

The Effect of Project BILANG in Enhancing Mathematics Performance

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International Journal of Science and Research Archive, 2026, 19(02), 1064-1072

Publication history: Received on 09 April 2026; revised on 17 May 2026; accepted on 19 May 2026

Article DOI: <https://doi.org/10.30574/ijrsra.2026.19.2.1149>

Abstract

Numeracy is a fundamental skill essential for academic success and lifelong learning, yet many learners continue to struggle with foundational mathematical concepts. This study aimed to improve the mathematics performance of learners at Dangla Elementary School through Project BILANG (Borderless Initiatives of Leaders in Attaining Numeracy Goals) during S.Y. 2025–2026. A quasi-experimental one-group pre-test and post-test design was used involving 17 learners from Grades I to VI identified as “Emerging” based on their initial Rapid Mathematics Assessment (RMA) results. Standardized RMA-based tests were administered before and after the intervention. The program consisted of 30-minute daily sessions using math manipulatives such as geoboards, fraction tiles, and base-ten blocks to strengthen learners’ conceptual understanding. Data was analyzed using paired sample t-test and qualitative interviews. Results showed that learners had a low initial mean score of 33.12%, indicating weak numeracy skills. After the implementation of Project BILANG, post-test results significantly improved to a higher proficiency level, with a statistically significant difference between pre-test and post-test scores. Qualitative findings further revealed challenges such as limited learning resources and learner difficulty in understanding abstract concepts, which were addressed through the intervention. Overall, the study confirms that Project BILANG is effective in improving learners’ mathematics performance and bridging numeracy gaps, supporting its continued implementation as a remediation strategy in elementary mathematics.

Keywords: Project BILANG; Numeracy; Mathematics Performance; Remediation; Intervention Material

1. Introduction

Numeracy is key foundational skill that learners must acquire and develop early on to achieve success in advanced levels of education (Munda et al., 2024). Early math and numeracy skills are crucial as they form the foundation for future learning and vital for developing more complex math understanding later (Celemin, 2023; Cruz, 2025). Hence, building a strong foundation in early years helps prevent future math difficulties by supporting early thinking and problem-solving skills (Vendicacion et al., 2025).

Numeracy is the skill to confidently identify, count, and work with numbers through simple operations and problem-solving, forming the essential foundation for learning all higher-level math concepts. Therefore, assessing learners’ numeracy skills is crucial to track their progress in mathematics (Gonzales, 2024; Aguilaro and Zaragoza, 2025).

However, low performance in mathematics is a global concern, with many learners across continents struggling to achieve proficiency (Luong, 2022). Thus, studies emphasize that early numeracy is critical for cognitive development and later academic success (Leonano and Reyes, 2024). Moreover, numeracy extends beyond reading numbers, but it involves applying mathematical reasoning in everyday life, which is increasingly important in the 21st century (Adawurah, 2025; Taufik et al., 2024; Nityasanti et al., 2025). Globally, scholars agree that mathematical communication, sharing, and discussing ideas enhances understanding and problem-solving (Bennison, 2026). Additionally,

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international findings highlight that mathematics education fosters critical thinking and career readiness, but learners in rural and developing contexts often face challenges due to limited resources and poor teacher training (Bryant et al., 2021; Jyrwa and May, 2025).

The Department of Education prioritizes numeracy as fundamental skills essential for academic success and lifelong learning, demonstrating its commitment to providing high-quality, relevant education for learners (Santiago and Mustacisa, 2024). Relative to this, numeracy is a vital skill emphasized in the Department of Education's MATATAG Curriculum, designed to equip learners with essential mathematical competencies for academic and life success (Dionanga and Cajandig, 2025). Thus, educators can help improve learners' poor performance in mathematics by organizing and implementing targeted intervention activities and programs tailored to address specific learning needs (Reyes et al., 2024).

