

The Effectiveness of ARAL Math Program in Improving the Numeracy Performance of Struggling Elementary Learners

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Abstract

This literature review examined the potential contribution of ARAL-Mathematics, the mathematics component of the Academic Recovery and Accessible Learning Program, to the numeracy performance of struggling Grade 4 learners in the context of SDO Cagayan, District II. The review synthesized recent studies on foundational numeracy, mathematics learning difficulties, tutoring, remedial instruction, explicit teaching, mathematical representations, problem solving, learner grouping, and progress monitoring. It also considered national policies and implementation guidelines related to ARAL-Mathematics. The reviewed literature consistently showed that targeted and systematic mathematics interventions can improve learning when instruction is matched to identified needs, delivered through focused tutoring, supported by clear explanations and meaningful representations, and guided by continuous assessment. Philippine and international evidence also suggests that intervention quality, tutor preparation, learner grouping, instructional time, and regular monitoring influence outcomes. These findings indicate that ARAL-Mathematics has a strong evidence-informed foundation for supporting struggling elementary learners. However, direct empirical evidence on its actual effectiveness, particularly among Grade 4 learners in SDO Cagayan, District II, remains limited. The review therefore concludes that ARAL-Mathematics is promising, but further local evaluation is needed to determine its actual outcomes and guide future implementation, refinement, and sustained learning recovery efforts across diverse school contexts and learner proficiency levels nationwide.

Keywords: ARAL Math Program, Numeracy Performance, Grade 4 Learners, Mathematics Intervention, Struggling Learners, Learning Recovery

1. Introduction

Numeracy is an essential component of elementary education because it enables learners to understand numbers, perform mathematical operations, recognize patterns, interpret quantitative information, and apply mathematical reasoning in everyday situations. Difficulties that develop during the elementary years may affect later mathematics learning, making timely and appropriate intervention particularly important for struggling learners. In the Philippine context, persistent weaknesses in mathematics achievement and learning gaps associated with disruptions in schooling have increased the need for structured learning recovery programs. The Academic Recovery and Accessible Learning (ARAL) Program represents a national response to these concerns by providing targeted academic support in mathematics and other priority learning areas. This literature review examines the evidence supporting ARAL-Mathematics and its potential contribution to the numeracy development of struggling Grade 4 learners, with SDO Cagayan, District II serving as the educational context of the review.

Numeracy provides learners with foundational competencies needed for increasingly complex mathematics and other areas of learning. Early numerical competencies are associated with later mathematical achievement, although the importance of particular numeracy skills may differ among learners and educational settings (Ruiz et al., 2024). When difficulties emerge, appropriate intervention during the elementary years can help prevent learning gaps from becoming more difficult to address. Mathematics achievement remains a concern in the Philippine educational system. In PISA 2022, only 16% of participating Filipino students achieved at least Level 2 proficiency in mathematics, compared with the OECD average of 69% (Organisation for Economic Co-operation and Development [OECD], 2023). Although PISA assesses 15-year-old students rather than Grade 4 learners, these results indicate broader and persistent weaknesses in mathematics learning that may have developed during earlier stages of schooling. Learning recovery became increasingly important following educational disruptions during and after the COVID-19 pandemic. The Department of Education strengthened efforts to provide enrichment, consolidation, remediation, and intervention for learners who had not achieved expected competencies (Department of Education, 2023). Such efforts acknowledge that regular classroom instruction alone may not adequately address accumulated mathematics learning gaps, particularly among learners requiring more focused and systematic support.

