

Effectiveness of National Mathematics Program on the Numeracy Skills of Intermediate Pupils

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Abstract

This study aimed to determine the effectiveness of the National Mathematics Program on the numeracy skills of intermediate pupils in Aldea Elementary School, Tanay District, Schools Division Office of Rizal during School Year 2025–2026. Utilizing an experimental single-group pretest-posttest design, the respondents were 70 intermediate pupils identified as non-numerates. Data were gathered through validated pretest and posttest instruments to measure numeracy skills before and after exposure to the program. Respondents were described in terms of age, sex, sibling position, family size, parents' educational attainment, parents' occupation, monthly family income, and grade level. Findings revealed that most respondents were 10–12 years old, male, middle or youngest children, and came from families with 2–5 siblings and average income. Most parents were high school graduates and employed as skilled workers. Results of the pretest indicated that pupils had low numeracy proficiency, while posttest results showed improvement to a higher but still developing proficiency level. Statistical analysis revealed a significant difference between pretest and posttest scores, indicating that the National Mathematics Program is effective in improving numeracy skills. However, no significant differences were found in posttest scores when grouped according to age, sex, sibling position, family size, monthly income, parents' educational attainment, and parents' occupation. Only grade level showed a significant difference in numeracy performance. The study concludes that the National Mathematics Program is effective in enhancing numeracy skills among intermediate pupils, while grade level is a determining factor of performance. It is recommended that teachers employ varied and engaging mathematics interventions, pupils be exposed to enriched learning activities, and that a proposed action plan be implemented. Further studies using a two-group experimental design are recommended. The findings contribute to evidence-based mathematics instruction in basic education contexts program implementation.

Keywords: National Mathematics Program, Numeracy Skills, Intermediate Pupils, Experimental Design, Mathematics Intervention, Academic Performance.

Introduction

Education is widely recognized as a fundamental pillar of societal development that shapes individuals and drives national progress. It equips learners with essential knowledge, skills, and values necessary for personal growth, lifelong learning, and career success. Beyond individual benefits, education fosters critical thinking, problem-solving, and informed decision-making, enabling citizens to actively participate in democratic processes and contribute meaningfully to community development. Moreover, education serves as a powerful tool in addressing global challenges such as poverty, inequality, and environmental sustainability by empowering individuals to take informed and responsible actions.

In the Philippine context, education is strongly anchored on legal and constitutional mandates. The 1987 Philippine Constitution, Article XIV, Section 2(1), emphasizes that “The State shall provide for a complete, adequate, and integrated system of education relevant to the needs of the people and society” (Philippine Constitution, 1987). This provision underscores the State's obligation to ensure inclusive and quality education for all Filipinos. It also highlights the importance of developing essential competencies such as numeracy, which is vital in enabling learners to function effectively in daily life and contribute to national development.

In support of this mandate, the Department of Education institutionalized the National Mathematics Program (NMP) through DepEd Order No. 110, s. 2022, which aims to enhance learners' numeracy and mathematics competencies through learner-centered instructional materials, assessment tools, and continuous teacher professional development (DepEd, 2022). The program also emphasizes collaborative implementation, monitoring, and evaluation to ensure effective delivery of mathematics instruction across basic education.

Recent related studies (RRS) affirm the importance of structured mathematics interventions in improving learners' numeracy and mathematical competencies. Experimental studies revealed that mathematics programs significantly improve students' post-test performance compared to pre-test results, indicating the effectiveness of structured interventions (Seker,

2022; Munda, 2024; Legal, 2024; Sanday, 2025). Similarly, program-based interventions have been shown to enhance academic achievement motivation and mathematical thinking skills (Nasef, 2021), while early intervention strategies significantly improve foundational numeracy skills among learners (Aunio, 2021). Moreover, studies on interactive learning platforms, digital tools, peer-assisted learning, and teacher feedback consistently show positive effects on students' engagement and numeracy development (Smith, 2022; Evans, 2024; Kim, 2024; Reynolds, 2023; Navarro, 2022; Santos & Reyes, 2024; Lopez, 2023). These findings collectively suggest that well-structured, learner-centered, and interactive instructional approaches contribute significantly to improved mathematics outcomes.

