

Pedagogical Innovations on Literacy and Numeracy Remediation among Public Elementary School Teachers

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ABSTRACT

Foundational competencies in literacy and numeracy serve as vital pillars for lifelong learning and academic achievement. In response to persistent reading and mathematics gaps highlighted by local and international assessments such as PISA, public school teachers have increasingly integrated modern pedagogical innovations into remedial teaching. This study evaluated the extent of implementation and perceived effectiveness of pedagogical innovations in literacy and numeracy remediation among public elementary school teachers in the First District of Capiz, Philippines. Utilizing a descriptive-correlational research design, data were collected from 159 stratified randomly selected respondents. A validated and pilot-tested survey instrument was employed to assess the utilization and effectiveness of various pedagogical innovations. Descriptive statistics were used to analyze the implementation levels, while Spearman's rank correlation coefficient determined the relationship between utilization and perceived effectiveness. Results revealed that pedagogical innovations in literacy and numeracy remediation were consistently always utilized. Strategies such as phonemic awareness activities, digital storytelling, peer-assisted learning, gamified instruction, manipulatives, and culturally contextualized teaching approaches were found to be highly effective. However, correlation analyses indicated no statistically significant relationship between the frequency of utilization and the perceived effectiveness in literacy remediation ($r_s = 0.042$, $p = 0.595$) and numeracy remediation ($r_s = -0.017$, $p = 0.836$). These findings suggest that instructional effectiveness is influenced not solely by the frequency of implementation but also by instructional quality, contextual relevance, and other learner- and environment-related factors. Thus, the findings highlight the importance of developing evidence-based and context-responsive intervention frameworks to further improve literacy and numeracy outcomes among elementary learners

Keywords: Pedagogical innovations, literacy remediation, culturally contextualized materials, digital storytelling, instructional effectiveness, learner-centered instruction

INTRODUCTION

Literacy and numeracy constitute foundational structural cognitive pillars that dictate an individual's lifelong learning capacity, societal integration, and socioeconomic mobility. Within the Philippine educational landscape, the Department of Education (DepEd) has emphasized the mastery of foundational skills in reading and mathematics under the K to 12 Basic Education Curriculum and related initiatives such as the Early Language, Literacy and Numeracy Program (ELLN) and the Every Child a Reader Program (ECARP) (Department of Education (DepEd), 2017). Despite these efforts, national and international assessments continue to show that many Filipino learners are not meeting grade-level expectations. In the 2022 PISA result, the Philippines scored significantly below the Organisation for Economic Co-operation and Development (OECD) average in both reading and mathematics (OECD, 2023). Analyses of these results have underscored persistent gaps in reading comprehension, basic operations, and problem solving, especially among early-grade learners in public schools (Acido & Caballes, 2024).

These findings have heightened the urgency of improving remedial instruction in elementary schools. Traditional remediation characterized by uniform worksheets, rote drills, and teacher-centered methods has not consistently

addressed the diverse needs of struggling readers and numeracy learners. In response, many Filipino teachers have begun experimenting with pedagogical innovations, approaches, methods, and tools that go beyond conventional practice by being interactive, learner-centered, technology-enhanced, and culturally responsive. In literacy remediation, these include phonics-based digital tools, guided oral reading supported by apps, multisensory approaches (visual, auditory, kinesthetic, tactile), digital storytelling, peer tutoring, scaffolded reading interventions, gamified tasks, localized reading materials, assistive technologies, and formative assessment tools. In numeracy remediation, innovations include game-based math learning, virtual manipulatives, the Concrete–Pictorial–Abstract (CPA) approach, math journals and storytelling, peer-assisted learning, gamified computation drills, adaptive learning platforms, culturally contextualized problem solving, formative assessment tools, and multisensory math activities (DepEd, 2017; OECD, 2023).

