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ASSESSMENT TOOL IN NUMERACY (ATIN): ANALYZING THE PERFORMANCE LEVEL OF PRIMARY SCHOOL LEARNERS IN MATHEMATICAL CONCEPTS AND OPERATIONS

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Abstract

This study determined the numeracy performance level particularly on mathematical concepts and operations as assessed by the Assessment Tool in Numeracy (ATIN) among the Grade 2 Pupils of select elementary schools in Calanasan, Apayao, Philippines. Descriptive correction design was adopted, and data were gathered thru a standardized test from among all the pupils of the selected grade level and elementary schools. The profiles of the respondents showed a variety of family and school backgrounds. As to the learners' numeracy performance level, in areas like number identification and basic operations, there was a mix of abilities. While many learners were at developing or beginner levels in key areas, only a small number reached advanced levels. There was a notable difference in math performance between the two schools, with learners from Pedro Bunot Central School scoring higher on average. The analysis showed that specific personal factors, like how educated the parents were and the learners' weekly allowance, really did connect to how well learners performed in math. Learners whose parents had higher education levels and who had better grades tended to do better in math, highlighting the role of parental education and involvement in school success. A strong link between reading accuracy and comprehension was established signifying learners who read better also tended to do well in math tasks that required understanding problems and instructions. This pointed out how literacy skills were tied to math success.

Keywords: *Assessment Tool in Numeracy (ATIN), Calanasan Apayao, mathematical concepts and operations, numeracy performance, primary school learners*

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INTRODUCTION

In early childhood education, mathematical literacy especially numeracy skills were vital because it laid the groundwork for more advanced mathematical understanding. In the Philippines, the Department of Education (DepEd) highlighted the significance of fostering early numeracy development through a range of initiatives, such as the Assessment Tool in Numeracy (ATIN). ATIN functioned as a standardized evaluation to measure learners' early-stage mathematical skills, confirming their alignment with the anticipated competencies for their grade level. In spite of these endeavors, a number of primary school learners still find it difficult to master basic numeracy skills, which had a negative impact on their academic success and broader cognitive growth.

Similar to numerous other learning institutions, Pedro Bunot Central School and Sabangan Elementary School encountered difficulties in improving the numeracy abilities of its Grade 2 learners. Teachers noticed that certain learners struggled with fundamental arithmetic operations, solving problems, and logical reasoning. These difficulties could be linked to a number of causes, including inadequate instructional resources, lack of home support, or subpar teaching methods. It is essential to analyze and comprehend the numeracy performance of learners utilizing ATIN in order to pinpoint specific gaps and enhance instructional methods.

Although the current body of work on numeracy assessments underscored the significance of formative evaluation tools for monitoring learners' advancement, there was a lack of research evaluating the impact of ATIN on learners' numeracy performance in primary school environments such as Pedro Bunot Central School and Sabangan Elementary School. Prior research frequently centered on numeracy trends at the national level, with limited data examining its effects in localized contexts, especially in smaller rural schools.

This study addressed this gap by performing a current analysis of numeracy performance with ATIN. In this way, it could offer empirical data regarding the strengths and weaknesses of Grade 2 learners in terms of numerical proficiency. The results would provide a foundation for suggesting targeted measures that can improve numeracy teaching and learner outcomes.

The study was timely and relevant due to DepEd's ongoing efforts to enhance foundational mathematical skills in early education. Gaining insight into the numeracy performance of young learners via ATIN would benefit learners and teachers alike, while also aiding in the wider objective of enhancing the country's educational quality. (Magsambol, 2025).

Statement of the Problem

This study determined the numeracy performance level particularly on mathematical concepts and operations as assessed by the Assessment Tool in Numeracy (ATIN) among the Grade 2 Pupils of Pedro Bunot Central School and Sabangan Elementary School.

