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Bridging the Numeracy Gap: Effects of a Remedial Mathematics Intervention on the Numeracy Skills of Grade VI Newton Learners at Cogon Elementary School

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ABSTRACT

This study examined changes in the numeracy skills of Grade 6 Newton learners following a Teaching at the Right Level (TaRL)-based remedial mathematics intervention at Cogon Elementary School, Monreal, Masbate. Using a descriptive-quantitative pretest–posttest design, the study included all 27 learners in the section through total enumeration. Numeracy was assessed before and after the intervention using the Albay Numeracy Assessment Tool (ALNAT), and scores were analyzed using descriptive statistics and single-factor analysis of variance (ANOVA). The overall numeracy rating increased from 34.38% (Needs Major Support) to 75.40% (Anchoring), representing an improvement of 41.02 percentage points. The reported statistical analysis indicated a significant difference between pretest and posttest scores ($p < .05$). Representing and Communicating demonstrated particularly strong post-intervention performance, while Knowing and Understanding, Estimating, and Visualizing and Modelling continued to require instructional support. These findings indicated that remedial instruction was associated with improved numeracy performance, although progress varied across competencies. Teachers should sustain differentiated remedial activities, prioritize persistent learning difficulties, and conduct regular assessments to guide instructional adjustments. The study was limited to one class, without a comparison group or long-term follow-up assessment. Its findings provide school-based evidence for strengthening targeted mathematics instruction, addressing foundational learning gaps, and supporting instructional planning for learners transitioning to secondary education.

Keywords: *Elementary Learners, Mathematics Remediation, Numeracy Assessment, Numeracy Skills, Pretest–Posttest Design, TaRL Intervention*

1. INTRODUCTION

1.1. Background and Context of the Study

Numeracy is a foundational competency that enables learners to interpret quantities, perform mathematical operations, and solve problems in academic and everyday situations. In elementary education, these skills support the gradual development of mathematical reasoning and prepare learners for more complex competencies in secondary school. Learners who progress without sufficient mastery of basic concepts may continue to encounter difficulties as mathematical tasks become more demanding. Svane et al. (2023), in a systematic review of mathematics interventions across educational levels, demonstrated the importance of instructional support that responds to learners' needs and educational contexts. Research has shown that targeted mathematics support can strengthen foundational skills, although results vary according to the intervention and setting. Lopez-Pedersen et al. (2023) reported initial gains following small-group numeracy instruction among first-grade learners, but these benefits diminished during subsequent assessments. Lindström-Sandahl et al. (2024) found stronger improvements in conceptual knowledge, arithmetic, and problem-solving among second-grade learners receiving intensive intervention than among those receiving usual instruction. In the Philippines, Munda et al. (2024) reported improved numeracy performance among Grade 8 and Grade 9 learners who participated in Project COUNTS. These findings underscore the value of remedial instruction while showing why its outcomes need to be assessed rather than presumed. Remedial mathematics instruction provides opportunities for guided practice, corrective feedback, and learning activities matched to identified difficulties. Low et al. (2024) identified various instructional aids used in mathematics remediation, including manipulatives, games, and structured learning materials. At Cogon Elementary School in Monreal, Masbate, improving the numeracy skills of Grade 6 Newton learners is especially important as they approach the transition to secondary education. In this setting, a Teaching at the Right Level (TaRL)-based intervention was examined to determine whether learners' numeracy performance changed following remedial instruction.

1.2. Research Problem

Persistent difficulties in foundational mathematics can hinder learners' ability to complete increasingly complex mathematical tasks. Previous Philippine studies have emphasized the need to diagnose these difficulties and evaluate the results of additional instruction. Tallud and Caballes (2023) used a localized assessment to identify numeracy gaps among elementary learners, illustrating the usefulness of school-based assessment in determining areas requiring support. Blancia (2023) reported a significant difference between the pretest and posttest performance of identified Grade 6 non-numerate learners following remedial activities. However, findings from other schools do not establish the outcomes of the intervention implemented at Cogon Elementary School. The specific concern of this study was the numeracy performance of Grade 6 Newton learners before and after the remedial mathematics intervention. The school context described in the original manuscript included limited instructional resources and no internet connection, making context-appropriate learning support particularly relevant. Aguhayon et al. (2023) found that differentiated instruction improved mathematics performance and confidence among participating Grade 10 learners, but these findings involved a different population and intervention design. Accordingly, the extent of any change in Grade 6 Newton learners' numeracy skills, including whether the pre-intervention and post-intervention difference was statistically significant, required direct assessment.