Despite these positive findings, challenges in numeracy proficiency among learners persist. Local studies indicate that while programs such as the NMP are implemented, learners still exhibit varying levels of proficiency, particularly in higher-level mathematical operations, and results on program effectiveness remain inconsistent across contexts (Marcaida, 2025; Pitogo & Oco, 2023). Some studies also reveal that improvements in numeracy are significant but still fall short of the desired proficiency level, suggesting the need for continued instructional enhancement and targeted interventions (Sanday, 2025).

Although extensive studies have been conducted on mathematics intervention programs, peer-assisted learning, digital tools, and remedial instruction, most of these focus on foreign contexts, higher grade levels, or specific instructional strategies rather than the comprehensive National Mathematics Program in Philippine elementary settings. Locally, existing studies on the NMP are often descriptive in nature or focus on implementation rather than experimentally measuring its direct effect on numeracy skills (Marcaida, 2025). Furthermore, limited research has examined how learner profiles such as age, sex, family background, and grade level influence numeracy outcomes after exposure to the program. This creates a gap in understanding the program's effectiveness in diverse learner contexts, particularly among intermediate pupils in specific school settings such as Aldea Elementary School in Tanay District, Rizal.

In response to this gap, the present study investigates the effectiveness of the National Mathematics Program on the numeracy skills of intermediate pupils, providing empirical evidence that may support instructional improvement and program enhancement in basic education mathematics.

Material and methods

2.1 Research Design

This study utilized the experimental method of research

2.2 Locale of the Study

The study was conducted at Aldea Elementary School, located in the District of Tanay, Schools Division Office of Rizal. The school offers a complete elementary education program, serving learners from kindergarten to grade six.

2.3 Respondents of the Study

The respondents of this study were 70 intermediate pupils of Aldea Elementary School, District of Tanay, Schools Division Office of Rizal. These pupils were identified as non-numerates based on the results of the pretest administered prior to the implementation of the intervention. The respondents were further described in terms of age, sex, sibling position, number of children in the family, parents' educational attainment, parents' occupation, monthly family income, and grade level to provide a comprehensive profile of their background and possible influencing factors on their numeracy skills.

2.4 Sample and Sampling Procedure

This study employed a total enumeration sampling technique, wherein all 70 intermediate pupils identified as non-numerates were included as respondents of the study. The selection was based on pretest results used to determine the learners' numeracy level, ensuring that only those who met the criteria were considered. The sampling procedure involved the administration of a standardized numeracy pretest to all intermediate pupils, after which those who were classified as non-numerates were purposively included in the study. This approach ensured that the intervention was focused on learners who needed numeracy enhancement and allowed for a more accurate evaluation of the effectiveness of the National Mathematics Program.

2.5 Research Instrument

The study utilized a researcher-made pretest and posttest as the primary instruments for data collection. The pretest was administered to intermediate pupils prior to the implementation of the National Mathematics Program to determine their baseline numeracy skills, consisting of 50 items designed to assess fundamental mathematical competencies. After the intervention, a parallel posttest with similar content and 50 items was administered to measure any changes or improvements in the pupils' numeracy skills. The results of both tests were compared and analyzed to evaluate the effectiveness of the National Mathematics Program. The scores were interpreted using a five-level scale ranging from Not

Proficient (0–14) to Highly Proficient (45–50), providing a clear description of learners' numeracy performance levels. The instrument underwent content validation by the panel members, professorial lecturer, thesis adviser, and Dean of the Graduate Studies Program, and was further reviewed by the District Supervisor, Principal Consultant on Mathematics, District Math Coordinator, and Master Teacher. Their feedback, comments, and recommendations were incorporated to ensure the validity, reliability, and appropriateness of the assessment tool.