Specifically, it sought answers to the following questions:

1. What is the personal and academic profile of primary school learners?
2. What is the numeracy performance level of the primary school learners along: a) Number Identification b) Number Discrimination c) Missing Numbers d) Four Fundamental Operations and e) Word Problem
3. What is the numeracy performance level of the learners when taken as a whole and grouped according to school they are in?
4. Is there a significant difference in the numeracy performance levels of the primary school learners based on the type of school they were in?
5. Is there a significant relationship between the numeracy performance levels of the primary school learners and the profile variables of the primary school learners?

METHODS AND PROCEDURES

Research Design

This study employed a descriptive-correlational research design. Descriptive research was used to understand the personal and academic profiles as well as the numeracy performance of the respondents through a thorough analysis of their number identification, number discrimination, missing numbers, basic operations, and word problem-solving. Meanwhile, the correlational aspect of the research aimed to find out whether and how different numeracy abilities correlated with the personal and academic profiles of the respondents.

Locale of the Study

The study was conducted at Pedro Bunot Central School and Sabangan Elementary Schools in the Calanasan District in the province of Apayao. These are prime schools that enroll primary school learners, such as Grade 2 learners. The school was suitable for research on numeracy ability since it followed the regular mathematics education curriculum. The study of Grade 2 learners was particularly important since that grade was the stage where basic numeracy ability was acquired, and it was crucial in the acquisition of higher-level mathematical ability.

Respondents and Sampling Procedure

The study employed a total of 32 Grade 2 learners- 21 regular learners from Pedro Bunot Central School and 11 learners from Sabangan Elementary school. Since the study aimed to assess the numeracy performance of young learners, the participants were chosen through meticulous considerations to obtain a representative population of Grade 2 learners.

Total enumeration was used in the recruitment of the respondents. The regular Grade 2 learners of Pedro Bunot Central School was only selected in the study , excluding the SPED class. This is to match with the lone class of Grade 2 in Sabangan Elementary School. The Grade 2 learners were chosen in this case because they were at the grade level where the fundamental numeracy skills were being developed.

Research Instruments

The primary research instrument used in this research was the Assessment Tool in Numeracy (ATIN), a normed instrument for measuring the numeracy skills of learners in primary schools. The instrument measured basic numeracy items including number recognition, number discrimination, missing numbers, the four operations, and word problem-solving skills. The ATIN was constructed with various test items measuring various levels of mathematical competence.

The ATIN tool, as a mathematics education specialist-tested for reliability and appropriateness for use with Grade 2 learners, rendered age-friendly, utilizing simple directions and familiar contexts to adequately measure numeracy performance of the respondents. Outcomes from this tool provided evidence of the

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strengths and weaknesses of the learners and allowed teachers to make evidence-based targeted interventions.

Data Gathering Procedures

The data collection process employed was a systematic approach in order to achieve precision and uniformity. Research permission was sought from the school principal and Grade 2 teachers to conduct the research. Ethical concerns, including parental consent, were addressed prior to data collection. The researchers oriented the learners and teachers to the purpose of the study. The instructions on answering the ATIN were written in simple and concise language to ensure that the young learners understood the test. The test was administered under a controlled classroom environment with the researchers and instructors monitoring. Learners were provided sufficient time to administer the test so that they would have the freedom to work at their own pace without any rush. Completed questionnaires were collected and checked for completeness. Unclear or missing answers were noted for clarification. Testing was scored according to the pre-set scoring rubric of the ATIN. Outcomes were encoded into a database so that they could be analyzed statistically. The data collected were processed using the appropriate statistical methods to determine the levels of numeracy performance of the respondents and identify any significant correlations between different numeracy skills.

Data Analysis

Basic statistics such as mean, standard deviation, and frequency distribution were used to summarize and describe learners' performance in each numeracy skill area. The descriptive statistics provided a general description of the learners' math strengths and weaknesses. The statistical coefficient was used to determine the relationship between different numeracy skills. As an illustration, the research examined whether greater skill in the identification of numbers was associated with better word problem-solving. Where necessary, a t-test was used to determine numeracy performance between the two Grade 2 classes. This was done in order to find out whether or not there was a difference in their mathematical skill.