1.3. Research Gap

Existing research has examined numeracy interventions across educational levels, but the findings cannot be assumed to apply uniformly to all learner groups or school contexts. Munda et al. (2024) evaluated Project COUNTS among junior high school learners, whereas Tallud and

Caballes (2023) investigated numeracy assessment and intervention among learners in Grades 1–3. Sari et al. (2025) examined Teaching at the Right Level in secondary school mathematics. However, these studies do not establish how the selected intervention was associated with the numeracy performance of Grade 6 Newton learners at Cogon Elementary School. The research gap was therefore contextual and evaluative: school-specific evidence was needed to document learners' assessed numeracy skills before and after TaRL-based remediation. The present study addressed this need through a comparison of pre-intervention and post-intervention assessment results, including a test of statistical significance. This approach contributes evidence for instructional decision-making within the participating school without claiming that the intervention alone caused any observed change.

1.4. Purpose and Objectives of the Study

The study aimed to determine the effects of a remedial mathematics intervention on the numeracy skills of Grade 6 Newton learners at Cogon Elementary School, Monreal, Masbate. Teaching at the Right Level (TaRL) served as the remedial instructional approach, and ALNAT was used to assess numeracy performance. Specifically, the study sought to determine the learners' numeracy skills before the intervention, assess their numeracy skills after its implementation, and establish whether a statistically significant difference existed between the two assessments. Its investigation was confined to the participating section, the mathematical competencies covered by the remedial activities, and the assessment results obtained during the study. These objectives guided the interpretation of changes in learner performance.

1.5. Significance and Practical Contribution of the Study

The study offers school-based evidence that may help teachers plan and refine remedial mathematics activities for learners approaching secondary education. Results from the initial assessment can identify competencies requiring additional instruction, while the subsequent assessment can indicate areas in which performance changed. For school heads and education supervisors, these findings may inform decisions about instructional materials, time allocation, and support for targeted numeracy programs. They may also help parents understand the importance of reinforcing foundational mathematical skills through appropriate home-based practice and communication with teachers. More broadly, the study contributes a context-specific examination of TaRL-based remediation in a rural Philippine elementary school and provides a basis for future investigations involving comparable settings.

1.6. Sustainable Development Goals (SDG) Alignment

The study directly aligns with Sustainable Development Goal 4: Quality Education, which calls for inclusive and equitable quality education and lifelong learning opportunities (United Nations, n.d.). In particular, SDG Target 4.1 emphasizes effective learning outcomes in primary and secondary education, including minimum proficiency in mathematics. By assessing numeracy before and after remedial instruction, the study examines a school-level effort to strengthen foundational learning. Its emphasis on supporting learners with differing numeracy needs also relates to the equity concerns of Target 4.5, particularly in a rural educational setting. The findings may inform more responsive instructional support at Cogon Elementary School; however, the study did not directly assess progress toward national or global SDG indicators.

