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Correlates of Numeracy Skills of Elementary Pupils in the Division of Northern Samar

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Abstract— This study examined multi-level factors influencing the numeracy skills of 936 Grade 5 pupils in Northern Samar, using a descriptive-correlational design with data from pupils and 10 math teachers across nine public schools. Findings revealed widespread gaps in foundational numeracy, with most pupils performing below proficiency. At the teacher level, there is a shortage of veteran educators, a disconnect between curriculum reforms and teacher training, and gaps in content knowledge due to a focus on general pedagogy over math-specific instruction. Although all teachers pursued graduate studies (30% with a Master's degree, 70% enrolled), traditional materials remain favored, while tech tools and structured feedback are underused due to access and training limitations. Regression results showed no significant effect from teacher experience, degree title, materials, or feedback. Higher education had a negative impact (β = –.439), while training (β = .345) and learner-centered pedagogy (β = .313) were strong positive predictors of numeracy, stressing the value of relevant training and effective teaching strategies.

***Index Terms*—Numeracy, numeracy skills, elementary pupils.**

1. Introduction

Numeracy is the knowledge, skills, practices, and attitudes that learners need to do Math in a variety of situations. It involves perceiving and comprehending the world's mathematical functions Victorian Curriculum and Assessment Authority, (2017). Studying numeracy skills and academic performance of elementary learners are essential for building a strong foundation for future learning, promoting independent learning, developing critical thinking and problem-solving abilities, improving retention and long-term memory, fostering time management skills, cultivating self- discipline and perseverance boosting confidence and more on **(**Ofsted, 2018). Equipping children with numeracy skills is crucial for tackling real-life mathematical challenges. Research shows that learners with solid foundational skills, particularly numeracy, excel in solving routine problems in school, home, and the workplace Jumadain and Sarino, 2025).

Based from the study of Insorio (2020) if the students have low numeracy skills, they were not able to understand the higher mathematics which may cause frustration on the part of the students. Students may eventually develop a dread of dealing with mathematical concepts or studying mathematics as a topic in school. Some students still have a low level of numeracy skills (Latiban and Mendez, 2022).

Meanwhile, the Philippines ranked 2nd from the bottom among the participating countries in the recent Programme for International Student Assessment (PISA) 2018 according to DepEd-National Report of the Philippines (2019). This alarming result revealed that Filipino students recorded a mean score of 353 points in Mathematics Literacy which is significantly lower than the OECD mean of 489 points. The National Achievement Test (NAT) continues to show low math proficiency across several grade levels, with Grade 5 logging the lowest Mean Percentage Score (MPS) at 72.04% in the Division of Northern Samar for SY 2023–2024 (DepEd Division of Northern Samar, 2024). These findings raise the alarm for educational stakeholders, as poor numeracy at this stage predicts wider academic and economic disparities in later years (Fernandez & Dizon, 2021).

According to the findings of Harris & Petersen (2019), students who are exposed to and master early math abilities at a young age are more likely to succeed in school. Student who enters Kindergarten low in math skills tend to continue to perform below their peers in later grades. Hence, study aimed to examine the various factors influencing numeracy skills among elementary pupils in the Division of Northern Samar. Specifically, it aims to determine the profile of the teachers as regard to length of service as math teacher, trainings attended related to numeracy, baccalaureate degree course, highest educational attainment, pedagogical approaches used, numeracy intervention materials used and feedback mechanisms used. Moreover, it also aims to find out the numeracy skill level and lastly, determine the significant relationship between teacher's profile and the learner's numeracy skill level.

This study was conducted in nine public elementary schools from Balicuatro, Central, and Pacific areas in the DepEd Division of Northern Samar, Region VIII, Philippines. These areas were purposively selected to reflect varied educational settings. Schools were chosen based on two criteria: low numeracy performance and size classification. Selection focused on those with consistently low Grade 5 Mathematics scores, as indicated in the 2023 MPS Report, to explore factors influencing numeracy skills. Descriptive -correlational research design was used to variables to test the significant relationships of the variables. A total of 936 Grade 5 pupils enrolled in School Year 2023–2024 participated in the study were surveyed

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using survey questionnaire. These pupils came from three key geographical areas—Balicuatro, Central, and Pacific—each comprising one large, one medium, and one small school. Frequency counts and percentage were used to analyze the descriptive data on the profiles of the respondents while mean scores for the pupil's numeracy skills levels and multiple regression analysis for the test of relationships of variables.