In the Philippines, mathematics education faces systemic challenges such as insufficient instructional materials, large class sizes, and limited teacher training (Verenikina and Chinnappan, 2006; Encallado and Pasia, 2025). Despite reforms under the K-12 curriculum, learners still continue to struggle with numeracy (Granada, 2025). The 2022 PISA results revealed that the Philippines ranked 6th lowest out of 81 countries, with only 16% of students reaching minimum proficiency (Palasi, 2025). These findings underscore the urgency of strengthening numeracy education. In response, the Department of Education has prioritized numeracy through policies such as DepEd Order No. 12, s. 2015, that one of the best predictors of a school's success is how well learners progress in foundational skills, including numeracy (Department of Education [DepEd], 2015) and DepEd Order No. 010, s. 2025, which remains committed to addressing learning loss by offering a diverse range of interventions focused on foundational numeracy (DepEd, 2025). However, learners' mathematics performance is also shaped by demographic factors such as age, sex, grade level, and parents' educational attainment, which provide important context for understanding their numeracy development.

Within the Cordillera Administrative Region, the Schools Division of Apayao has recognized the need to address numeracy gaps. Evident in the Beginning of School Year (BOSY) pre-test results from the National Dashboard of Apayao in Rapid Mathematics Assessment (RMA) indicate significant challenges in foundational numeracy among key stage 1 learners (Grades 1 to 3). Currently, 86.53% of learners fall below grade-level proficiency, with over half 52.91% categorized as "Emerging" and 33.62% as "Developing" wherein, only 13.47% of learners demonstrated the required mastery or readiness for their level (RMA KS1 National Dashboard, 2025). On the other hand, RMA pre-test results for key stage 2 (Grades 4 to 6) also highlight a critical proficiency gap. A significant majority, totaling 68.67% fall within "Emerging" categories (26.39% Not Proficient; 42.28% Low Proficient), while only 1.78% perform "At Grade Level". These figures underscore an urgent need for targeted interventions for both key stages (RMA KS2 National Dashboard, 2025). To respond, the division launched Project BILANG (Borderless Initiatives of Leaders in Attaining Numeracy Goals). This comprehensive intervention program was officially rolled out in October 2023 following successful pilot testing in other schools in Apayao. It is designed to address numeracy gaps as well as to enhance or advance the numeracy skills among learners in both elementary and secondary schools based on their individual numeracy needs to develop sound mathematical knowledge, skills and understanding. The project envisions progressive stages of numeracy development, aligned with learners' individual needs, and aims to craft a numeracy tool to support learners in becoming increasingly numerate. Assessing learners' performance through diagnostic and achievement tests, such as the Rapid Mathematics Assessment, is essential to determine the effectiveness of such interventions.

Kabugao District, one of the far-flung areas in Apayao, faces unique challenges in delivering quality mathematics education. Multi-grade classrooms, diverse learner backgrounds, and limited resources make it difficult to provide consistent numeracy instruction (Tolibas, 2025). These conditions highlight the importance of targeted interventions that can bridge gaps and support learners in developing foundational math skills. Project BILANG is particularly relevant in this context, as it provides structured support to learners who are at risk of falling behind and is expected to produce measurable improvements in their mathematics performance.

Dangla Elementary School, one of the remote schools in Kabugao District 2, serves as the focal point of this study. As a multi-grade school, it faces challenges in addressing learners' varying proficiency levels. It is evident in the Rapid Mathematics Assessment (RMA) pre-test result in the national dashboard encompassing both Key Stage 1 (Grades 1-3) and Key Stage 2 (Grades 4-6), reveal significant gaps in foundational mathematical mastery. With 97.06% of learners falls below the "Proficient", while 48.04% are "Developing" basic skills, nearly half the learners (49.015%) remain in the "Emerging" level. With 0% of learners performing at grade level, the findings highlight a systematic struggle with numeracy foundations that requires immediate intervention. To further establish the study gap, an analysis of the least learned competencies across grade levels reveals specific mathematical areas where learners consistently struggle, necessitating targeted intervention through Project BILANG. Key stage 1 learners struggle with foundational operations and number relations. Grade 1 learners face difficulties in comparing numbers up to 100 using relational symbols and