2.6 Data Gathering Procedure

The research followed the Gantt chart of activities in the conduct of the study. After the validation of the research instrument, permission from the concerned authorities were sought. Then, the pretest was administered to the intermediate pupils to establish their baseline numeracy skills prior to the implementation of the National Mathematics Program. This pre-assessment is crucial as it provides a clear starting point for evaluating the intervention's impact. The pretest was conducted under standardized conditions to maintain consistency and eliminate potential biases in the results. The data collected during this phase offered insight into the participants' initial levels of performance. The identified non numerates were given intervention activities in the National Mathematics Program. They receive targeted activities, lessons, and strategies tailored to improve their numeracy skills, delivered in a systematic and monitored manner. The intervention period was carefully planned and executed to maximize its effectiveness and ensure that the program is delivered as intended. After completing the intervention, the pupils were given the posttest to measure any changes in their numeracy skills. This post-assessment administered under conditions identical to those of the pretest to ensure consistency and comparability of results. Data Privacy Act of 2012 was followed in the gathering of the needed information. The data obtained from the pretest and posttest were treated applying appropriate statistical tools utilizing Statistical Package for Social Science (SPSS) at the College statistical center. Data were analyzed and interpreted based on the sub problems. Based from the interpreted data, summary of findings, conclusions and recommendations were formulated. After the oral defense, the manuscript was revised incorporating all the comments and suggestions of the oral examination committee. The manuscript was also subjected to antiplagiarism test. After the final revision of the manuscript, hard bound copies were submitted to the office of the graduate studies program and other concerned offices.

2.7 Data Analysis Techniques

To analyze and interpret the data gathered in this study, appropriate statistical tools were employed. Frequency, percentage, and rank distribution were used to describe the profile of the respondents in terms of selected variables. To determine the level of numeracy skills of intermediate pupils before and after exposure to the National Mathematics Program, as reflected in the pretest and posttest results, frequency counts, mean, and standard deviation were utilized. The significant difference in the numeracy skills of the respondents before and after the implementation of the program was analyzed using the dependent t-test. Meanwhile, to determine whether there was a significant difference in the posttest results when grouped according to respondents' profile variables, One-Way Analysis of Variance (ANOVA) was applied. These statistical tools provided a comprehensive basis for evaluating the effectiveness of the National Mathematics Program on the numeracy skills of intermediate pupils.

2.8 Ethical Considerations

This study strictly adhered to ethical standards in the conduct of research. Prior to data collection, permission was sought from the school authorities and concerned officials to ensure proper coordination and approval. The respondents were informed about the purpose of the study, and their participation was entirely voluntary. Informed consent was obtained, assuring them that they could withdraw from the study at any time without any consequences. Confidentiality and anonymity of the respondents were strictly maintained by not disclosing their identities and ensuring that all collected data were used solely for academic purposes. Additionally, the researcher ensured that no harm, discomfort, or bias would affect the participants throughout the process. All information gathered was treated with utmost respect and integrity, and results were presented honestly and objectively.

Results and Discussion

3.1 Profile of the Respondents in Terms of the Selected Variables

As shown in the table, in terms of age, majority of the respondents are 10-12 years old with 61.4%. Most of them are males with 64.3%. As to their sibling position, 41.4 % are middle children while 28.6% are youngest children. In terms of number of children in the family, 45.7% come from families with 4-5 children while 44.3% belong to families with 2-3 number of children. The majority of fathers (65.7%) and mothers (67.2%) have high school education. The majority of fathers (48.6%) are skilled workers, while mothers (42.9%) are employees. In terms of monthly family income, 47.2% come from families with a monthly income below ₱10,000 and 45.7% come from families with monthly income ₱10,001 - ₱20,000. In terms of grade level, majority of the respondents are in the grade four level with 51.4%

Table 1
*Frequency and Percentage Distribution of the Respondents
in Terms of the Selected Variables*