2. Findings

Table 1
Length of service as math teacher

Length of service as math teacher	Frequency	Percentage
25 and above	1	10%
19 - 24	2	20%
13 - 18	1	10%
7 - 12	2	20%
6 and below	4	40%
Total	**10**	**100%**

Table 2 shows that 40% of teachers have six years or less of experience, while only 10% have served over 25 years. The rest fall within the 7–24 year range, indicating a workforce mostly composed of early to mid-career educators. This suggests a shortage of veteran teachers, potentially limiting mentorship and instructional leadership in schools. Research confirms that structured veteran-to-new teacher mentoring enhances teacher leadership, school culture, and instructional quality (Mori, 2024).

Table 2
Trainings attended related to numeracy

Trainings Attended related to Numeracy	Frequency	Percentage
MATATAG Curriculum in Math and ELLN	1	10%
Orientation on how to conduct numeracy test	1	10%
SOLO Framework in Math	1	10%
None	7	70%
Total	**10**	**100%**

Table 2 reveals that 70% of math teachers lacked training specifically on numeracy, with only 30% attending targeted programs. This suggests a major gap in content-focused professional development, which may hinder effective math instruction and alignment with current standards. Limited exposure to frameworks like the MATATAG Curriculum and SOLO Model points to weak support for deeper learning and assessment practices. This gap likely hinders effective math instruction and alignment with current standards. Limited familiarity with frameworks such as the MATATAG Curriculum and SOLO Model further undercuts supports for deeper learning, a disconnect echoed in study of Lumapac and Montero (2025) revealing misalignment between teacher prep and DepEd's new curriculum.

Table 3
Level of trainings attended

Level	Frequency	Percentage
Division	1	10 %
District	1	10 %
School	1	10 %
No Trainings	7	70 %
Total	**10**	**100%**

Table 3 reveals that only 30% of math teachers have attended numeracy-focused training limited to school, district, or division levels—while 70% reported no participation. This suggests restricted access to research-informed professional development aligned with reforms such as MATATAG. Concerningly, most training follows a top-down "cascading" model prone to dilution of content and relevance, providing little exposure to structured instructional models or assessment strategies vital for quality math teaching (Gumilao & Langam, 2025).

Table 4
Baccalaureate degree of the respondents

Baccalaureate Degree	Frequency	Percentage
Bachelor of Elementary Education	8	78 %
Bachelor of Arts in Industrial Education major in Industrial arts	2	22 %
Total	**10**	**100%**

Table 4 shows that 78% of teachers hold a BEEd degree, while 22% earned degrees in Industrial Education, with none having a math-related background. This suggests a content knowledge gap, as their training focuses more on general pedagogy than on mathematical concepts. This corresponds with findings that teacher subject-matter expertise, especially in math, is strongly linked to improved student achievement, while general pedagogy alone is not sufficient (Exconde, T. G., & Escabel, E. B.,2021).

Table 5
Highest educational attainment

Highest Educational Attainment	Frequency	Percentage
Master's Units	7	70 %
Master's Degree	3	30 %
Total	**10**	**100%**

Table 5 shows that all teachers (100%) have pursued graduate studies, with 30% holding a Master's degree and 70% currently enrolled. While this reflects a strong commitment to professional growth, research suggests that advanced degrees alone do not guarantee improved teaching effectiveness unless aligned with classroom needs and supported by ongoing pedagogical training. As Exconde and Escabel (2021) emphasized, pedagogical content knowledge (PCK) in mathematics—often lacking in general graduate programs—is critical for effective numeracy instruction.

Table 6 shows that direct instruction, formative assessment, and real-world applications were the most frequently used strategies, with all 10 teachers (100%) reporting consistent use. These reflect a strong emphasis on clarity, feedback, and relevance in foundational numeracy instruction. Such approaches align with best practices that promote conceptual understanding and engagement. According to Hattie (2009), direct instruction and formative assessment rank among the highest-impact strategies for improving student achievement, especially when combined with real-life applications that enhance meaning and motivation.

