

# **An Analysis of Teacher Strategies, Student Engagement, and Learning Outcomes in the Implementation of Project All Numerates in a Selected Public Elementary School in Pandi, Philippines**

Mary Anne D. Santos, Joseline M. Santos\*

Graduate School, Bulacan State University, Malolos, Bulacan Philippines

\***Email:** joselinesantos16@gmail.com

## **Abstract**

This study investigated the relationship between teacher strategies and student engagement in the implementation of Project All Numerates (Project AN) and its implications for student learning outcomes in Mathematics. This study was conducted in response to the Philippines' low performance in the 2019 Trends in International Mathematics and Science Study (TIMSS). The respondents are 6 Key Stage 2 teachers and 133 students (Grades 4-6) at an elementary school in the Philippines. Utilizing a quantitative, correlational research design, the data were collected through adapted survey questionnaires and standardized Project AN pretest and posttest measures of students' numeracy skills. Descriptive statistics and correlation analyses were employed to evaluate the data. The study's results showed a statistically significant improvement in student performance from pretest to posttest, with a small effect size, indicating meaningful progress. All forms of student engagement, such as cognitive, behavioral, emotional, and social, were found to be positively and significantly correlated with posttest scores. The professional development, teacher preparation, and parents' involvement/ support in students' learning showed weak relations with posttest scores of the students. However, the variable with no correlation is personal strategies. The study concludes that while teacher strategies play a limited role, student engagement is a strong predictor of academic performance. The study's findings highlight the importance of enhancing student engagement to improve numeracy skills.

## **Keywords**

Project AN, Teaching Strategies, Student Engagement, Learning Outcomes, Mathematics

## **Introduction**

Numeracy plays a vital role in daily life, encompassing activities such as financial management, decision-making, shopping, calculating expenses, and telling time. Numeracy refers to the knowledge, skills, and dispositions needed to apply mathematical concepts effectively across real-life contexts and to recognize the relevance of mathematics in everyday situations (Victoria State

**Submission:** 11 November 2025; **Acceptance:** 16 January 2026; **Available online:** February 2026



**Copyright:** © 2026. All the authors listed in this paper. The distribution, reproduction, and any other usage of the content of this paper is permitted, with credit given to all the author(s) and copyright owner(s) in accordance to common academic practice. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license, as stated in the website: <https://creativecommons.org/licenses/by/4.0/>

Government, 2024). It is important for students as they frequently engage in tasks such as counting objects, sharing quantities, and managing time. It supports problem-solving and critical thinking skills, preparing learners for future academic and life demands.

However, international assessments reveal persistent challenges in mathematics education in the Philippines. In the 2019 Trends in International Mathematics and Science Study (TIMSS), the Philippines ranked lowest among 58 participating countries in mathematics and science at the Grade 4 level (Magas, 2023). After this 16-year break, the country placed last among 64 participating nations in both subjects (Orbeta & Paqueo, 2022). These results indicate persistent gaps in foundational numeracy skills despite ongoing education reforms. In response, Division Memorandum No. 362, s. 2024, titled “Administration of Project All Numerates (PAN) Assessment for Grade 4-7 Students for S.Y. 2024-2025.” Project AN assesses learners’ numeracy levels and guides the implementation of targeted intervention strategies suited to the individual needs of the students (Department of Education, Bulacan, 2024).

This study employs a quantitative correlational research design to examine the relationships among teacher instructional strategies, students’ active engagement, and learners’ numeracy skills in the implementation of Project AN. It will not only identify effective strategies but also explore how to localize these approaches to meet the needs of diverse students. The implications of this study could inform educational policymakers and guide teachers in crafting intervention programs. Furthermore, the insights gained may serve as a basis for refining Project AN and improving its long-term impact on a more responsive education system.

### ***Statement of the Problem***

The general problem of the study is to determine the relationship between teacher strategies and student engagement in the implementation of Project All Numerates, and the implications of these factors on students' learning outcomes.