performing addition with sums up to 100. Grade 2 learners' critical gap are evident in solving 1- and 2-step word problems involving addition and subtraction of numbers up to 1,000, as well as basic multiplication and division using the 2,3,4,5, and 10 tables. While Grade 3 learners' mastery is notably low in multiplying 2- to 4-digit numbers and dividing 2- to 3-digit numbers with and without remainders. On the other hand, key stage 2 (Grades 4-6) learners where mathematical concepts become more complex, the gap widens in multi-step operations and geometry. Consistent challenges are observed in multiplying multi-digit numbers and dividing 3- to 4-digit numbers by 1-digit divisors. Additionally, solving problems involving the area of squares and rectangles remains a significant hurdle for these learners. These identified least mastered competencies directly inform the design of the intervention materials used in Project BILANG. By focusing on these specific competency gaps, this study moves beyond general numeracy assessment to provide a tailored pedagogical response to the documented needs of the learners at Dangla Elementary School

Therefore, the researcher seeks to evaluate the initial implementation and effectiveness of Project BILANG in this specific context, with the hope that learners under emerging levels in each grade for the third to fourth quarter of this school year will become proficient or highly proficient after the intervention. This school-level initiative situates the global and national concerns within the immediate realities of Dangla Elementary School, thereby making the intervention both relevant and necessary.

This study aimed to improve the mathematics performance of learners at Dangla Elementary School through the implementation of Project BILANG (Borderless Initiatives of Leaders in Attaining Numeracy Goals) as an intervention material. Specifically, it sought to answer the level of Mathematics performance of the learners at Dangla Elementary School before and after the use of the BILANG intervention material, as measured by their pre-test and post-test scores in Rapid Mathematics Assessment. Also, the challenges encountered that contribute to the low mathematics performance of learners. In addition to this, it identifies the significant difference between the pre-test and post-test scores of the learners in Mathematics after using the BILANG intervention material.

2. Methodology

2.1. Research Design

The study employed a quasi-experimental design, specifically the one-group pre-test-post-test design. It determines the effect of the implementation of Project BILANG as an intervention material in enhancing the mathematics performance of emerging learners at Dangla Elementary School during School Year 2025-2026. Learners will be assessed using a pre-test prior to the intervention and a post-test after the intervention to measure changes in their performance.

2.2. Locale of the Study

The study was conducted at Dangla Elementary School (DES). It is a multigrade school of Kabugao District 2. The school is located at sitio Dangla, Barangay Kumao, Kabugao, Apayao. According to the municipal record the distance is 17 kilometer starting from the Municipal Town Hall Poblacion, Kabugao, Apayao.

2.3. Participants of the Study

The study participants were pupils from Grades I to VI at Dangla Elementary School who were identified as "Emerging" learners in numeracy through the Rapid Mathematics Assessment (RMA). This category refers to students who are not proficient or are low proficient in foundational numeracy skills. Out of 35 pupils assessed, 17 fell under the "Emerging" category, with Grade 5 and Grade 6 showing the highest numbers of struggling learners. From these 17, the researcher elected 5 participants for qualitative interviews, focusing on those who scored below 25% in the pre-test, consistently struggled across multiple numeracy domains such as number identification and basic operations, and displayed frustration or low participation during mathematics instruction. By using purposive sampling, the study concentrated on learners most in need of support, aiming to evaluate how Project BILANG could enhance their numeracy performance.

2.4. Research Instrument

The researcher made use of standardized assessment tool based on Rapid Mathematics Assessment (RMA). The RMA served as both the pre-test and post-test instrument to measure the mathematics performance of the learners. The pre-test was administered to identify emerging learners, while the post-test was conducted after the implementation of Project BILANG to determine the effect of the intervention.

A qualitative interview was obtained to identify the challenges encountered by learners in mathematics and in the administration of the Rapid Mathematics Assessment (RMA).