2. METHODOLOGY

2.1. Research Design

The study adopted a descriptive-quantitative research design incorporating pre-test and post-test assessments to examine changes in Grade 6 Newton learners' numeracy performance following remedial instruction. Teaching at the Right Level (TaRL) was used to match activities to assessed learning needs, consistent with research on differentiated numeracy instruction

(Shabrina et al., 2024; Susanti et al., 2024). The independent variable was the TaRL-based intervention, while the dependent variable was numeracy performance measured using the Albay Numeracy Assessment Tool (ALNAT). Comparisons of assessment results addressed the study's objective of examining changes in numeracy skills.
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2.2. Research Locale, Population, and Participants or Respondents

The study took place at Cogon Elementary School in Monreal, Masbate, Philippines. Its population comprised the learners enrolled in the Grade 6 Newton section, who participated in the remedial mathematics activities and the associated assessments. The statistical summary included 27 pre-test scores and 27 post-test scores, corresponding to 27 learners assessed at both stages. The class was selected because the investigation focused on its numeracy needs and on changes in performance following TaRL-based instruction. The setting and respondents defined the scope of the study, with findings referring specifically to this group of elementary school learners.

2.3. Sampling Technique and Sample Determination

Total enumeration was employed, covering all learners in the Grade 6 Newton section rather than selecting a smaller sample. The final sample consisted of 27 learners, as reflected in the pre-test and post-test summary. This approach was aligned with the study's focus on numeracy instruction for the entire identified class. Since all members were included, no separate sample-size calculation was applied. Assessment data from the same class formed the basis for comparisons before and after the intervention.

2.4. Research Instrument and Validation

The Albay Numeracy Assessment Tool (ALNAT), developed by the Department of Education's Albay Division, served as the principal instrument for measuring learners' numeracy skills. Its use in Region V is documented in Department of Education issuances (Department of Education, Region V, 2023; Department of Education, Schools Division Office of Iriga City, 2023). ALNAT was administered as a pre-test to identify mathematical strengths and difficulties and as a post-test to assess subsequent performance. Results guided the selection of remedial activities aligned with learners' actual numeracy levels.
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2.5. Data Gathering Procedure

Following approval of the thesis proposal by the school thesis committee, the researcher submitted a request letter, noted by the thesis adviser, to the Schools Division Superintendent of Masbate. After permission was secured, the researcher coordinated with Cogon Elementary School administrators. Learners first completed the ALNAT pre-test. The researcher subsequently conducted TaRL-based mathematics lessons, guided exercises, and activities suited to the assessed numeracy levels, consistent with the approach described by VVOB et al. (2023). Afterward, ALNAT was readministered, and scores were checked, recorded, and organized for analysis.
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2.6. Data Analysis and Statistical Treatment

The scores were analyzed with a statistician's assistance. Frequency counts and percentages were used to summarize the reported demographic profile of respondents, while the weighted mean provided a numerical summary of relevant responses or performance indicators. Pre-test and post-test results were compared to examine changes in numeracy skills. The manuscript specified one-way, single-factor analysis of variance (ANOVA) to test the difference between

assessment groups. The statistical results informed the interpretation of learners' performance and the identification of areas requiring further instructional support.

2.7. Ethical Considerations

Institutional permission preceded data collection. The thesis proposal was approved by the school thesis committee, the request to conduct the study was submitted to the Schools Division Superintendent, and arrangements were coordinated with the school administration. During assessment and data processing, the researcher maintained the confidentiality of learners' information and handled participation appropriately. The recorded scores were used for the stated purposes of assessing numeracy performance and informing instructional recommendations.

