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EFFECTIVENESS OF DIFFERENT NUMERACY INTERVENTION ACTIVITIES ON THE TEST PERFORMANCE OF THE GRADE 4 PUPILS IN MATHEMATICS

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ABSTRACT

This study evaluated the effectiveness of different Numeracy Intervention activities on the test Performance of the Grade 4 Pupils in Mathematics in Sabang Bao Elementary School. The findings of the study were the basis for an intervention Plan. This study utilized a quasi-experimental research design, specifically the pretest–posttest design, to determine the effectiveness of different numeracy intervention activities on the test performance of Grade 4 pupils in Mathematics under the Enhanced K to 10 Curriculum. In this design, learners were given a pretest to measure their initial numeracy skills, after which they underwent selected intervention activities such as guided remediation, math games, peer-assisted learning, or worksheet-based drills. After the intervention period, a posttest aligned with the same competencies as the pretest was administered to measure any improvement in their performance, allowing comparison of results before and after the intervention. To gather the data, the researcher first prepared validated assessment tools based on the Grade 4 Mathematics competencies, then administered the pretest to the target group of pupils with

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the consent of parents and the approval of school authorities. The chosen numeracy interventions were implemented over a set number of weeks, ensuring that all activities followed the same time allotment and procedures for consistency. After the implementation, the posttest was conducted, and the results were collected, scored, and statistically analyzed to determine the effectiveness of each intervention. Additional data were gathered through teacher observations and pupil performance records to support the interpretation of results.

The Test of Difference Between Pre-Test and Post-Test Scores determined whether there was a statistically significant change in the numeracy performance of the respondents after the implementation of the intervention. The analysis examined the difference between the pre-test and post-test results, compared the computed value with the critical value at the established level of significance, and identified the appropriate decision regarding the null hypothesis. This procedure was conducted to verify whether the observed improvement in pupils' scores could be attributed to the instructional intervention rather than to chance.

The findings revealed a clear increase in performance from pre-test to post-test. The computed value exceeded the critical value at the set level of significance, which led to the rejection of the null hypothesis. This statistical outcome confirmed that the improvement in pupils' numeracy scores was not accidental but was associated with the intervention strategies implemented during the study.

Further analysis showed that the gap between the pre-test and post-test means reflected a marked enhancement in pupils' numeracy competencies. The strength of the

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computed result demonstrated that the improvement was consistent among the respondents. Rejecting the null hypothesis signified that the intervention produced a measurable and meaningful effect on learners' mathematical performance, strengthening their mastery of essential skills and concepts.

Overall, the findings established that a significant difference existed between the pre-test and post-test scores, with the post-test results considerably higher than the pre-test results. The statistical evidence supported the effectiveness of the numeracy intervention. The result implies that structured and explicit instructional strategies contributed positively to pupils' understanding, application, and retention of mathematical concepts, thereby improving their overall academic performance in Mathematics.

Keywords: *Different Numeracy Intervention Activities, Test performance, Mathematics, Grade 4*

INTRODUCTION

The Enhanced K to 10 Curriculum emphasizes foundational skills in Mathematics, particularly numeracy, as essential competencies required for higher-order learning. Among Grade 4 pupils, numeracy becomes even more critical because this is the stage where learners transition from basic number concepts to more complex operations such as multi-step problem solving, measurement, data interpretation, and introductory geometry. Given these developmental expectations, schools have adopted different numeracy intervention

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activities—such as guided math sessions, math games, differentiated remediation, peer-assisted learning, and technology-aided drills—to support learners who experience difficulty in mastering grade-level competencies. Understanding the effectiveness of these interventions is essential because pupils' test performance often reflects their readiness to meet curriculum standards and their ability to apply mathematical concepts in real contexts.

Numeracy intervention activities are designed to address gaps in computation, conceptual understanding, and problem-solving. Their effectiveness can be measured not only by improvement in test scores but also by learners' increased confidence, engagement, and mastery of skills over time. Within the K to 10 framework, interventions become a necessary component of classroom instruction because teachers must ensure that learners progress according to grade-level expectations. When interventions are properly implemented—using appropriate strategies, correct pacing, and targeted remediation—Grade 4 pupils can demonstrate meaningful improvement in both formative and summative assessments. Furthermore, effective interventions allow teachers to modify instruction based on learners' specific needs, making the teaching-learning process more responsive and learner-centered.