Age	f	%	R			
Below 10	23	32.9	2			
10-12	43	61.4	1			
13-15	4	5.7	3			
Total	70	100.0				
Sex	f	%	R			
Male	45	64.3	1			
Female	25	35.7	2			
Total	70	100.0				
Sibling Position	f	%	R			
Eldest	18	25.7	3			
Middle	29	41.4	1			
Youngest	20	28.6	2			
Only Child	3	4.3	4			
Total	70	100.0				
Number Of Children In The Family	f	%	R			
Only Child	3	4.3	4			
2 - 3	31	44.3	2			
4 - 5	32	45.7	1			
6 or More	4	5.7	3			
Total	70	100.0				
Parents' Educational Attainment	Father			Mother		
	f	%	R	f	%	R
Postgrad	2	2.9	4	4	5.7	4
College	12	17.1	2	12	17.1	2
High School	46	65.7	1	47	67.2	1
Elementary	10	14.3	3	7	10.0	3
Total	70	100.0		70	100.0	
Parents' Occupation	Father			Mother		
	f	%	R	f	%	R
Professional	2	2.8	4	2	2.8	4
Office	3	4.3	3	7	10.0	3
Skilled	34	48.6	1	10	14.3	2
Employee	31	44.3	2	30	42.9	1
Total	70	100		70	100.0	
Monthly Family Income	f	%	R			
₱30,001 And Above	1	1.4	4			
₱20,001 - ₱30,000	4	5.7	3			
₱10,001 - ₱20,000	32	45.7	2			
Below ₱10,000	33	47.2	1			
Total	70	100.0				

3.2 Level of Numeracy Skills of Intermediate Pupils Before and After Exposure to National Mathematics Program as Revealed in Their Pretest and Posttest Results

The results revealed a significant improvement in the numeracy skills of pupils after exposure to the National Mathematics Program. In the pretest, all 70 pupils (100%) were classified as Emergent (Not Proficient) with a mean score of 8.30, indicating that the learners were initially non-numerates. After the intervention, the posttest results showed that most pupils (83%) moved to the Emergent (Low Proficient) level, 4% reached the Developing (Nearly Proficient) level, while 13% remained Not Proficient. The mean score increased to 19.66, interpreted as Low Proficient, reflecting a clear improvement in numeracy performance. This indicates that the National Mathematics Program was effective in enhancing pupils' mathematical understanding, problem-solving skills, and overall numeracy development. The findings align with the study of Marcaida (2025), which also highlighted that structured mathematics programs significantly improve learners' numeracy skills through strengthened instruction and targeted interventions.

Table 2

Level of Numeracy Skills of Intermediate Pupils Before and After Exposure to National Mathematics Program as Revealed in Their Pretest and Posttest Results

Score	Verbal Interpretation	Pretest		Posttest	
		f	%	f	%
45 - 50	At Grade Level (Highly Proficient)	-	-	-	-
39 - 44	Transitioning (Proficient)	-	-	-	-
29 - 38	Developing (Nearly Proficient)	-	-	3	4
15 - 28	Emergent (Low Proficient)	-	-	58	83
0 - 14	Emergent (Not Proficient)	70	100	9	13
Total		70	100	70	100
Highest Grade		14		33	
Lowest Grade		2		11	
Mean		8.30 (NP)		19.66 (LP)	
Standard Deviation		3.30		5.07	

3.3 Significant Difference on the Level of Numeracy Skills of Intermediate Pupils Before and After Exposure to National Mathematics Program as Revealed in Their Pretest and Posttest Results

The results show that the mean score of pupils increased from 8.300 in the pretest to 19.664 in the posttest, indicating a clear improvement in numeracy skills after exposure to the National Mathematics Program. The computed mean difference of 11.364, with a t-value of 24.409 and a p-value of 0.000, led to the rejection of the null hypothesis, confirming that there is a significant difference in pupils' numeracy skills before and after the intervention. This implies that the National Mathematics Program had a significant positive effect on improving learners' mathematical performance, particularly in addressing learning gaps and enhancing basic numeracy competencies. However, the findings also suggest that while the program is effective in improving scores and developing skills, challenges such as learner engagement, resource availability, and instructional preparedness may still affect the consistency of outcomes. This result is aligned with the study of Legal (2024), which also found significant improvements in students' numeracy performance after intervention, as evidenced by a significant t-test result and a marked shift from low performance levels to higher proficiency categories after the implementation of remedial instruction.