3. RESULTS AND DISCUSSION

3.1. Numeracy Performance of Grade VI Newton Learners Before the Remedial Mathematics Intervention

The numeracy assessment conducted before the implementation of the remedial mathematics intervention revealed substantial learning difficulties among the 27 Grade VI Newton learners at Cogon Elementary School. The assessment covered eight numeracy competencies: Knowing and Understanding, Computing and Solving, Estimating, Visualizing and Modelling, Representing and Communicating, Conjecturing and Reasoning, Proving and Decision Making, and Applying and Connecting. The findings showed that 93.98% of the competency classifications fell under Needs Major Support, while 1.85% were classified as Emerging, 0.46% as Developing, and 3.70% as Transforming. No classifications fell under Anchoring. These percentages reflected the combined classifications across the eight competencies and indicated widespread difficulties in essential mathematical skills. The results further revealed that all 27 learners required major support in Knowing and Understanding, Computing and Solving, Estimating, and Representing and Communicating. Similarly, 26 learners needed major support in Proving and Decision Making and Applying and Connecting, while 23 were classified under the same category in Conjecturing and Reasoning. Visualizing and Modelling showed relatively better performance, with three learners classified as Emerging and four as Transforming. These findings indicated that learners experienced difficulties across computational, conceptual, and reasoning-related competencies, although their performance varied among specific mathematical tasks. The overall pre-intervention numeracy rating was 34.38%, classified as Needs Major Support. Female learners obtained an overall rating of 36.62%, slightly higher than the 32.29% recorded among male learners. Nevertheless, both groups remained within the same performance classification. Among the eight competencies, Visualizing and Modelling obtained the highest rating of 52.59%, followed by Conjecturing and Reasoning at 51.85%. In contrast, Estimating registered the lowest rating of 16.05%, followed by Proving and Decision Making at 25.93% and Representing and Communicating at 29.63%. Computing and Solving recorded 33.83%, Applying and Connecting obtained 32.41%, and Knowing and Understanding registered 35.39%. All competencies remained within Needs Major Support, indicating that the learners had not demonstrated sufficient mastery of the assessed numeracy skills. These findings emphasize the importance of identifying specific mathematical difficulties before implementing remedial instruction. Filiz and Güneş (2023), in their systematic review of mathematics interventions for primary school learners with learning difficulties, identified the importance of structured instructional strategies, particularly those addressing numbers and mathematical operations. Similarly, Rojo et al. (2024) found that the effectiveness of mathematics interventions varied across mathematical content areas, highlighting the importance of matching instruction to identified

learning needs. In the Philippine context, Aguhayon et al. (2023) demonstrated that differentiated instruction improved mathematics performance and confidence among learners experiencing mathematical difficulties, although their investigation involved Grade 10 students. The present findings also correspond with the broader concern regarding mathematics achievement gaps discussed by Greuel et al. (2025), who emphasized identifying foundational numeracy difficulties and providing targeted instructional assistance. Although their report addressed a different educational setting, its emphasis on early identification and appropriate support is relevant to the difficulties observed among the Grade VI learners. Collectively, the baseline findings established the need for systematic remedial activities, guided mathematical practice, and differentiated instruction, particularly in Estimating and other foundational competencies.

3.2. Improvement in Numeracy Performance Following the Remedial Mathematics Intervention

Following the implementation of the remedial mathematics intervention, the Grade VI Newton learners demonstrated considerable improvement across several numeracy competencies. The proportion of competency classifications under Needs Major Support decreased from 93.98% before the intervention to 46.76% afterward. Meanwhile, 34.72% of the post-intervention classifications reached Transforming, while 8.33% were classified as Emerging, 5.09% as Developing, and 5.09% as Anchoring. These changes indicated a substantial shift toward higher numeracy classifications, although the remaining proportion under Needs Major Support showed that some mathematical difficulties persisted. Among the eight competencies, Representing and Communicating demonstrated the strongest performance, with 26 of the 27 learners reaching Transforming. Proving and Decision Making also showed considerable progress, with 17 learners classified as Transforming, followed by Conjecturing and Reasoning with 16 learners. Visualizing and Modelling recorded nine learners at Transforming and seven at Emerging. Computing and Solving showed improvement, with eight learners classified as Emerging, four as Developing, and one as Transforming. However, Estimating remained a major concern, with 25 learners still classified under Needs Major Support, followed by Knowing and Understanding with 24 learners. These findings suggested that the learners progressed at different rates across mathematical competencies. The overall post-intervention numeracy rating increased to 75.40%, classified as Anchoring, compared with the initial rating of 34.38%. This represented an improvement of 41.02 percentage points. Representing and Communicating obtained the highest post-intervention rating of 98.77%, classified as Transforming. Conjecturing and Reasoning recorded 79.63%, Computing and Solving obtained 77.28%, Proving and Decision Making registered 77.04%, and Applying and Connecting reached 75.93%, all reported under Anchoring. In contrast, Knowing and Understanding obtained 65.84%, Estimating recorded 67.90%, and Visualizing and Modelling reached 73.33%, remaining under Needs Major Support. These results indicated substantial improvement in the learners' ability to communicate mathematical ideas, perform computations, apply mathematical concepts, and demonstrate reasoning skills, while highlighting the need for continued development of other competencies. When grouped according to sex, female learners obtained an overall post-intervention rating of 77.83%, classified as Anchoring, while male learners recorded 73.47%, remaining under Needs Major Support. Although female learners maintained a higher descriptive overall rating, both groups demonstrated improvement compared with their initial performance. The findings suggested that the intervention period was associated with better mathematical performance among both groups. However, the observed differences between male and female learners were descriptive because the manuscript did not report a separate statistical comparison by sex. The