RESULTS AND DISCUSSION

Personal Profile of the Respondents

The results show that in terms of sex, there are more male respondents having 53.13% compared to females with 46.87% of the total population, 100.00% of the respondents are Isnag. It is not a wonder since Calanasan where the study was conducted is an Isnag community.

As to the number of siblings among the Pedro Bunot Central School and Sabangan Elementary School, most of them have only one sibling. On the highest educational attainment of fathers, majority of the fathers of the respondents representing 65.63% of the population were high school graduates. On the highest educational attainment of mothers, majority of them mothers of the respondents, 53.13% are high school graduates. Mothers tended to be the primary caregivers, and the education of mothers significantly shaped a learner's initial learning experiences. On the occupation of fathers, the highest percentage, 46.68%, were unemployed. The employment status of the father dictated the poverty level of the family and their ability to sponsor educational needs. Gutierrez and Lim (2024) elucidated that underemployed or unemployed fathers may also experience emotional distress, which would impact responsiveness and involvement towards academic success of learner. On the occupation of mothers, the highest percentage, 34.38%, were self-employed. The mother's income-earning activity was part of household income, which allowed the family to meet educational expenses more effectively. Francisco (2024) noted that rural self-employed mothers wore a dual hat; they were breadwinners and education advocates. As to the weekly allowance of students given by parents, . The highest percentage, 34.38%, were from Php. 101.00 - Php. 200.00. The weekly allowance provided by parents indicated the financial capacity of the family to support a child in meeting daily needs related to school. According to Navarro et al. (2024), when parents provided their children with regular financial assistance in the form of an allowance, attendance tended to be higher, and nutritional intake and engagement in school activities were improved.

Academic Profile of Respondents

The results show that for every 10 students, only two of whom receive academic honors in class. Scholastic standing was essentially an indicator proving that the performance of a learner was good, usually through grades, honors, or academic distinctions.

On the availability of printed materials for study available at home, all the respondents, 100.00%, have textbooks and workbooks, while the lowest percentage, 3.13%, of them have encyclopedias and magazines. Print-out study materials at home such as textbooks and workbooks allowed the learners to apply their learning in class by supplying them with structured material, activities, and reference materials that helped them to learn and maintain concepts. According to Dizon and Manalo (2024), physical education materials like books promoted better reading comprehension and increased learner initiation of self-directed learning.

As to the availability of the gadgets for study of the learners during class. The highest percentage, 32.00%, have cellphones, and the lowest percentage, 18.75%, were have tablets. As technology had become integrated into education, several types of device, including mobile phones, tablets, and laptops, have been reported in which learners used them to access digital resources, participate in virtual classrooms, and undertake research tasks. As reported by Santiago and Villamor (2024), among public school learners, a most common electronic gadget was the cellphone and, due to the availability of these portable electronic devices, they were easily accessible.

When it comes to the availability of private tutors; all of the respondents answered the option “no" with 100.00% which means that no one among them had a private tutor to help them in their enhancement or even advanced studies

The result of the learner's location in the two given public school is also seen in the table. A total of 65.63% of the respondents were from Pedro Bunot Central School, and 34.38% were from Sabangan Elementary School.

Numeracy Performance Level of The Primary School Learners

Table 1 shows the numeracy performance levels of primary school learners in five different domains: number identification, number discrimination, missing numbers, four fundamental operations and word problem solving.

Number identification was the most developed numeracy skill, and most learners achieved an advanced level in this domain. This showed that learners had a high capability of understanding, naming and explaining basic numbers, which were important skills

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during early mathematics learning. As de Guzman and Santos (2024) stated, mastery in number identification was an essential prerequisite for further mastery of more complex arithmetic operations in later grades and was generally a good predictor of success overall with numeracy.

