, vocabulary instruction, counting, manipulatives, games, and guided learning reflect the multidimensional nature of foundational learning (Herrera et al., 2021; Skene et al., 2022). Areas that may require additional support include differentiated instruction, contextualized mathematical activities, instructional resources, and professional development.

## 4. Conclusion & Recommendations

The study concluded that kindergarten teachers employed varied strategies for developing early reading and numeracy competencies. Reading practices emphasized storytelling and shared reading, vocabulary development, phonological awareness, and print-related activities, while numeracy practices emphasized counting and number recognition, manipulatives, mathematics games, patterns, and guided learning. Both reading and numeracy strategies were perceived as highly effective. However, instructional materials, differences in pupils' readiness and learning pace, limited instructional time, and individualized support emerged as implementation challenges. Overall, the findings emphasize the value of developmentally appropriate, interactive, and differentiated strategies in supporting foundational learning.

Kindergarten teachers are encouraged to continue using varied and developmentally appropriate early reading and numeracy strategies while strengthening differentiated and small-group instruction and contextualized numerical problem solving. Schools and educational administrators should support the provision of appropriate instructional materials, sustained professional development, and opportunities for teachers to exchange effective classroom practices. Future studies may incorporate direct assessments of pupil achievement, classroom observations, broader samples, and intervention-based designs to further examine the effectiveness of specific literacy and numeracy strategies.

The study was limited to kindergarten teachers within the defined educational setting and relied on teacher-reported instructional practices and perceptions. The descriptive design did not establish causal relationships between particular intervention strategies and improvements in pupils' reading or numeracy achievement. Self-reported responses may also be influenced by individual perceptions and experiences, while the absence of direct pupil assessments and systematic classroom observations limited the measurement of actual learning outcomes. These limitations should be considered when interpreting and generalizing the findings.

## 5. Compliance with ethical standards

The authors affirm that no conflicts of interest exist in relation to this study. The research was conducted in accordance with ethical principles for human-participant research, including voluntary participation, informed consent, the right to withdraw at any stage without penalty or professional disadvantage, and the protection of confidentiality through anonymous, secure, and aggregated data management. Data were collected through a non-invasive survey questionnaire, and no personally identifiable information was collected or disclosed. The researchers acknowledge the kindergarten teachers of Ambaguio District, Nueva Vizcaya, and the concerned schools and educational authorities for their participation and institutional support.

## REFERENCES

- Bautista, G. F., Ghesquière, P., & Torbeyns, J. (2024). Stimulating preschoolers' early literacy development using educational technology: A systematic literature review. *International Journal of Child-Computer Interaction*, 39, 100620. <https://doi.org/10.1016/j.ijcci.2023.100620>
- Cusiter, J., Short, K., Webb, A., & Munro, N. (2025). Combined language and code emergent literacy intervention for at-risk preschool children: A systematic meta-analytic review. *Child Development*, 96(4), 1519–1542. <https://doi.org/10.1111/cdev.14252>
- Department of Education. (n.d.). *Kindergarten*. Department of Education, Republic of the Philippines.
- Department of Education. (2023a). *DepEd to strengthen numeracy, literacy programs, integrate 'peace competencies' in revitalized K to 12*. Department of Education, Republic of the Philippines.
- Department of Education. (2023b). *MATATAG curriculum: Kindergarten curriculum guide*. Department of Education, Republic of the Philippines.

- Department of Education. (2024). *Training on the MATATAG Curriculum for Kindergarten, Grade 1, 4 & 7 (K147) school leaders and teachers*. Department of Education, Republic of the Philippines.
- Department of Education. (2025). *Kindergarten learning activity sheets*. DepEd Learning Resources Management and Development System.
- Devlin, B. L., Jordan, N. C., & Klein, A. (2022). Predicting mathematics achievement from subdomains of early number competence: Differences by grade and achievement level. *Journal of Experimental Child Psychology*, 217, 105354. <https://doi.org/10.1016/j.jecp.2021.105354>
- Devlin, D., Moeller, K., & Sella, F. (2022). The structure of early numeracy: Evidence from multi-factorial models. *Trends in Neuroscience and Education*, 26, 100171. <https://doi.org/10.1016/j.tine.2022.100171>
- Herrera, S., Phillips, B. M., Newton, Y.-C., Dombek, J. L., & Hernandez, J. A. (2021). *Effectiveness of early literacy instruction: Summary of 20 years of research* (REL 2021-084). Regional Educational Laboratory Southeast, National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- Noble, C., Sala, G., Peter, M., Lingwood, J., Rowland, C., Gobet, F., & Pine, J. (2019). The impact of shared book reading on children's language skills: A meta-analysis. *Educational Research Review*, 28, 100290. <https://doi.org/10.1016/j.edurev.2019.100290>
- Outhwaite, L. A., Aunio, P., & Leung, J. K. Y. (2024). Measuring mathematical skills in early childhood: A systematic review of the psychometric properties of early maths assessments and screeners. *Educational Psychology Review*, 36, 110. <https://doi.org/10.1007/s10648-024-09950-6>
- Pillinger, C., & Vardy, E. J. (2022). The story so far: A systematic review of the dialogic reading literature. *Journal of Research in Reading*, 45(4), 533–548. <https://doi.org/10.1111/1467-9817.12407>
- Republic of the Philippines. (2012). *Republic Act No. 10157: Kindergarten Education Act*. Official Gazette of the Republic of the Philippines.
- Savva, M., Higgins, S., & Beckmann, N. (2022). Can e-books foster child language? Meta-analysis on the effectiveness of e-book interventions in early childhood education and care. *Educational Research Review*, 37, 100472. <https://doi.org/10.1016/j.edurev.2022.100472>
- Skene, K., O'Farrelly, C. M., Byrne, E. M., Kirby, N., Stevens, E. C., & Ramchandani, P. G. (2022). Can guidance during play enhance children's learning and development in educational contexts? A systematic review and meta-analysis. *Child Development*, 93(4), 1162–1180. <https://doi.org/10.1111/cdev.13730>
- UNICEF. (2022). *Are children really learning? Exploring foundational skills in the midst of a learning crisis*. United Nations Children's Fund.
- UNICEF Philippines. (2023). *Seven hopes on the first day of classes*. United Nations Children's Fund Philippines.
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- World Bank. (2022). *Ending learning poverty*. World Bank.