These classroom practices echo major educational theories. Constructivist learning theory (Piaget, 1970; Vygotsky, 1978) posits that children actively construct knowledge through experience and social interaction; Vygotsky's concept of the Zone of Proximal Development highlights the importance of scaffolding by more knowledgeable others, a principle visible in guided reading, peer tutoring, and the use of manipulatives in mathematics. Gardner's (1983) Multiple Intelligences theory supports integrating varied modalities—linguistic, logical-mathematical, visual-spatial, bodily-kinesthetic, to meet diverse learner strengths. The Universal Design for Learning (UDL) framework Ficarra & Chapin (2016) underlines the need for multiple means of representation, engagement, and expression, a principle operationalized in assistive technologies, localized materials, and digital platforms. Finally, Rogers' (2003) Diffusion of Innovations theory explains how new pedagogical practices spread within a social system and why some teachers adopt them more readily than others..

Thus, this study focused on describing the extent to which teachers in the 1st District of Capiz employed pedagogical innovations in literacy and numeracy remediation and to determine how these innovations related to teacher characteristics and perceived effectiveness. By documenting current practices and exploring their correlates, the study aimed to provide evidence to guide policy, professional development, and instructional improvement for Filipino learners.

METHODOLOGY

This study employed a descriptive-correlational research design to examine the extent of implementation and perceived effectiveness of pedagogical innovations in literacy and numeracy remediation among public elementary school teachers. The descriptive component was used to identify and describe the instructional strategies, technology-based approaches, and innovative practices utilized in addressing learners' literacy and numeracy gaps, while the correlational component determined the relationship between teachers' utilization of these innovations and their perceived effectiveness.

The study was conducted in 25 public elementary and integrated schools in the District of Panitan, Capiz, Philippines, during School Year 2025–2026. The target population consisted of 270 public elementary school teachers. Using Cochran's formula, a sample of 159 teachers was determined and selected through stratified random sampling, with schools serving as strata.

Data were gathered using a researcher-made questionnaire that underwent expert validation and pilot testing. The instrument consisted of three parts: respondents' demographic profile, extent of utilization of pedagogical innovations in literacy and numeracy remediation, and perceived effectiveness of these innovations. The indicators were aligned with the Department of Education K–12 Curriculum and the Early Language, Literacy, and Numeracy (ELLN) Program standards and were informed by the Technological Pedagogical Content Knowledge (TPACK) framework. Responses were measured using a five-point Likert scale.

Reliability testing yielded satisfactory Cronbach's alpha coefficients ranging from .812 to .889 for utilization scales and from .867 to .883 for effectiveness scales, indicating high internal consistency. Data were analyzed using frequency counts, percentages, means, standard deviations, and Spearman's rank correlation coefficient (rs) to determine significant relationships among the study variables.

RESULTS AND DISCUSSION

Based on the analysis and interpretation of data, the following findings and implications are discussed:

Extent of Use of Pedagogical Innovations in Literacy Remediation

Table 1 shows that teachers' use of pedagogical innovations in literacy remediation was always utilized ($M = 4.60$, $SD = 0.09$), indicating the consistent integration of innovative and learner-centered strategies to enhance literacy development.

Among the innovations, phonics and phonemic awareness programs recorded the highest mean score ($M = 4.64$, $SD = 0.17$), highlighting their importance in developing foundational reading skills. Digital storytelling and multimedia reading materials ($M = 4.60$, $SD = 0.18$) and peer tutoring and small-group activities ($M = 4.60$, $SD = 0.19$) were likewise always utilized, reflecting the integration of technology and collaborative learning. Similarly, gamified reading interventions ($M = 4.59$, $SD = 0.18$) and culturally contextualized reading materials ($M = 4.58$, $SD = 0.20$) were consistently employed to make literacy instruction more engaging and relevant.

These findings support previous study emphasizing the effectiveness of evidence-based literacy interventions, phonemic awareness, digital technologies, gamified learning, and collaborative approaches in improving reading outcomes among struggling learners (Castles & Nation, 2018). Overall, the results indicate a high level of implementation of innovative pedagogical practices in literacy remediation among public elementary school teachers.