Specifically, this study seeks to answer the following questions:

1. How may the strategies and techniques of the teachers in implementing Project All Numerates be described in terms of:
  - 1.1. Teacher's Professional Development;
  - 1.2. Teacher's Preparation;
  - 1.3. Teacher's Personal Teaching Strategies; and
  - 1.4. Teacher's Perspectives on Parents’ Involvement?
2. How may the level of engagement of the students in Mathematics be described in terms of:
  - 2.1. Cognitive Engagement;
  - 2.2. Behavioral Engagement;
  - 2.3. Emotional Engagement; and
  - 2.4. Social Engagement?
3. How may the pretest and posttest in Project All Numerates be described?
4. Is there a significant difference between the pretest and posttest in Project All Numerates?
5. Is there a significant relationship between the strategies and techniques of teachers and the level of engagement of students in Mathematics?
6. Is there a significant relationship between the strategies and techniques of teachers and their posttest?
7. Is there a significant relationship between the level of engagement of students and their posttest?

### **Hypotheses**

$H_0$  There is no significant improvement in the performance levels between the pretest and posttest.

$H_1$  There is a significant improvement in the performance levels between the pretest and posttest.

### **Methodology**

This study used a quantitative, descriptive-correlational design to examine the relationships between teacher instructional strategies and student engagement in Project AN and their effects on students' mathematics learning outcomes. The respondents included 6 Key Stage 2 Mathematics teachers and 133 students from Grades 4 to 6 in a public elementary school in Pandi, Philippines. Raosoft Sample Size Calculator was utilized to determine the sample size of the study, and the Simple Random Sampling Technique was used. Project AN used a standardized Pretest two months after the start of the school year to assess students' baseline numeracy skills and identify non-numerates and nearly numerates, followed by a three-month intervention program, and another standardized posttest to measure students' numeracy skills (Department of Education, Bulacan, 2024). Data were analyzed using descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics (correlation) to examine relationships and differences between pretest and posttest results. Ethical considerations included obtaining school permission, informed parental consent, while ensuring confidentiality and maintaining voluntary participation.

### **Results and Discussion**

Table 1. Strategies and Techniques of the Teachers in Implementing Project All Numerates

Strategies and Techniques	Mean	Standard Deviation	Rating
1 Teacher's Professional Development	3.58	0.816	Often
2 Teacher's Preparation	3.94	0.564	Often
3 Teacher's Personal Teaching Strategies	3.87	0.631	Often
4 Teacher's Perspectives on Parents' Involvement	3.33	0.465	Sometimes
Overall Mean and Standard Deviation	3.68	0.619	Often

This finding supports the effectiveness of Project AN in enhancing teachers' mathematics competence by strengthening cross-curricular numeracy integration (Connolly, Carr, & Knox, 2021). These results suggest that targeted professional development leads to the effective implementation of Project AN. Consistent with this, adequate teacher preparation for the differentiated interventions enables more responsive instruction that enhances student learning in mathematics (Enríquez, Valencia, & Oliveira, 2018). The findings also indicate that integrating well-designed digital materials effectively supports student learning (Prediger, Fischer, Selter, & Schöber, 2018). This underscores the importance of prioritizing teacher training and professional learning communities to enhance pedagogical skills, promote meaningful technology use, and sustain improvements in numeracy outcomes. Finally, the study highlights both alignment and divergence in teacher-parent perspectives (VanValkenburgh, Putnam, & Porter, 2021). Thus, schools can bridge such gaps through targeted initiatives and improved communication strategies.

Moreover, the results underscore the importance of continuous teacher training, strengthened professional learning communities, and improved communication strategies with parents to ensure the effective and sustained implementation of Project AN.

Table 2. Level of Engagement of the Students in Mathematics

Students Engagement in Mathematics		Mean	Standard Deviation	Rating
1	Cognitive Engagement	3.85	0.87	Often
2	Behavioral Engagement	3.88	0.97	Often
3	Emotional Engagement	4.00	0.84	Often
4	Social Engagement	4.00	0.84	Often
Overall Mean and Standard Deviation		3.93	0.88	Often

The result of the study strengthens the claim that students' cognitive engagement is a strong predictor of mathematics performance, with notable effects on emotional, social, and behavioral involvement (Flores et al., 2021). In line with this, the respondents often observed that behavioral engagement aligns with the findings of the important role of attitudes, norms, and self-beliefs in shaping students' participation in mathematics (Gjicali & Lipnevich, 2021). It reinforces the findings that students' perceptions significantly influence mathematics performance, with teacher support playing a critical role in emotional engagement (Liu et al., 2017). The interventions in Project AN should be designed to be cognitively, behaviorally, emotionally, and socially stimulating to foster motivation.