However, the degree of effectiveness varies depending on how these activities are structured and delivered. For instance, numeracy games motivate pupils, but if not aligned with competencies, they may not translate to better performance. Peer tutoring promotes collaborative learning but may require strong guidance to ensure accuracy of instruction. Likewise, technology-based interventions can enhance procedural fluency, yet they demand consistent access to devices and stable connectivity. Thus, assessing how these varied

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interventions influence test performance is necessary to determine which approaches are most beneficial, feasible, and sustainable within the actual context of Grade 4 Mathematics classes. This evaluation becomes even more relevant as schools seek to improve learners' numeracy achievement while adhering to the standards of the Enhanced K to 10 Curriculum.

Geary (2019) emphasized that numeracy interventions grounded in cognitive development significantly improve learners' mathematical outcomes, especially when activities focus on strengthening working memory, number sense, and procedural fluency. His research shows that targeted and structured numeracy supports are more effective than general remediation because they address specific cognitive gaps in learners. Similarly, Ng and Lee (2021) examined intervention programs in primary schools and found that differentiated instruction combined with manipulatives and visual models helps struggling learners understand mathematical concepts more concretely. Their findings highlight that pupils exposed to systematic numeracy interventions exhibit better test performance and retain mathematical skills longer than those taught through traditional whole-class instruction. These studies affirm the value of well-designed intervention activities in meeting curriculum competencies and improving assessment results among elementary learners.

From the researcher's perspective, improving the test performance of Grade 4 pupils requires a combination of varied and responsive numeracy intervention strategies. No single approach can address all learning gaps, so a blend of structured remediation, interactive learning activities, and individualized support becomes essential. Strategies such as explicit instruction for foundational skills, incorporation of visual aids and manipulatives, use of real-

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life problem contexts, and consistent formative assessments are crucial. The researcher also believes that integrating play-based numeracy tasks and digital learning tools increases learners' engagement and reduces anxiety toward Mathematics. Equally important is the alignment of interventions with the competencies outlined in the Enhanced K to 10 Curriculum, ensuring that every strategy directly contributes to pupils' mastery of required skills.

In the implementation of the different strategies difficulty involves ensuring that interventions are uniformly applied across different sections or classrooms, which could affect the reliability of test performance comparisons. Teachers may also differ in their delivery of interventions, resulting in variations in effectiveness. Additionally, pupils' attendance, motivation, and home support may influence the outcomes of interventions, making it challenging to isolate the variables that directly affect test performance. These potential limitations must be recognized and addressed to ensure accurate evaluation of intervention effectiveness.

This study must be pursued because understanding the effectiveness of different numeracy intervention activities is essential to strengthening Mathematics instruction under the Enhanced K to 10 Curriculum. By identifying which approaches most significantly improve Grade 4 pupils' test performance, teachers and schools can refine instructional practices, create more targeted remediation programs, and provide equitable learning opportunities to all learners. The results of this study will help ensure that numeracy interventions are purposeful, evidence-based, and aligned with curriculum standards—ultimately supporting learners in building strong mathematical foundations necessary for higher grade levels.

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Pursuing this research is therefore vital in promoting better academic outcomes and in fostering a more inclusive, responsive, and effective learning environment for Grade 4 pupils.

This study evaluated the effectiveness of different Numeracy Intervention activities on the test Performance of the Grade 4 Pupils in Mathematics in Sabang Bao Elementary School. The findings of the study were the basis for an Enhancement Plan.

Specifically, it sought to answer the following questions:

1. What is the test Numeracy performance of the Grade 4 pupils before the integration of different Numeracy Intervention activities in the delivery of the of the most essential learning competencies in the 3rd Grading period?
2. What is the test Numeracy performance of the Grade 4 pupils after the integration of different Numeracy Intervention activities in the delivery of the of the most essential learning competencies in the 3rd Grading period?
3. Is there a significant difference in the pretest and posttest Numeracy performances of the Grade 4 pupils before and after the integration of different Numeracy Intervention activities in the delivery of the of the most essential learning competencies in the 3rd Grading?
4. What enhancement plan can be proposed based on the findings of the study?