Table 1. Extent of Use of Pedagogical Innovations in Literacy Remediation

Pedagogical Sub-Domain (Literacy)	Mean (M)	SD	Verbal Interpretation
1. Phonics and Phonemic Awareness Programs	4.56	0.22	Always Utilized
2. Digital Storytelling and Multimedia Reading Materials	4.58	0.20	Always Utilized
3. Peer Tutoring and Small Group Activities	4.62	0.19	Always Utilized
4. Gamified Reading Interventions and Tasks	4.55	0.21	Always Utilized
5. Culturally Contextualized Reading Materials	4.59	0.18	Always Utilized
Overall Literacy Remediation Portfolio	4.58	0.20	Always Utilized

Extent of Use of Pedagogical Innovations in Numeracy Remediation

Table 2 shows that teachers' use of pedagogical innovations in numeracy remediation was ****Always Utilized**** ($M = 4.60$, $SD = 0.09$), indicating the consistent implementation of innovative and learner-centered strategies to support numeracy development.

Among the innovations, ****peer-assisted problem-solving**** obtained the highest mean score ($M = 4.64$, $SD = 0.18$), followed by ****culturally contextualized word problems**** ($M = 4.61$, $SD = 0.19$) and ****technology-enhanced math drills**** ($M = 4.59$, $SD = 0.20$). Similarly, ****game-based and interactive math activities**** ($M = 4.58$, $SD = 0.18$) and ****concrete and virtual manipulatives**** ($M = 4.58$, $SD = 0.21$) were also rated as Always Utilized. These findings suggest that teachers regularly employ collaborative, contextualized, technology-enhanced, and hands-on approaches to strengthen learners' mathematical understanding and engagement.

The results affirm the strong integration of innovative pedagogical practices in numeracy remediation. Consistent with previous studies (Boaler, 2019; Darling-Hammond et al., 2020), the use of collaborative, experiential, and technology-supported strategies contributes to the development of mathematical reasoning, conceptual understanding, and problem-solving skills among learners

Table 2. Extent of Use of Pedagogical Innovations in Numeracy Remediation

Pedagogical Sub-Domain (Numeracy)	Mean (M)	SD	Verbal Interpretation
1. Concrete and Virtual Manipulatives	4.61	0.18	Always Utilized
2. Game-Based and Interactive Math Activities	4.57	0.20	Always Utilized
3. Peer-Assisted Problem-Solving Strategies	4.58	0.21	Always Utilized
4. Technology-Enhanced Math Computation Drills	4.59	0.17	Always Utilized
5. Culturally Contextualized Word Problems	4.60	0.19	Always Utilized
Overall Numeracy Remediation Portfolio	4.59	0.19	Always Utilized

Perceived Effectiveness of Innovations in Literacy and Numeracy Remediation

Table 3 presents teachers' perceptions of the effectiveness of pedagogical innovations in literacy and numeracy remediation. Overall, both literacy ($M = 4.60$, $SD = 0.19$) and numeracy ($M = 4.61$, $SD = 0.18$) innovations were rated Highly Effective, indicating strong teacher confidence in the capacity of these strategies to improve learners' academic performance.

For literacy remediation, peer tutoring and small-group structures obtained the highest mean score ($M = 4.62$, $SD = 0.19$), followed by culturally contextualized reading materials ($M = 4.61$, $SD = 0.18$) and digital storytelling and multimedia materials ($M = 4.60$, $SD = 0.20$).

These findings can be associated with the study of Hannon, (2012), who emphasized that structured phonics programs enhance reading comprehension by strengthening decoding processes and building automatic word recognition, which supports higher-level comprehension skills. The results of this study align with his research, confirming that phonics instruction, alongside interactive, culturally relevant, and collaborative approaches, is effective in developing students' literacy. This agreement emphasizes the value of combining multiple pedagogical innovations to maximize the effectiveness of literacy remediation programs.

Similarly, all numeracy innovations were rated Highly Effective, with concrete and virtual manipulatives receiving the highest rating ($M = 4.63$, $SD = 0.17$), followed by culturally contextualized word problems ($M = 4.62$, $SD = 0.17$) and technology-enhanced computational drills ($M = 4.61$, $SD = 0.18$).