Table 3. Mean Performance of Students in the Pretest and Posttest in Project All Numerates

	N	Mean
Pretest	133	45.71
Posttest	133	58.74

The results emphasized the importance of structured instructional programs and interventions, such as Project AN, to support students' progress. Educators can use these findings to continuously integrate similar initiatives or localized interventions to improve numeracy.

Table 4. Comparison of Performance Levels in Pretest and Posttest Results in Project AN

Performance Level	p-value	Decision	Verbal Interpretation	Effect Size	Verbal Interpretation
Pretest and Posttest	0.000	Reject the Null	There is a significant difference.	0.169	Small Effect

The small effect size of 0.169 indicates an improvement in student performance between pretest and posttest (Mcleod, 2023). Thus, structured intervention programs like Project AN can enhance learning through targeted individualized interventions.

Table 5. Correlation between Strategies and Techniques and the Level of Engagement

Variables	$\rho$	Description	p-value	Decision	Interpretation
Cognitive	0.262	Weak	0.002	Reject Ho	There is significant relationship.
Behavioral	0.192	Weak	0.027	Reject Ho	There is significant relationship.

Emotional	0.227	Weak	0.008	Reject Ho	There is significant relationship.
Social	0.198	Weak	0.022	Reject Ho	There is significant relationship.
Overall	0.240	Weak	0.005	Reject Ho	There is significant relationship.
<b>Engagement</b>					

Even with differentiated instruction and contextualized resources, teachers' direct impact on some students' performance may be limited (Caballero et al., 2025). This highlights the need to explore other factors that have indirect effects on teaching.

**Table 6. Correlation between Strategies and Techniques of Teachers, and their Posttest**

Variables	$\rho$	Description	p-value	Decision	Interpretation
Professional Development	0.149	Weak	0.087	Do Not Reject Ho	There is no significant relationship.
Preparation	0.251	Weak	0.004	Reject Ho	There is a significant relationship.
Personal Strategies	0.039	No correlation	0.652	Do Not Reject Ho	There is no significant relationship.
Parents' Involvement	0.114	Weak	0.114	Do Not Reject Ho	There is no significant relationship.
Overall Strategy	0.306	Weak	0.306	Do Not Reject Ho	There is no significant relationship.

Personal Strategies must be further focused to improve the strategies and techniques of the teachers in conducting the individualized interventions in Project AN and their posttest. Hence, to improve academic performance, the other contributing factors that have no significant relationship might be explored.

**Table 7. Correlation between Level of Engagement of Students and their Posttest**

Variables	$\rho$	Description	p-value	Decision	Interpretation
Cognitive	0.641	Moderate	0.000	Reject Ho	There is a significant relationship.
Behavioral	0.632	Moderate	0.000	Reject Ho	There is a significant relationship.
Emotional	0.537	Moderate	0.000	Reject Ho	There is a significant relationship.
Social	0.457	Moderate	0.000	Reject Ho	There is a significant relationship.
Overall	0.645	Moderate	0.000	Reject Ho	There is a significant relationship.
<b>Engagement</b>					

The result of the study further confirms that higher student engagement positively correlates with learning achievement (Rizaldi, 2024). Schools should prioritize strategies and policies for conducting individualized interventions in Project AN to foster holistic engagement, as these substantially influence academic performance.

### Conclusion

Teachers applied professional development, preparation, personal strategies, and digital tools in implementing Project All Numerates, though parental involvement remained limited. Students showed moderate engagement across cognitive, behavioral, emotional, and social dimensions,

with measurable gains in mathematics performance, as evidenced by a statistically significant improvement from pretest to posttest. While most teacher strategies had limited impact on learning outcomes, the findings highlight the critical role of targeted professional development, purposeful digital integration, and strategies to boost student engagement. To maximize learning, schools should strengthen teacher support, foster collaborative practices, and implement interventions such as Project AN.

### Acknowledgements

The researcher expresses sincere gratitude to Bulacan State University for its guidance, support, and inspiration throughout this study. Special thanks are also extended to the faculty and mentors whose expertise, time, and constructive feedback were invaluable in successfully completing this research.