Table 3

Significant Difference on the Level of Numeracy Skills of Intermediate Pupils Before and After Exposure to National Mathematics Program as Revealed in Their Pretest and Posttest Results

Groups	N	Mean	SD	Mean Difference	df	t-value	p-value	Ho	Verbal Interpretation
Posttest	70	19.664	5.067	11.364	69	24.409	0.000	Rejected	Significant
Pretest	70	8.300	3.033						

3.4 Significant Difference on the Level of Numeracy Skills of Intermediate Pupils After Exposure to National Mathematics Program as Revealed in Their Posttest Results in Terms of Their Profile

The F-test results revealed that there is no significant difference in the posttest numeracy skills of pupils when grouped according to age, sex, sibling position, number of children in the family, parents' educational attainment, parents' occupation, and monthly family income, as all variables obtained p-values greater than 0.05. However, a significant difference was found in terms of grade level ($F = 8.475$, $p = 0.001$), indicating that numeracy performance varies depending on the learners' grade level. This suggests that after exposure to the National Mathematics Program, pupils' numeracy skills were generally comparable across most demographic profiles, except for grade level, which appears to influence learning outcomes. The findings imply that demographic factors such as age, sex, and family background are not major determinants of numeracy skills, while grade level plays a crucial role in learners' mathematical performance and ability to understand and apply numeracy concepts. This is consistent with the study of Sanday (2025), which found that learners' demographic profiles such as age, sex, and parents' educational attainment did not significantly affect numeracy proficiency, while differences in performance were mainly influenced by academic level, and that the National Mathematics Program contributed to improved mathematics proficiency across learners.

Table 4

Significant Difference on the Level of Numeracy Skills of Intermediate Pupils After Exposure to National Mathematics Program as Revealed in Their Posttest Results in Terms of Their Profile

Variables	F-value	p-value	Ho	Verbal Interpretation
Age	0.896	0.413	Accepted	Not Significant
Sex	3.816	0.055	Accepted	Not Significant
Sibling Position	0.770	0.515	Accepted	Not Significant
Number of Children in the Family	0.660	0.580	Accepted	Not Significant
Fathers' Educational Attainment	1.945	0.131	Accepted	Not Significant
Mothers' Educational Attainment	0.397	0.756	Accepted	Not Significant
Fathers' Occupation	1.950	0.130	Accepted	Not Significant
Mothers' Occupation	1.163	0.336	Accepted	Not Significant
Monthly Family Income	1.316	0.277	Accepted	Not Significant

Conclusions & Recommendations

Based on the findings of the study, it can be concluded that the National Mathematics Program is effective in enhancing the numeracy skills of intermediate pupils. The significant improvement in learners' performance from pretest to posttest indicates that the program contributes positively to developing pupils' mathematical competencies. Furthermore, the results suggest that most demographic variables such as age, sex, sibling position, number of children in the family, monthly family income, parents' educational attainment, and parents' occupation do not significantly influence pupils' numeracy skills. However, grade level emerged as a determinant factor, implying that learners' mathematical abilities vary depending on their grade level.

In light of these conclusions, it is recommended that teachers employ varied and engaging intervention strategies in teaching Mathematics to further enhance pupils' numeracy skills. Pupils should likewise be exposed to more interactive and meaningful learning activities to sustain and improve their mathematical competencies. The proposed action plan developed from the study is recommended for implementation to support numeracy development initiatives. Finally, it is further suggested that future researchers conduct experimental studies using a two-group design to further validate the effectiveness of the National Mathematics Program and strengthen the generalizability of its results.

Compliance with ethical standards

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