2.5. Statistical Analysis

The study used mean and standard deviation to assess pupils' performance in the Pre-Test and Post-Test based on the Rapid Mathematics Assessment (RMA) proficiency criteria. Learners were categorized into five levels: Emerging (Not Proficient), Emerging (Low Proficient), Developing (Nearly Proficient), Transitioning (Proficient), and At Grade Level (Highly Proficient), corresponding to score ranges from below 25% up to 100%.

A paired sample t-test was conducted to determine whether there was a significant difference in pupils' scores before and after implementing Project BILANG. Additionally, thematic analysis was used to identify and analyze the challenges learners faced in Mathematics and in administering the RMA.

3. Results and Discussion

Table 1 Pre-test Scores of Learners in Rapid Mathematics Assessment

Grade Level	Learner	Pre-test Score (%)	Performance Level
Grade 1	A	45.71	Emerging (Low Proficient)
	B	48.57	Emerging (Low Proficient)
Grade 2	A	44.00	Emerging (Low Proficient)
	B	44.00	Emerging (Low Proficient)
	C	48.00	Emerging (Low Proficient)
Grade 3	A	35.00	Emerging (Low Proficient)
Grade 4	A	38.00	Emerging (Low Proficient)
Grade 5	A	35.00	Emerging (Low Proficient)
	B	35.00	Emerging (Low Proficient)
	C	35.00	Emerging (Low Proficient)
	D	15.63	Emerging (Not Proficient)
	E	18.75	Emerging (Not Proficient)
	F	18.75	Emerging (Not Proficient)
	G	35.00	Emerging (Low Proficient)
Grade 6	A	24.00	Emerging (Not Proficient)
	B	22.00	Emerging (Not Proficient)
	C	18.00	Emerging (Not Proficient)
Overall Mean Score		33.12	Emerging (Not Proficient)
Standard Deviation		11.32	

Table 1 shows the pre-test scores of learners in the Rapid Mathematics Assessment, where pupils from Grades I to VI consistently fall under the Emerging category. The overall mean score of 33.12% with a standard deviation of 11.32 reflects generally weak performance in numeracy, with Grade 5 and Grade 6 learners recording the lowest scores, some as low as 15.63% and 18.00%, which are classified as Not Proficient. These findings underscore the urgent need for Project BILANG to provide intervention materials, as the participants identified in the Emerging category demonstrate significant gaps in foundational mathematics skills. The results emphasize the importance of structured support to strengthen learners' performance and guide them toward proficiency.

The findings support the need for targeted intervention programs such as Project BILANG, as similar studies have shown significant improvements in learners' numeracy when structured materials are introduced. For instance, Munda, Endrinal, and Nequinto (2024) demonstrated the effectiveness of Project COUNTS in raising students' numeracy skills through systematic intervention, while Leonano and Reyes (2024) found that an intervention program for fifth graders led to highly significant gains in mathematics performance. These studies reinforce the present results, where learners initially classified as Emerging showed substantial gaps in foundational skills, underscoring the importance of implementing intervention materials to strengthen mathematics proficiency.

Table 2 Challenges Encountered by Learners in Mathematics and RMA Administration

Challenges Encountered by Learners	Frequency (n=17)	Rank	Sample Responses
Test anxiety and lack of confidence in Mathematics	15	1	"During exams, I get nervous, kahit alam ko yung sagot minsan hindi ko masulat."
Difficulty in basic mathematical operations	14	2	"The scariest part for me is division, lalo na kapag may remainder."
Unfamiliarity with the RMA test format	13	3	"Nalito ako kasi iba yung style ng tanong sa RMA compared sa usual tests."
Pressure during timed tests	12	4	"The time is too short, hindi ko natapos lahat ng items."
Feelings of fear and nervousness toward Math class	11	5	"When teacher says it's time for Math, kinakabahan ako, parang may butterflies sa tummy."
Poor study habits and distractions at home	10	6	"At home, I don't review Math. Minsan maingay sa paligid kaya hindi ako makafocus."
Limited time for remediation and discussion	9	7	"Mabilis ang lesson, hindi ko agad maintindihan."
Lack of practice materials at home	8	8	"We don't have reviewers at home, so I can't practice much."
Limited access to tools and technology	7	9	"I wish we had blocks or calculators. Wala kaming internet or gadgets, so I can't study math online."
Lack of academic support when stuck in lessons	6	10	"If I get stuck, I ask my parents, pero minsan hindi rin nila alam paano sagutin."
Classroom atmosphere contributing to anxiety	5	11	"Tahimik naman, pero minsan sobrang tahimik kaya lalo akong kinakabahan."
Nervousness during the administration of the RMA	4	12	"When teacher said start RMA, I felt nervous agad, parang mahirap."