The lowest performance was seen in number discrimination and solving word problems, where many learners were at the beginning level. Number discrimination was all about comparing numbers and their amounts, and it seemed to be a tough spot for many. Mendoza and Cruz (2024) suggested that this issue came from not fully understanding number sizes and amounts, often worsened by not using enough hands-on tools or visual aids in teaching. Word problem solving and Four fundamental operation were other areas where learners struggled. It needed both math and reading skills. Learners had to read the problem, understand what it was asking, and pick the right math operations to solve it. Tolentino and Dela Cruz (2024) noted that a lot of learners didn't have trouble doing the math; they struggled more with figuring out the problem's language. This pointed to the need for combining reading lessons with math, especially in multilingual settings where learners might have faced language challenges.

In general, learners did well in number identification (88.75%) but struggled with number discrimination (52.50%), basic operations (55.00%), and word problems (55.00%). Along missing numbers proficiency (70%), the learners are on developing performance level These numbers showed that it was crucial to improve teaching in the areas where learners were having a hard time. Strategies like tailored instruction, using hands-on materials, and combining reading with problem-solving in math could help them move from a beginning level to a more skilled level. These findings matched what Valencia and Ramos (2024) mentioned about the need for early math intervention programs in public schools to help close learning gaps and boost math skills overall.

Table 1. Frequency and Percentage Numeracy Performance Level of The Primary School Learners

Range	Numeracy Level	A. Number Identification		B. Number Discrimination		Missing Numbers		D. Four Fundamental Operations		E. Word Problem	
		Number of Pupils	Percentage	Number of Pupils	Percentage	Number of Pupils	Percentage	Number of Pupils	Percentage	Number of Pupils	Percentage
0%	Non-Numerate										
1% - 69%	Beginning			27	84.38	18	56.25	24	75.00	28	87.50
70% - 79%	Developing	7	21.88								
80% - 89%	Proficient	4	12.50	5	15.63	9	28.13	8	25.00	4	12.50
90% - 100%	Advance	21	65.63			5	15.63				
AVERAGE Percentage Performance		**88.75**		**52.50**		**70.00**		**55.00**		**55.00**	
		Proficient		**Beginning**		**Developing**		**Beginning**		**Beginning**	

Numeracy Performance Level of The Learners When Taken as A Whole and Grouped According to School They Are In

Table 2 presents a comparison of how learners at Pedro Bunot Central School and Sabangan Elementary School were doing in terms of numeracy performance. The results showed that there were different levels of performance between the two schools. Most learners from Pedro Bunot Central School were doing pretty well, falling into the developing category. This meant they had some basic skills but still needed help to reach a higher level. On the other hand, most learners from Sabangan Elementary School were in the beginning category, which suggested they were still starting out with their numeracy skills and might need more focused support and basic instruction.

Overall, when we looked at both schools together, most learners showed they were at the beginning stage, with an average score of 68.25%. This score was lower than what we'd expect for proficient performance. This matched what Reyes and Salazar (2024) found, noting that many public elementary learners in rural areas of the Philippines struggled to get good materials and support in math, which impacted their numeracy skills.

Looking closer, a few learners from Pedro Bunot Central School had reached the proficient or even advanced levels, which might mean they had better teaching or more support at home. In contrast, Sabangan Elementary School had no learners in these higher categories, which could have been due to issues like fewer resources, larger class sizes, or teacher-learner ratios. This difference showed the need for local programs to help, as emphasized by Garcia and Mendoza (2024), who stressed the importance of using materials and training that fit each school's specific needs.

These results pointed to the need for school-based and community-supported programs to improve numeracy. According to Delos Reyes et al. (2024), schools that used inclusive teaching strategies—like personalized learning, peer mentoring, and digital tools—had seen noticeable improvements in learner performance over time.

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In summary, while some learners were showing good progress and reaching higher skill levels, many still needed support to move beyond the beginning stage. This called for ongoing help, teacher training, and adjustments to the curriculum to improve learning outcomes. These findings supported the push from DepEd's MATATAG Curriculum Reform (2024) to focus on numeracy in early grades, especially in schools that needed more resources.