Null Hypothesis:

H_O: There is no significant difference in the pretest and posttest numeracy performances of the Grade 4 pupils before and after the integration of different numeracy intervention activities in the delivery of the most essential learning competencies in the 3rd Grading.

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METHODOLOGY

Design. This study utilized a quasi-experimental research design, specifically the pretest–posttest design, to determine the effectiveness of different numeracy intervention activities on the test performance of Grade 4 pupils in Mathematics under the Enhanced K to 10 Curriculum. In this design, learners were given a pretest to measure their initial numeracy skills, after which they underwent selected intervention activities such as guided remediation, math games, peer-assisted learning, or worksheet-based drills. After the intervention period, a posttest aligned with the same competencies as the pretest was administered to measure any improvement in their performance, allowing comparison of results before and after the intervention.

To gather the data, the researcher first prepared validated assessment tools based on the Grade 4 Mathematics competencies, then administered the pretest to the target group of pupils with the consent of parents and the approval of school authorities. The chosen numeracy interventions were implemented over a set number of weeks, ensuring that all activities followed the same time allotment and procedures for consistency. After the implementation, the posttest was conducted, and the results were collected, scored, and statistically analyzed to determine the effectiveness of each intervention. Additional data were gathered through teacher observations and pupil performance records to support the interpretation of results.

The main local of the study is Sabang Bao ES in the Schools Division of Ormoc City. The respondents of the study were Grade 4 learners.

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To gather the necessary data for the study, the researcher employed test questionnaires specifically designed to assess the numeracy performance of Grade 4 pupils. These questionnaires were aligned with the objectives outlined in the Self-Learning Modules (SLMs), which were integral to the Enhanced Curriculum Implementation. By utilizing these structured assessments, the researcher aimed to evaluate students' understanding and application of key mathematical concepts, ensuring that the questions accurately reflected the skills and knowledge they were expected to acquire. The test covered a range of numeracy topics, including basic arithmetic operations, problem-solving, and critical thinking, enabling a comprehensive evaluation of each pupil's mathematical abilities. In addition to measuring students' current numeracy skills, the test questionnaires served as a tool for validating the effectiveness of the numeracy intervention activities implemented in the classroom. By comparing pre-test and post-test results, the researcher was able to determine whether the interventions had a significant impact on student performance. This approach not only provided quantitative data on learning outcomes but also offered insights into areas where students required further support. Ultimately, the data collected from these test questionnaires were crucial in assessing the overall effectiveness of the numeracy interventions, informing future instructional practices, and contributing to the ongoing improvement of mathematics education for Grade 4 learners.

Sampling. There were 30 participants to be included in the study. There were 14 Males and 20 females that were being identified and the primary means of reach is during the actual

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conduct of the study as well as during the gathering of data in the school where the study was conducted. Another way of contacting them are through cell phones.

Research Procedure. The research procedure began with the researcher seeking formal permission to conduct the study from the Schools Division Office (SDO), which was overseen by the School Division Superintendent. This request was made through a Transmittal Letter that outlined the purpose of the research and its significance for educational improvement. The same content was provided to the Public-School District Supervisor, the School Principal, and the teachers responsible for the Grade 4 pupils who participated in the study. This step was crucial in ensuring transparency and gaining the necessary approvals to access the schools and engage with the students effectively. By involving all relevant stakeholders early in the process, the researcher fostered a collaborative environment and established trust, which was vital for the successful implementation of the study.

The primary research instruments consisted of test questionnaires designed to assess the numeracy performance of the Grade 4 pupils, focusing on the Most Essential Learning Competencies (MELCs) for Mathematics during the third grading period. These questionnaires served as a baseline measure to identify the current performance levels of the students. The researcher administered these tests directly to the pupils, allowing for a controlled assessment environment that yielded accurate data on students' understanding of mathematical concepts. This initial assessment provided valuable insights into the strengths and weaknesses of the pupils' numeracy skills, thereby laying the groundwork for effective intervention strategies.