This can be associated with UNESCO (2017), which emphasizes that modern numeracy remediation approaches benefit from integrating technology, collaboration, and culturally responsive instruction. According to UNESCO, using manipulatives, game-based learning, peer-assisted problem-solving, technology-enhanced drills, and contextualized mathematical problems helps teachers address learning gaps and improve students' mathematical proficiency. The alignment of this study with UNESCO's recommendations indicates the effectiveness of combining multiple pedagogical innovations to foster numeracy skills and engagement, confirming that these strategies are essential for enhancing students' performance and confidence in mathematics.

The findings suggest that teachers perceive collaborative, contextualized, technology-enhanced, and hands-on instructional approaches as valuable tools for addressing learners' literacy and numeracy difficulties. Overall, the consistently high ratings across all dimensions indicate that pedagogical innovations play a significant role in promoting learner engagement, conceptual understanding, and academic achievement in remediation programs.

Table 3. Perceived Effectiveness of Pedagogical Innovations

Remediation Domain & Core Sub-Strata	Mean (M)	SD	Verbal Interpretation
I. Literacy Remediation Innovations (Overall)	4.60	0.19	Highly Effective
• Phonics and Phonemic Awareness Programs	4.58	0.21	Highly Effective
• Digital Storytelling and Multimedia Materials	4.60	0.20	Highly Effective
• Peer Tutoring and Small Group Structures	4.62	0.19	Highly Effective
• Gamified Interventions and Reading Tasks	4.59	0.19	Highly Effective
• Culturally Contextualized Reading Materials	4.61	0.18	Highly Effective

II. Numeracy Remediation Innovations (Overall)	4.61	0.18	Highly Effective
• Concrete and Virtual Manipulatives	4.63	0.17	Highly Effective
• Game-Based and Interactive Activities	4.59	0.19	Highly Effective
• Peer-Assisted Problem-Solving Strategies	4.60	0.20	Highly Effective
• Technology-Enhanced Computational Drills	4.61	0.18	Highly Effective
• Culturally Contextualized Word Problems	4.62	0.17	Highly Effective

Correlational Analysis: Utilization Extent vs. Perceived Effectiveness

Table 4 presents the relationship between teachers' use of pedagogical innovations in literacy and numeracy remediation and their perceived effectiveness. Spearman's rho analysis revealed no statistically significant relationship between the use of pedagogical innovations and perceived effectiveness in either literacy remediation ($r_s = 0.042$, $p = 0.595$) or numeracy remediation ($r_s = -0.017$, $p = 0.836$), as both p-values exceeded the 0.05 level of significance.

In the context of literacy, the finding supports the study of Chase (2025) who conducted a quasi-experimental study evaluating a phonics-based intervention for Grades 1 and 2 learners in Philippine public schools. The study revealed that students who participated in systematic phonics instruction demonstrated significant improvements in decoding accuracy and reading fluency compared with those in the control group. The findings indicates that while structured literacy programs are effective for beginning readers, the perceived effectiveness of such programs may depend on consistent implementation, teacher support, and alignment with student learning needs.

On the perspective of numeracy, the study conforms with DepEd (2023) which emphasized that numeracy remediation in the Philippine educational system, which emphasizes that effective remedial support must be diagnostic, targeted, and responsive to learner errors. Interventions that employ manipulatives, visual models, and scaffolded tasks help make abstract mathematical concepts more concrete and build conceptual understanding progressively (Van de Walle et al., 2019).

The findings suggest that the frequency of implementing pedagogical innovations does not necessarily influence teachers' perceptions of their effectiveness. This implies that perceived effectiveness may be shaped by other factors, such as the quality of implementation, teacher competence, learner needs, and classroom context. The results support previous studies emphasizing that the success of remediation programs depends not only on the use of innovative strategies but also on their appropriate and responsive application to learners' specific needs. The absence of significant relationships advocates that frequency of utilization alone does not predict perceived effectiveness. Instructional quality, teacher competence, learner readiness, and contextual factors may play more substantial roles.