observed improvements were consistent with Lindström-Sandahl et al. (2024), who conducted a randomized controlled study of an intensive numeracy intervention among Swedish second-grade learners at risk of mathematics difficulties. Their findings revealed improvements in conceptual knowledge, arithmetic calculations, and mathematical problem-solving among learners receiving additional instruction. Similarly, Myers et al. (2022), through a meta-analysis of mathematics word-problem-solving interventions among elementary learners with mathematical difficulties, reported positive effects of structured instructional interventions. These studies support the educational relevance of targeted mathematics instruction, although their designs and participants differed from those of the present study. Additional support comes from Vessonen et al. (2025), whose systematic review and meta-analysis identified positive effects of mathematical word-problem-solving interventions among elementary learners in Grades 1–6. Their findings emphasized the importance of instructional quality and appropriate implementation in improving mathematical performance. Likewise, Aguhayon et al. (2023) highlighted the value of differentiated mathematics activities in addressing learning gaps and developing learner confidence. These findings provide a useful context for understanding the progress observed among the Grade VI Newton learners. Overall, the post-intervention results indicated meaningful improvement in the learners' numeracy performance, particularly in Representing and Communicating, Proving and Decision Making, and Conjecturing and Reasoning. Nevertheless, the continued classification of several competencies under Needs Major Support demonstrated that improved overall performance did not necessarily indicate complete mastery of every mathematical skill. The findings therefore highlighted the importance of sustaining remedial instruction while giving additional attention to Knowing and Understanding, Estimating, and Visualizing and Modelling.

3.3. Significant Difference Between Learners' Numeracy Performance Before and After the Intervention

The statistical analysis examined whether a significant difference existed between the numeracy performance of the Grade VI Newton learners before and after the remedial mathematics intervention. Based on the reported single-factor Analysis of Variance (ANOVA), the pretest scores of the 27 learners produced a mean of 17.1851852, with a variance of 31.5413105. In comparison, the posttest scores obtained a mean of 37.7037037, with a variance of 16.8319088. The increase in the mean scores indicated that learners performed substantially better during the post-intervention assessment than during the initial evaluation. The reported ANOVA yielded an F-value of 234.990753, exceeding the critical F-value of 4.0266314. Furthermore, the reported p-value of 6.2376×10^{-21} was lower than the established 0.05 significance level. Based on the reported statistical results, the null hypothesis was rejected, indicating a statistically significant difference between the pretest and posttest numeracy scores. This finding was consistent with the increase in the overall percentage rating from 34.38% to 75.40%, suggesting that the learners demonstrated substantial academic progress during the intervention period. The improvement may be understood in relation to the instructional value of additional mathematics support. Nickow et al. (2024), in their systematic review and meta-analysis of tutoring interventions, reported positive effects of tutoring on learning outcomes across preschool, elementary, and secondary education. Their findings indicated that structured instructional assistance can support learners experiencing academic difficulties. Similarly, Myers et al. (2023) found positive effects of mathematical interventions on word-problem-solving performance among upper elementary and secondary learners with mathematics difficulties. These findings correspond with the improved assessment results observed among the Grade VI Newton learners,