Collaborative learning, differentiated instruction, manipulatives, math discussions, and game-based learning followed closely, with 90% of teachers reporting their use. This

Table 6
Pedagogical approach used

Pedagogical Approach	Frequency	Rank
Direct Instruction	10	2
Formative Assessment	10	2
Real-World Applications	10	2
Collaborative Learning	9	6
Differentiated Instruction	9	6
Use of Manipulatives	9	6
Mathematical Discussion	9	6
Game-Based Learning	9	6
Inquiry-Based Learning	8	10.5
Problem-Based Learning (PBL)	8	10.5
Experiential Learning	8	10.5
Scaffolded Instruction	8	10.5
Concrete-Representational-Abstract (CRA) Approach	7	13.5
Flipped Classroom	7	13.5
Technology-Enhanced Learning	6	15

** No. of Teachers = 10*

Table 7
Numeracy intervention materials used

Math Workbooks	Mean	Interpretation
Place Value Charts	4.10	High
Flashcards	4.10	High
Math Games (board games, card games)	3.70	High
Number Lines	3.60	High
Counting Bears	3.40	High
Math Manipulatives Kits	3.30	Moderate
Base Ten Blocks	3.20	Moderate
Fraction Circles	3.10	Moderate
Interactive Math Software	3.00	Moderate
Graph Paper	3.00	Moderate
Geoboards	2.90	Moderate
Digital Learning Platforms (e.g., Khan Academy)	2.60	Moderate
Mathematics Storybooks	2.50	Low
Abacus	2.10	Low
Grand Mean	**2.00**	**Low**

indicates a shift toward interactive and learner-centered methods that support engagement, motivation, and conceptual understanding. These strategies are supported by Tomlinson (2014), who highlighted the effectiveness of differentiated instruction in meeting diverse learner needs.

Inquiry-based, problem-based, experiential, and scaffolded instruction were each used by 80% of teachers, showing a growing interest in fostering higher-order thinking and learner autonomy. These approaches align with constructivist theories that emphasize active learning and cognitive engagement. This confirms with the findings of Prince and Felder (2006), inquiry and problem-based learning enhance students' critical thinking and application skills.

The Concrete-Representational-Abstract (CRA) and flipped classroom approaches were used by 70% of teachers, suggesting underutilization likely due to limited training or technological constraints. CRA could have been effectively implemented for flipped classrooms can enhance engagement and conceptual understanding when properly implemented (Bergmann & Sams, 2012).

Technology-enhanced learning ranked lowest, with only 60% of teachers reporting its use, reflecting a persistent digital divide. This limited integration forms resemblance with the findings by the OECD (2021), which noted that inadequate infrastructure and access in disadvantaged areas hinder effective technology use in education, especially in rural settings.

Table 7 shows a moderate overall use of numeracy materials (M = 3.11). High use was noted for workbooks and place value charts (M = 4.1), while tools such as the abacus (M = 2.0), digital platforms (M = 2.5), and math storybooks (M = 2.1) received low ratings. This pattern suggests that teachers favor traditional resources, with limited integration of technology and narrative tools likely due to issues related to access, training, or perceived instructional value. This confirms with the findings of Cheung and Slavin (2013) found that effective use of digital tools in the classroom is contingent upon targeted teacher training and support.

Table 8 shows a high overall use of feedback strategies (M = 3.55), with immediate verbal feedback (M = 4.5) and homework reviews (M = 4.4) rated highest. This underscores teachers' strong reliance on real-time, oral feedback to support learning. Less-used tools like rubrics, journals, and digital platforms (Ms = 2.1–3.2) suggest limited adoption of structured and tech-based feedback, likely due to access or training gaps. According to Shute (2008), effective feedback must be timely, specific, and actionable to significantly improve learning. However, limited training and infrastructure often hinder the implementation of more formal and technology-based feedback systems (Carless & Boud, 2018).

Table 9 shows that 65% of the 936 Grade 5 pupils are below the desired numeracy proficiency, with only 29% reaching Proficient or Highly Proficient levels. This indicates widespread gaps in foundational skills, which are critical for

Table 8
Feedback mechanisms used

Feedback mechanisms used	Mean	Interpretation
Immediate Verbal Feedback During Class	4.5	Very Highly used
Homework Review Sessions	4.4	Very Highly used
Progress Reports	4.3	Very Highly used
Interactive Whiteboard Responses	4.2	Very Highly used
Parent-Teacher Meetings	4.1	Highly used
Peer Feedback Sessions	3.8	Highly used
Group Feedback Discussions	3.7	Highly used
Written Comments on Assignments	3.6	Highly used
Student Self-Assessment Checklists	3.6	Highly used
One-on-One Conferences	3.3	Moderately used
Rubrics with Detailed Criteria	3.2	Moderately used
Use of Learning Management Systems (e.g., Google Classroom)	2.8	Moderately used
Feedback Journals	2.8	Moderately used
Digital Feedback Tools (e.g., Kahoot, Socrative)	2.8	Moderately used
Online Quizzes with Instant Feedback	2.1	Lowly used
Grand Mean	**3.55**	**Highly used**