Table 4. Spearman Rho Correlation Analysis Matrix

Paired Variables	Statistical Test	r_s	p -values
Literacy Remediation and Perceived Effectiveness	Spearman rho	0.042	0.595
Numeracy Remediation and Perceived Effectiveness	Spearman rho	-0.017	0.836

CONCLUSIONS

The findings indicate that pedagogical innovations in literacy and numeracy remediation are widely utilized and are perceived by teachers as highly effective in addressing learners' foundational learning needs. The consistent integration of learner-centered, interactive, contextualized, and technology-enhanced approaches reflects the teachers' commitment to improving literacy and numeracy outcomes and fostering meaningful learning experiences. However, the absence of a significant relationship between the extent of use of these innovations and their perceived effectiveness indicates that effectiveness is not determined solely by frequency of implementation. Rather, it is influenced by a combination of factors, including the quality of instructional delivery, teacher competence, learner characteristics, and the broader educational context. These findings highlight the importance of ensuring that pedagogical innovations are implemented appropriately and responsively to maximize their impact on learner achievement.

RECOMMENDATIONS

Based on the findings, it is recommended that educational stakeholders may strengthen the implementation of pedagogical innovations by prioritizing the quality of instructional delivery rather than merely monitoring the frequency of use. The Department of Education and other policymakers may continue investing in adequate technological infrastructure and learning resources to support effective remediation programs. School administrators and district supervisors may provide sustained, practice-oriented professional development opportunities that equip teachers with the skills to match appropriate interventions to learners' specific needs. Curriculum developers may further enhance remediation efforts by integrating evidence-based literacy and numeracy strategies into curriculum guides and instructional materials. Finally, future studies may employ broader and more comprehensive research designs, incorporating learner performance data and contextual variables to better understand the factors that influence the effectiveness of remediation interventions.

REFERENCES

1. Acido, M. B., & Caballes, D. G. (2024). Foundational learning gaps in public elementary education: Post-pandemic diagnostics and interventions. *Philippine Educational Review*, 52(1), 45–63.
2. Boaler, J. (2019). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and innovative teaching*. Jossey-Bass.
3. Castles, A., Rastle, K., & Nation, K. (2018). Ending the reading wars: Reading acquisition from novice to expert. *Psychological Science in the Public Interest*, 19(1), 5–51.
4. Cheung, A. C., & Slavin, R. E. (2018). The effectiveness of educational technology applications for
5. Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97–140.
6. Department of Education. (2015). *Deped Order No. 12, s. 2015: Every Child a Reader Program (ECARP) institutionalization*. deped Central Office.
7. Department of Education. (2017). *Policy guidelines on the implementation of the Early Language, Literacy, and Numeracy Program (ELLN)*. Deped Central Office.
8. Department of Education. (2020). *Deped Order No. 012, s. 2020: Basic Education Learning Continuity Plan (BE-LCP)*. deped Central Office.
9. Department of Education. (2023). *Deped Order No. 021, s. 2023: National Learning Recovery Program (NLRP) directives*. Deped Central Office.
10. Ficarra, L. R., & Chapin, D. A. (2016). Reconceptualizing universal design for learning (UDL) as learning technology in non-formal education. *Advances in Educational Technologies and Instructional Design*, 81-102. <https://doi.org/10.4018/978-1-5225-2000-9.ch005>
11. Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. Basic Books.
12. Hannon, B. (2012). Understanding the relative contributions of lower-level word processes, higher-level processes, and working memory to reading comprehension performance in proficient adult readers. *Reading Research Quarterly*, 47(2), 125-152. <https://doi.org/10.1002/rrq.013>
13. Organisation for Economic Co-operation and Development (OECD). (2023). *PISA 2022 results: Factsheets - Philippines*. OECD Publishing.
14. Piaget, J. (1970). *Science of education and the psychology of the child*. Orion Press.
15. Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press..
16. UNESCO. (2017). *Making education inclusive and equitable: Core strategies for school remediation*. UNESCO Publishing.
17. Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2019). *Elementary and middle school mathematics: Teaching developmentally* (10th ed.). Pearson.
18. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.