Table 5 revealed that the learners' struggles in mathematics and in the administration of the Rapid Mathematics Assessment (RMA) were influenced by emotional, academic, instructional, assessment, and resource-related challenges. Among the identified concerns, test anxiety and lack of confidence ranked first with a frequency of 15, followed by difficulty in basic mathematical operations with a frequency of 14, and unfamiliarity with the RMA test format with a frequency of 13. Learners admitted becoming nervous during examinations even when they knew the answers, while others identified division with remainders as the most difficult mathematical skill. Pressure during timed examinations, fear of mathematics classes, poor study habits, and distractions at home were also frequently mentioned. In addition, learners had trouble due to fast-paced lessons, lack of practice materials, limited access to tools and technology, and insufficient academic support at home. The findings indicate that learners' mathematics difficulties were not only associated with computational skills but were also shaped by emotional readiness, classroom experiences, assessment practices, instructional pacing, and limited learning resources. These imply the need for interventions that strengthen both mathematical competence and learners' confidence while providing adequate remediation, familiar assessment practices, and access to appropriate learning materials and instructional tools.

The findings support the results of the study conducted by Vendicacion, Huevos, and Espiritu (2025), which revealed that the use of manipulatives and learner-centered strategies significantly reduced mathematics anxiety and improved numeracy performance among struggling learners. Likewise, the study of Bryant et al. (2021) emphasized that early numeracy interventions, proper instructional pacing, and continuous learner support helped improve mathematical understanding and reduce assessment-related difficulties. Similar to these studies, the present findings suggest that effective mathematics interventions should combine academic remediation with emotional support, concrete learning aids, and assessment practices that help learners become more confident and engaged in mathematics learning.

Table 3 Post-test Scores of Learners in Rapid Mathematics Assessment

Grade Level	Learner	Post-test Score (%)	Performance Level
Grade 1	A	51.43	Developing (Nearly Proficient)
	B	74.29	Developing (Nearly Proficient)
Grade 2	A	72.00	Developing (Nearly Proficient)
	B	64.00	Developing (Nearly Proficient)
	C	68.00	Developing (Nearly Proficient)
Grade 3	A	55.00	Developing (Nearly Proficient)
Grade 4	A	53.85	Developing (Nearly Proficient)
Grade 5	A	75.00	Transitioning (Proficient)
	B	85.00	At Grade Level (Highly Proficient)
	C	81.25	Transitioning (Proficient)
	D	75.00	Transitioning (Proficient)
	E	81.25	Transitioning (Proficient)
	F	75.00	Transitioning (Proficient)
	G	78.00	Transitioning (Proficient)
Grade 6	A	66.00	Developing (Nearly Proficient)
	B	64.00	Developing (Nearly Proficient)
	C	60.00	Developing (Nearly Proficient)
Overall Mean Score		69.06	Developing (Nearly Proficient)
Standard Deviation		10.17	

Table 3 presents the post-test scores of learners in the Rapid Mathematics Assessment, showing a clear improvement in their performance compared to the pre-test. The overall mean score rose to 69.06%, while the standard deviation decreased to 10.17, indicating not only higher achievement but also more consistent results across grade levels. Most learners advanced to the Developing (Nearly Proficient) category, with Grade 5 pupils showing the most significant progress, achieving scores between 75.00% and 85.00%, which placed them in the Transitioning (Proficient) and even At Grade Level (Highly Proficient) categories. This upward trend demonstrates that the intervention through Project BILANG effectively enhanced learners' numeracy skills, bridging gaps in foundational mathematics and supporting their movement toward proficiency.