Table 10
Regression analysis of teacher's profile and the pupil's numeracy skill level

Teacher's Profile	Unstandardized Coefficients		Standardized Coefficients	t	p-value	Interpretation
	B	Std. Error	Beta			
Length of service as math teacher	-.968	1.286	-.050	-.753	.452	Not Sig.
Trainings attended related to numeracy	7.464	1.242	.345	6.010	.000	Sig.
Baccalaureate degree course	-4.498	4.515	-.090	-.996	.319	Not Sig.
Highest educational attainment	-21.256	3.838	-.439	-5.538	.000	Sig.
Pedagogical Approaches Used	6.312	1.465	.313	4.309	.000	Sig.
Numeracy intervention materials used	-1.874	2.781	-.085	-.674	.501	Not Sig.
Feedback Mechanisms Used	-.128	3.593	-.004	-.036	.972	Not Sig.

later academic achievement. Early numeracy has been consistently linked to long-term success in mathematics and broader academic outcomes (Dierkx, van de Rijt, Hessen, van Luit, & van Viersen, 2025).

Table 9
Numeracy skill level of the grade 5 pupil-respondents

Description	Intervals	Frequency	Percentage
Highly Proficient	90 - 100	112	12%
Proficient	75 - 89	157	17%
Nearly Proficient	50 - 74	355	38%
Low Proficient	25 - 49	254	27%
Non-Proficient	0 - 24	58	6%
	Total	**936**	**100%**

3. Conclusion

The study concludes that the numeracy level of Grade 5 pupils in the Division of Northern Samar remains below the desired proficiency, with 65% of learners not meeting expected standards. Despite learner motivation and resilience, significant gaps in foundational skills persist, underscoring the need for improved instructional support.

Regarding the profile of mathematics teachers, findings indicate that most are early to mid-career educators lacking math specialization and numeracy-specific training. While all have pursued graduate studies, only a few hold math-relevant degrees, and classroom strategies remain largely conventional. This points to a mismatch between teacher qualifications and the instructional demands of numeracy education.

Regression analysis further reveals that teacher variables such as years of experience, degree title, and educational attainment are not significantly associated with pupil performance. In contrast, participation in numeracy-related training ($\beta = .345$, $p = .000$) and the use of varied, learner-centered pedagogical approaches ($\beta = .313$, $p = .000$) are strong positive predictors of numeracy achievement. These findings emphasize that practice-based competencies and professional development are more critical than formal credentials in driving pupil outcomes.

The results call for sustained teacher capacity building focused on numeracy content, pedagogy, and assessment practices to improve learner achievement and bridge persistent learning gaps.

4. Recommendations

To improve numeracy outcomes, schools should implement guidance and home-based programs that promote growth mindset, emotional regulation, and family engagement. Learner-centered classroom strategies aligned with students' needs and learning styles are also essential.

School leaders must monitor MPS in Mathematics and ensure that available resources are effectively used. While rural challenges persist, localized instructional improvements and peer support networks can help mitigate their impact.

Given the link between teacher profiles and pupil performance, administrators should prioritize targeted training, effective deployment, and instructional coaching. Teacher hiring should also consider math specialization and graduate study as part of professional development.

Regression results show that teacher experience ($\beta = –.050$, $p = .452$), degree title ($\beta = –.090$, $p = .319$), use of materials ($\beta = –.085$, $p = .501$), and feedback ($\beta = –.004$, $p = .972$) had no significant effect on pupil numeracy. Surprisingly, higher educational attainment had a negative impact ($\beta = –.439$, $p = .000$), possibly due to mismatch with classroom needs.

In contrast, training attended ($\beta = .345$, $p = .000$) and

pedagogical approaches used (β = .313, p = .000) were strong positive predictors, underpinning that targeted professional development and learner-centered strategies drive better numeracy outcomes supporting findings by Papay & Kraft (2020), Darling-Hammond et al. (2020), and Cheung & Slavin (2020).

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