Table 3. Frequency Distribution of Numeracy Performance Level of The Learners

When Taken as A Whole and Grouped According to School They Are In

Range	Numeracy Level	PEDRO BUNOT CS		SABANAGAN ES		AS A WHOLE	
		Number of Pupils	Percentage	Number of Pupils	Percentage	Number of Pupils	Percentage
0%	Non-Numerate						
1% - 69%	Beginning	7	33.33	10	31.25	17	53.13
70% - 79%	Developing	10	47.62	1	3.13	11	34.38
80% - 89%	Proficient	3	14.29			3	9.38
90% - 100%	Advance	1	4.76			1	3.13
AVERAGE Percentage Performance		**71.62**		**61.82**		**68.25**	
		Developing		**Beginning**		**Beginning**	

Comparison on the Numeracy Performance Levels of the Primary School Learners on the Type of School they Are In

Table 4 below showcases the comparison on the math or numeracy performance of learners at Pedro Bunot Central School and Sabangan Elementary School. The results showed that there was a noticeable difference in scores, with Pedro Bunot Central School learners averaging 71.62 and those at Sabangan Elementary School scoring 61.82. The t-value of 3.576 and a p-value of 0.001 showed that this difference was really significant.

This performance gap aligned with what other research on factors influencing learner's success. For example, Trinidad (2020) pointed out that public schools often faced challenges such as insufficient materials and properly trained teachers, which contributed to lower math scores. Bernal Jr. et al. (2020) found that a school's public or private status significantly influenced learners' later academic performance. They discovered that learners from private schools tended to perform better academically than those from public schools, highlighting the importance of quality education and resources.

Magulod Jr. (2021) investigated factors contributing to school effectiveness in the Philippines and found that strong leadership and teamwork among teachers significantly impacted school performance. Interestingly, public schools often had better connections with families, which helped boost learner success.

Overall, these studies suggested that differences in resources, school management, and support contributed to the performance gap between Pedro Bunot CS and Sabangan ES. Focusing on improvements in these areas, using specific strategies and support, could have helped both schools improve their learners' math skills.

Table 5. Comparison on the numeracy performance of the primary school learners on the type of school they are in

School	Mean	t- value	Probability value	Remarks
Pedro Bunot CS– 1	71.62	3.576**	0.001	Highly Significant
Sabanagan ES– 2	61.82			
**** Significant at .01**				

Association of the Numeracy Performance Levels and the Profile Variables of the Primary School Learners

The data in Table 5 show important links between certain profile traits and primary school learner's math performance. Personal and school backgrounds appeared to play a role in their math skills. For instance, learners whose fathers had higher education levels tended to perform better at number identification (r = .470, p = 0.007). This suggested learner of more highly educated fathers might perform better on this basic numeracy skill.

On the other hand, a learner's weekly allowance also related to how well they identified numbers (r = .442, p = 0.011), suggesting that learners with some financial support might have had better access to learning resources. Interestingly, having more siblings was tied to poorer performance in number identification (r = –.441, p = 0.012). This might have meant that in larger families, there was less individual attention or resources, which could have affected a learner's math development.

Looking at school-related factors, a learner's overall academic performance was negatively connected to several areas of numeracy, especially in solving word problems (r = –.683, p = 0.000) and identifying numbers (r = –.406, p = 0.021). This suggested that if a learner's general school performance dropped, their math skills might also have suffered. Also, the school a learner attended significantly affected their math skills, especially in number identification (r = –.641, p = 0.000).

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Research by Reyes and De Guzman (2024) found that the quality of schools—like how skilled the teachers were or how many learners there were per teacher—impacted learner performance even if learners came from similar backgrounds. Additionally, Santos and Mendez (2024) pointed out that having access to educational materials at home could boost outcomes for learners, which was backed up by the data showing that learners with printed materials at home performed better in number identification (r = .377, p = 0.033). These insights highlighted how important it was to create educational programs that took into account the learning environment and the support learners received at home to help improve math skills among primary school learners.