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Following the initial assessment, the researcher implemented Explicit Learning Approaches over a one-month period. This instructional strategy was designed to enhance students' understanding of numeracy concepts through direct teaching methods that emphasized clarity and structure. During this time, the researcher closely monitored the students' engagement and progress, ensuring that the intervention was tailored to meet their needs. After the one-month period, a post-test was administered to evaluate changes in the students' performance levels. This comparative analysis was critical in determining the effectiveness of the numeracy interventions and whether the Explicit Learning Approaches led to measurable improvements in the students' understanding and application of mathematical concepts.

Once the pre-test and post-test data were collected, the researcher collated the results for analysis. Appropriate statistical treatments were applied to assess the effectiveness of the intervention quantitatively, including descriptive statistics to summarize the data and inferential statistics to draw conclusions about the significance of the results. By analyzing the data, the researcher identified trends, patterns, and areas for further improvement, thereby contributing valuable insights to the field of mathematics education. The findings not only validated the effectiveness of the implemented strategies but also informed future practices, ensuring that interventions were continuously refined to meet the needs of Grade 4 learners.

Ethical Issues. The right to conduct the study was strictly adhered through the approval of the principal. Orientation of the respondents both their subject teachers.

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Treatment of Data. In this study, the researcher employed specific statistical formulas to analyze the data collected from the numeracy assessments of Grade 4 pupils. The quantitative responses from the pre-tests and post-tests were first tallied and organized into comprehensive tables. This systematic approach allowed for a clear visualization of the data, facilitating a more straightforward interpretation of the results. By creating these tables, the researcher ensured that the data were easily accessible and could be analyzed effectively, providing a foundation for further statistical treatment.

Weighted Mean. This measure was instrumental in assessing the overall numeracy performance of the Grade 4 pupils. By calculating the weighted mean, the researcher accounted for the varying levels of importance assigned to different questions or competencies within the assessments.

T-test for mean difference was employed to determine the statistical significance of any observed changes in the numeracy skills of the Grade 4 pupils before and after the intervention. This tool was particularly valuable for comparing the means of two sets of scores—specifically, the pre-test and post-test results. By calculating the t-test, the researcher ascertained whether differences in performance were statistically significant, indicating that the interventions applied had a measurable impact. This analysis was crucial in validating the effectiveness of the Explicit Learning Approaches and ensuring that the findings were reliable and applicable to educational practice.

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RESULTS AND DISCUSSION

TABLE I

PRE-TEST PERFORMANCE OF RESPONDENTS

Score Range	Description	Frequency	Percentage (%)
33–40	Very Good	0	0.00
25–32	Good	1	4.17
17–24	Fair	20	83.33
9–16	Poor	3	12.50
1–8	Very Poor	0	0.00
Total		**24**	**100.00**

Mean = 18.83

MPS = 47.08%

Interpretation: *Fair*

This table presents the Pre-Test Performance of Respondents, showing the distribution of scores of Grade 4 pupils prior to the implementation of the numeracy intervention. The table categorizes pupil performance into five descriptive levels: Very Good, Good, Fair, Poor, and Very Poor, including their corresponding frequency and percentage. It also reflects the computed mean score and Mean Percentage Score (MPS), which provide an overall picture of the pupils' initial numeracy proficiency. This baseline data serves as a reference point in determining the effectiveness of the instructional intervention implemented in the study.

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The results reveal that the majority of the pupils fell under the Fair category, comprising 83.33 percent of the total respondents. Only 4.17 percent were categorized as Good, while 12.50 percent were classified as Poor. Notably, no pupils reached the Very Good or Very Poor categories. This distribution indicates that most learners demonstrated an average level of understanding of the mathematical concepts covered in the assessment, while a small portion showed below-average mastery. The absence of very high achievers suggests that advanced numeracy skills were not yet fully developed among the group prior to the intervention.