particularly in competencies involving mathematical reasoning and problem-solving. Furthermore, Rojo et al. (2024) emphasized that mathematics intervention outcomes varied according to instructional characteristics and the mathematical content being addressed. Lindström-Sandahl et al. (2024) similarly demonstrated the importance of explicit and intensive instruction in strengthening foundational mathematics skills. These findings reinforce the practical importance of matching remedial activities to learners' existing competencies and providing sufficient opportunities for guided practice and mathematical understanding. Although the reported statistical comparison indicated a significant difference between assessment periods, the findings should be interpreted within the study's pretest–posttest design. Because the same learners were assessed before and after the intervention, the scores represented related observations. The single-factor ANOVA reported in the manuscript did not explicitly account for this repeated-measures structure. Consequently, the statistical evidence demonstrated an observed difference in numeracy performance but did not independently establish that the intervention was the sole cause of the improvement. Despite this consideration, the descriptive and reported inferential results consistently indicated substantial progress among the participating learners. Taken together, the findings showed that the remedial mathematics intervention period was associated with a substantial improvement in the numeracy performance of Grade VI Newton learners at Cogon Elementary School. The significant reported difference between pretest and posttest scores, together with the increased overall proficiency rating and improved competency classifications, suggested that the learners benefited from additional mathematical learning opportunities. However, the persistence of difficulties in Knowing and Understanding, Estimating, and Visualizing and Modelling emphasized the need for continued instructional reinforcement. The study therefore contributes school-level evidence on numeracy progress following remedial mathematics instruction and identifies specific competencies requiring sustained educational support.

4. CONCLUSIONS AND RECOMMENDATIONS

The study revealed that Grade 6 Newton learners at Cogon Elementary School, Monreal, Masbate, initially experienced substantial difficulties across all eight numeracy competencies, particularly in Estimating. Following the remedial mathematics intervention, the learners demonstrated considerable improvement, with their overall numeracy rating increasing from 34.38% to 75.40%. The study also established a significant difference between their numeracy performance before and after the intervention. The most notable improvement was observed in Representing and Communicating, while other competencies showed varying degrees of progress. However, Knowing and Understanding, Estimating, and Visualizing and Modelling remained areas requiring additional instructional support. Although female learners generally obtained slightly higher ratings than male learners, numeracy difficulties were evident in both groups. Overall, the findings demonstrated that remedial mathematics instruction was associated with improved numeracy performance among the participating learners, emphasizing the importance of sustained instructional assistance, differentiated learning activities, and continuous monitoring to strengthen foundational mathematical competencies.

Based on the findings, teachers should sustain structured remedial mathematics activities that address the specific learning difficulties of Grade 6 learners, particularly in Estimating, Knowing and Understanding, and Visualizing and Modelling. Instructional strategies should incorporate guided mathematical exercises, interactive games, individualized assistance, and practical activities that encourage learners to apply mathematical concepts in meaningful situations. Teachers should also conduct regular assessments to monitor individual progress, identify persistent learning difficulties, and adjust instructional approaches according to learners'

needs. School administrators should strengthen existing numeracy intervention programs by providing adequate instructional materials, supporting remedial teaching activities, and establishing consistent monitoring practices. Furthermore, learners should be encouraged to participate actively in remedial sessions and engage in regular mathematical practice to reinforce acquired competencies. Future researchers may conduct similar investigations involving larger groups of learners and additional school settings to examine the consistency of the observed improvements and further strengthen the evidence supporting remedial mathematics interventions.

The study focused on 27 Grade 6 Newton learners at Cogon Elementary School in Monreal, Masbate, which limited the generalizability of its findings to other grade levels, schools, and educational settings. The investigation examined numeracy performance before and after the remedial mathematics intervention, with findings centered on eight identified competencies. The reported results did not establish whether the observed improvements were sustained over an extended period or would occur similarly among other learner populations. Future studies may involve larger and more diverse samples, additional school settings, comparison groups, and follow-up assessments to further examine the effectiveness and sustainability of remedial mathematics interventions.

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