Table 5. Correlation Result on the Association of the Numeracy Performance Levels to

That of the Profile Variables of The Primary School Learners

Profile		A. Number Identification	B. Number Discrimination	C. Missing Numbers	D. Four Fundamental Operations	E. Word Problem
A. Personal Profile						
Number of Siblings	Pearson-r	**-.441***	-0.104	-0.014	-0.111	0.084
	P-value	**0.012**	0.572	0.939	0.545	0.649
Highest Educational Attainment of Mothers	Pearson-r	**.378***	-0.071	0.135	-0.042	0.089
	P-value	**0.033**	0.698	0.460	0.818	0.630
Highest Educational Attainment of Fathers	Pearson-r	**.470****	-0.064	0.031	0.114	-0.102
	P-value	**0.007**	0.728	0.866	0.535	0.578
	P-value	0.133	0.662	0.405	0.931	0.745
Weekly Allowance	Pearson-r	**.442***	0.036	0.014	0.163	0.062
	P-value	**0.011**	0.845	0.941	0.371	0.734
B. Academic Profile						
1. Scholastic Standing	Pearson-r	**-.406***	**-.567****	-0.248	-0.337	**-.683****
	P-value	**0.021**	**0.001**	0.170	0.059	**0.000**
2. Printed Materials for study Available at Home	Pearson-r	**.377***	-0.133	-0.151	0.188	0.023
	P-value	**0.033**	0.469	0.409	0.303	0.901
4. School They are Enrolled In	Pearson-r	**-.641****	**-.434***	0.038	-0.337	-0.124
	P-value	**0.000**	**0.013**	0.836	0.059	0.498
****. Correlation is significant at the 0.01 level (2-tailed).**						
***. Correlation is significant at the 0.05 level (2-tailed).**						

CONCLSIONS AND RECOMMENDATIONS

Conclusions

Using the Assessment Tool In Numeracy (ATIN) in analyzing the performance level of primary school learners in mathematical concepts and operations, the learners of Pedro Bunot and Sabangan Elementary schools are generally at the beginning level.

The testing showed clear differences in math skills between learners from Pedro Bunot Central School and Sabangan Elementary School, suggesting that the type of school impacted how well learners performed in numeracy. Pedro Bunot CS learners generally scored higher in numeracy skills than those from Sabangan ES.

Also, looking at other factors revealed links between personal backgrounds and numeracy performance. This highlighted how family background like the educational level of parents mattered. Interestingly, having a weekly allowance seemed to relate to better math outcomes, hinting that financial factors might have influenced how ready learners were for learning. Good academic standing was linked to fewer math difficulties, showing that learners who did better in school tended to have stronger numeracy skills. The school attended was significantly related to various math skills, which reinforced that the school environment was important.

Recommendations

1. School administrators have to upgrade the tools and spaces in schools, especially those struggling with math, gave learners a better learning experience. When learners had access to updated textbooks and tech, it was easier for

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them to understand tough concepts and stay engaged in class.

2. Schools should create special programs for learners who were falling behind in math. These programs could have helped fill gaps in basic math skills and allowed learners to catch up and feel more confident in their abilities.
3. Parents have to be involved and educating them on how they could help at home makes a big difference in their children's math performance, for if parents were engaged, it improves learners' motivation and attendance and led to better grades.
4. Teachers needed regular training on new teaching methods and math strategies. When they are well-prepared, they could spot when a learner is struggling and adjust their lessons to fit different learning styles, which could help learners do better academically.
5. The administration may **c**reate peer tutoring programs as this could help learners gain confidence and reinforce what they'd learned.
6. Since each school had its own challenges and strengths, the division office supervisor or school principal could develop improvement plans that fit their specific needs.
7. Teachers should keep track of learners' progress as regular assessments would help teachers see how learners are doing in math, spot any issues early, and change their teaching methods if needed. This way, adjustments could be made to support better learning outcomes and timely help for learners.

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