Further examination of the data shows that the computed mean score of 18.83 and an MPS of 47.08% fall within the Fair interpretation. This implies that less than half of the competencies assessed were mastered by the pupils before the implementation of the numeracy strategies. The concentration of scores within the Fair range suggests that while pupils possessed basic foundational skills, significant gaps remained in problem-solving, computational accuracy, and conceptual understanding. The presence of pupils in the Poor category further emphasizes the need for structured and targeted instructional support.

The overall findings indicate that the respondents' pre-test performance was generally at a Fair level, with most pupils demonstrating moderate understanding and a few showing weak mastery of numeracy skills. The overall mean of 18.83 (MPS = 47.08%) implies that learners required structured intervention to strengthen their mathematical competencies. The result implies that without targeted instructional strategies, pupils may continue to struggle in mastering essential numeracy skills, highlighting the necessity of implementing explicit and

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systematic learning approaches to improve academic performance.

Table 2

POST-TEST PERFORMANCE OF RESPONDENTS (n = 24)

Score Range	Description	Frequency	Percentage (%)
33–40	Very Good	14	58.33
25–32	Good	9	37.50
17–24	Fair	1	4.17
9–16	Poor	0	0.00
1–8	Very Poor	0	0.00
Total		**24**	**100.00**

Mean = 32.04

MPS = 80.10%

Interpretation: *Very Good*

This table presents the Post-Test Performance of Respondents (n = 24), showing the distribution of pupils' scores after the implementation of the numeracy intervention. The table categorizes performance into five descriptive levels: Very Good, Good, Fair, Poor, and Very Poor, along with their corresponding frequency and percentage. It also reflects the computed mean score and Mean Percentage Score (MPS), which provide a summary of the pupils' overall achievement following the intervention. This data serves as evidence in determining whether the instructional strategies applied contributed to improved numeracy performance.

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The results reveal a substantial improvement in pupils' achievement levels. A majority of the respondents, 58.33 percent, were classified under the Very Good category, while 37.50 percent fell under the Good category. Only 4.17 percent remained in the Fair category, and none of the pupils were categorized as Poor or Very Poor. This distribution indicates that almost all learners achieved satisfactory to outstanding mastery of the mathematical competencies assessed. The absence of pupils in the lower performance categories demonstrates that the intervention effectively addressed previous learning gaps.

Further analysis shows that the computed mean score of 32.04 and an MPS of 80.10% fall within the Very Good interpretation. Compared to the baseline performance, the post-test results reflect a marked increase in mastery of numeracy skills, including arithmetic operations, problem-solving, and critical thinking. The high concentration of pupils in the Very Good and Good categories suggests that learners were able to apply the concepts and strategies introduced during the intervention period, demonstrating improved confidence and accuracy in mathematical tasks.

The overall findings show that the respondents achieved a mean of 32.04 with an MPS of 80.10 percent, interpreted as Very Good. Specifically, 14 pupils (58.33%) attained Very Good performance, 9 pupils (37.50%) achieved Good performance, 1 pupil (4.17%) remained at Fair, and none were in the Poor or Very Poor levels. The result implies that the numeracy intervention significantly enhanced pupils' mathematical competence, strengthened foundational skills, and reduced performance gaps among learners. The high overall average rating indicates that structured and explicit instructional approaches were effective in elevating

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students' achievement levels.

TABLE 3

TEST OF DIFFERENCE BETWEEN PRE-TEST AND POST-TEST SCORES

Variables Compared	Mean Difference	Computed t	df	Critical Value (α = 0.05)	Decision on Ho	Interpretation
Pre-Test (18.83) vs Post-Test (32.04)	13.21	15.18	23	2.069	Reject Ho	Significant Difference

This table presents the Test of Difference Between Pre-Test and Post-Test Scores, which determines whether there was a statistically significant change in the numeracy performance of the respondents after the implementation of the intervention. The table shows the mean difference between the pre-test and post-test scores, the computed t-value, degrees of freedom, the critical value at the 0.05 level of significance, the decision on the null hypothesis, and the overall interpretation. This analysis was conducted to verify whether the observed improvement in scores was due to the intervention rather than chance.