### References

- Caballero, S., Vera, J. D., Mangubat, R., & Calasang, V. (2025). Teacher Strategies and Its Influence on Student Mathematic Performance. *International Journal of Educational Studies*, 8(1), 43–52. <https://doi.org/10.53935/2641533x.v8i1.296>
- Connolly, C., Carr, E., & Knox, S. (2021). Diving deep into numeracy, cross-curricular professional development. *International Journal of Mathematical Education in Science and Technology*, 54(6), 1–20. <https://doi.org/10.1080/0020739x.2021.1986160>
- Department of Education Bulacan. (2024). Division memorandum no. 362, s. 2024: Administration of Project All Numerates (PAN) assessment for grade 4–7 learners for S.Y. 2024–2025. [DIVISION MEMORANDUM NO. 362, S. 2024: ADMINISTRATION OF PROJECT ALL NUMERATES \(PAN\) ASSESSMENT FOR GRADE 4-7 LEARNERS FOR S.Y. 2024-2025 | Department of Education](https://www.deped.gov.ph/wp-content/uploads/2024/03/DIVISION-MEMORANDUM-NO-362-S-2024-ADMINISTRATION-OF-PROJECT-ALL-NUMERATES-PAN-ASSESSMENT-FOR-GRADE-4-7-LEARNERS-FOR-S.Y.-2024-2025-Department-of-Education)
- Department of Education Bulacan. (2024). 2024 Post-Test Administration of Mathematics Project All Numerates (PAN) For Grades 1-7 Learners. <https://bulacandeped.com.ph/wp-content/uploads/2024/03/DIVISON-MEMORANDUM-NO-129-S-2024.pdf>
- Enríquez, J. A. V., Valencia, H. G., & Oliveira, A. M. P. de. (2018). Strategies Used by Teachers of Mathematics in the Implementation of Tasks. *Modern Applied Science*, 12(5), 114. <https://doi.org/10.5539/mas.v12n5p114>
- Flores, S., Tamban, V., Lacuarin, N., Bando, M., & Cortezano, G. (2021). Students' Engagement and their Performances in Mathematics. *PARIPEX INDIAN JOURNAL of RESEARCH*, 164–167. <https://doi.org/10.36106/paripex/7211471>
- Gjicali, K., & Lipnevich, A. A. (2021). Got math attitude? (In)direct effects of student mathematics attitudes on intentions, behavioral engagement, and mathematics performance in the U.S. PISA. *Contemporary Educational Psychology*, 67, 102019. <https://doi.org/10.1016/j.cedpsych.2021.102019>
- Liu, R., Zhen, R., Ding, Y., Liu, Y., Wang, J., Jiang, R., & Xu, L. (2017). Teacher support and math engagement: roles of academic self-efficacy and positive emotions. *Educational Psychology*, 38(1), 3–16. <https://doi.org/10.1080/01443410.2017.1359238>

- Magas, J. (2023). Predictors of Student's Performance in TIMSS Mathematics Released Items. *Psychology and Education: A Multidisciplinary Journal*, 6(11), 1–1. <https://ejournals.ph/article.php?id=21022>
- Mcleod, S. (2023). *Sampling Distribution*. Simplypsychology.org; Simply Psychology. <https://www.simplypsychology.org/effect-size.html>
- Orbeta, A., & Paqueo, V. (2022). *Philippine Education: Situationer, Challenges, and Ways Forward*. <https://pidswebs.pids.gov.ph/CDN/document/pidsdps2223.pdf>
- Prediger, S., Fischer, C., Selter, C., & Schöber, C. (2018). Combining material- and community-based implementation strategies for scaling up: the case of supporting low-achieving middle school students. *Educational Studies in Mathematics*, 102(3), 361–378. <https://doi.org/10.1007/s10649-018-9835-2>
- Rizaldi, R. (2024). The Correlation Between Students Engagement and Students English Achievement. *ELP (Journal of English Language Pedagogy)*, 9(2), 167–175. <https://doi.org/10.36665/elp.v9i2.902>
- VanValkenburgh, J., Putnam, J., & Porter, M. (2021). Middle school parent involvement: Perceptions of teachers and parents. *Middle School Journal*, 52(4), 33–42. <https://doi.org/10.1080/00940771.2021.1948299>
- Victoria State Government. (2024). *Numeracy for All Learners*. [www.education.vic.gov.au](http://www.education.vic.gov.au). <https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/Pages/numeracy-for-all-learners.aspx>