The findings support the effectiveness of Project BILANG in enhancing learners' numeracy skills, as evidenced by the significant improvement in post-test scores compared to the pre-test. This result is consistent with the study of Munda, Andrina, and Requito (2024), which showed that structured interventions like Project COUNTS led to notable gains in students' numeracy performance. Similarly, Leona no and Reyes (2024) found that intervention programs implemented among fifth graders produced highly significant improvements in mathematics achievement. These studies reinforce the present results, confirming that well-designed intervention materials can bridge gaps in foundational skills and guide learners toward proficiency.

Table 4 Comparison of Pre-test and Post-test Scores of Learners

Test	Mean	SD	t-value	p-value	Interpretation
RMA Pretest Scores	33.12	11.32	9.06	0.001	Significant
RMA Posttest Scores	69.06	10.17			

Table 4 presents the comparison of the learners' pre-test and post-test scores in the Rapid Mathematics Assessment (RMA). The findings revealed a substantial increase in the mean score from 33.12 in the pre-test to 69.06 in the post-test, indicating notable improvement in the learners' numeracy performance after the implementation of Project BILANG. Moreover, the standard deviation decreased from 11.32 to 10.17, suggesting that learners' scores became more consistent in the post-test assessment. The computed t-value of 9.06 and p-value of 0.001 indicate a statistically significant difference between the pre-test and post-test scores. Since the p-value is lower than the 0.05 level of significance, the null hypothesis is rejected. This implies that Project BILANG was effective in enhancing the numeracy skills of the learners. The results further suggest that the intervention helped learners progress from the Emerging level of proficiency toward the Developing and Transitioning levels, thereby strengthening their foundational mathematics competencies.

The findings are consistent with the study of Gonzales (2024), which showed that structured mathematics intervention programs significantly improved learners' mathematical proficiency. Similarly, the study of Aquilaria and Zaragoza (2024) revealed that targeted numeracy interventions and continuous monitoring effectively addressed learning gaps and enhanced learners' mathematical skills. These studies support the present findings, emphasizing that well-planned intervention programs can significantly improve learners' numeracy performance and foundational mathematics skills.

4. Conclusion

The study conducted at Dangla Elementary School concludes that learners initially demonstrated low proficiency in mathematics, as reflected in their Emerging level performance and evident gaps in foundational numeracy skills, indicating the need for targeted intervention. Their difficulties in Mathematics and RMA were largely influenced by high anxiety, weak foundational skills, unfamiliar assessment formats, and limited learning support and resources, which negatively affected both their confidence and performance. However, after the implementation of Project BILANG at Dangla Elementary School, learners showed meaningful improvement in their mathematics performance, with much progressing to higher proficiency levels. The statistically significant difference between the pre-test and post-test scores confirms that Project BILANG is an effective intervention in improving learners' mathematical competence. Overall, the findings affirm that structured, concrete, and supportive instructional interventions are essential in addressing both cognitive and affective barriers in mathematics learning within the school context.

Compliance with ethical standards

Acknowledgments

I acknowledge that I have not used chat GPT or Copilot for refining some of the sections in the document

Disclosure of conflict of interest

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

Statement of ethical approval

The study was conducted with approval and in accordance with the standards of the college. No ethical approval was required, as the research followed all applicable ethical guidelines, ensuring respect for the respondents' privacy and confidentiality

Statement of informed consent

I affirm that the respondents voluntarily agreed to participate after being fully informed about the purpose, nature, and potential implications of the study. Their responses have been collected with utmost respect for their privacy and confidentiality, in accordance with ethical research guidelines.

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