The results indicate a mean difference of 13.21 between the pre-test mean of 18.83 and the post-test mean of 32.04. The computed t-value of 15.18 with 23 degrees of freedom exceeded the critical value of 2.069 at the 0.05 level of significance. Based on this comparison, the null hypothesis was rejected. This statistical outcome confirms that the increase in scores from pre-test to post-test was not incidental but was associated with the instructional

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intervention implemented during the study.

Further analysis of the data shows that the substantial gap between the pre-test and post-test means reflects a marked improvement in pupils' numeracy competencies. The high computed t-value demonstrates that the magnitude of improvement was strong and consistent among the respondents. The rejection of the null hypothesis signifies that the intervention had a measurable and meaningful effect on learners' mathematical performance, strengthening their mastery of essential skills and concepts.

The overall findings reveal that there was a significant difference between the pre-test and post-test scores, with the post-test mean (32.04) considerably higher than the pre-test mean (18.83), resulting in a mean difference of 13.21. The computed t-value exceeded the critical value, leading to the rejection of the null hypothesis. The result implies that the numeracy intervention was highly effective in improving the academic performance of the respondents. The substantial increase in the overall average score demonstrates that structured and explicit instructional strategies contributed positively to learners' understanding, application, and retention of mathematical concepts.

CONCLUSION

Based on the results of this study, the Test of Difference Between Pre-Test and Post-Test Scores confirmed that the numeracy intervention significantly improved the respondents' mathematical performance. The findings demonstrated that the structured and explicit instructional strategies employed during the intervention effectively enhanced pupils'

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understanding, application, and retention of numeracy concepts. This improvement was consistent across the respondents, indicating that the intervention had a meaningful and measurable impact on their learning outcomes. Overall, the results imply that well-planned and targeted instructional approaches can strengthen learners' competencies, boost their confidence in problem-solving, and contribute to higher academic achievement in Mathematics.

RECOMMENDATION

The Teacher should actively implement and utilize structured numeracy intervention strategies in their daily instruction to improve students' understanding, application, and retention of mathematical concepts. They should also provide timely feedback and monitor students' progress to ensure continuous improvement in numeracy performance.

The School Heads should support teachers by providing access to professional development opportunities focused on effective numeracy teaching methods, supplying instructional resources, and monitoring the implementation of intervention strategies to ensure consistent and high-quality instruction across classrooms.

The Public Schools District Supervisor should facilitate training workshops for teachers on numeracy intervention techniques, provide guidance on curriculum alignment, and regularly assess the effectiveness of interventions in improving students' mathematical competencies.

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The Parents should actively engage with their children's learning by supporting home-based practice activities, encouraging consistent participation in classroom activities, and fostering a positive attitude toward Mathematics to reinforce what is learned at school.

The Researcher should document the procedures, strategies, and results of the intervention for future reference, share best practices with the school community, and assist in developing scalable intervention plans that can be adapted for other grade levels or schools.

Future Researchers should replicate and expand this study in different grade levels, learning contexts, and subjects to validate the effectiveness of numeracy interventions, explore long-term impacts, and identify additional strategies to enhance student learning outcomes in Mathematics.

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AUTHOR'S PROFILE

ANDREW B. MEREZ

The author was born on May 16, 1995, in Ormoc City, Leyte, Philippines. He completed his Bachelor of Elementary Education with academic achievements at Eastern Visayas State University–Ormoc City Campus. His undergraduate studies provided him with a strong foundation in pedagogical principles, instructional strategies, and classroom management essential to the field of Elementary Education.

During his secondary and tertiary years, he demonstrated excellent leadership and active involvement in various student organizations. These experiences cultivated his interest in educational supervision and leadership, which further strengthened his commitment to the teaching profession.

At present, he is pursuing his Master of Arts in Education, major in Elementary Education, at Western Leyte College. His graduate studies continue to enhance his professional competence, research skills, and dedication to delivering quality instruction. As an educator, he remains committed to fostering holistic development, academic excellence, and lifelong learning among elementary learners.

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