The Academic Recovery and Accessible Learning Program was institutionalized through Republic Act No. 12028 to support learners who struggle to meet grade-level competencies in reading, mathematics, and science (Republic Act No. 12028, 2024). Its implementing rules provide for tutorial sessions, learning resources, assessment, trained tutors, and interventions based on identified learning needs (Department of Education, 2025). Mathematics is included in the program from Grades 1 to 10, making ARAL directly relevant to elementary learners experiencing numeracy difficulties. The program emphasizes support based on learners' actual competencies rather than assuming that all learners at the same grade level require identical instruction. This direction is consistent with evidence that mathematics interventions are more effective when they target clearly identified learning difficulties rather than merely repeat regular classroom lessons (Fuchs et al., 2021). Structured instruction, mathematical language, representations, number lines, problem-solving strategies, and guided practice are important components of mathematics support for struggling learners. ARAL Summer-Mathematics further reflects this targeted approach. The 20-day tutorial intervention was designed to strengthen foundational mathematics competencies among incoming Grades 2, 3, and 4 learners classified as Not Proficient or Low Proficient based on assessment results (Department of Education, 2026). Its provisions for focused instruction, proficiency-based grouping where appropriate, formative monitoring, trained tutors, and manageable tutor-to-learner ratios demonstrate an effort to respond directly to identified learning gaps. Evidence from broader mathematics intervention research supports several features of this approach. Pellegrini et al. (2021), in a meta-analysis of elementary mathematics programs, found positive effects from tutoring interventions, particularly when instruction was provided individually or in small groups. These settings can provide struggling learners with additional explanations, feedback, guided practice, and instruction adjusted to their learning difficulties. Nickow et al. (2024) similarly reported positive learning effects from tutoring across prekindergarten to Grade 12, with stronger outcomes often associated with earlier-grade intervention, frequent tutoring, and instruction provided by teachers or paraprofessionals. These findings suggest that the effectiveness of additional instruction depends not only on instructional time but also on its frequency, structure, quality, and responsiveness to learners' needs. Mathematics-specific research reinforces these findings. Svane et al. (2023) found that mathematics interventions generally improved learner outcomes, although the magnitude of improvement varied according to learner groups and intervention characteristics. Fuchs et al. (2021) likewise emphasized systematic and explicit instruction, mathematical representations, mathematical language, and structured practice for elementary learners experiencing persistent mathematics difficulties. Gervasoni et al. (2026) identified representations, computational fluency, and explicit instruction among commonly used approaches for primary learners experiencing mathematical difficulties and highlighted the value of implementing interventions in authentic school settings. Foundational numeracy interventions provide additional support for targeted instruction. Lindström-Sandahl et al. (2024) found that intensive intervention involving conceptual number knowledge, arithmetic procedures, and problem solving resulted in greater improvement among learners at risk of mathematics difficulties than regular instruction alone. Purposeful integration of meaningful representations and manipulatives has also been associated with improved elementary mathematics achievement (Siller & Ahmad, 2024). Collectively, these studies indicate that effective mathematics intervention involves explicit teaching, conceptual understanding, structured practice, appropriate representations, and responsiveness to individual learning needs.

International research provides substantial evidence supporting tutoring and targeted mathematics intervention. However, the effectiveness of intervention may vary according to learners, instructional strategies, implementation conditions, and school contexts. Grade 4 is particularly important because learners are expected to build on basic number concepts while engaging with increasingly complex operations, fractions, measurement, problem solving, and mathematical reasoning. Research indicates that number and operations often receive greater attention during earlier primary interventions, while fractions and word problems become increasingly important in later primary years (Gervasoni et al., 2026). At the national level, ARAL-Mathematics reflects the Philippine government's effort to provide systematic learning recovery through assessment, tutoring, learning resources,

targeted instruction, and monitoring. Within SDO Cagayan, District II, these national directions provide an appropriate context for considering how research-supported mathematics interventions may contribute to the learning needs of struggling Grade 4 learners. The literature review does not assume that Grade 4 learners in SDO Cagayan, District II have already experienced specific outcomes from ARAL-Mathematics. Instead, the division and district provide the educational setting to which the synthesized evidence may be relevant. Implementation may vary across schools and divisions because factors such as learner identification, instructional quality, grouping, learning resources, instructional consistency, and monitoring can affect intervention outcomes. These considerations are reflected in the ARAL framework, which emphasizes assessment, trained tutors, suitable learning resources, and monitoring (Department of Education, 2025).

The conceptual basis of this review centers on targeted learning recovery. Learners experiencing mathematics difficulties are expected to benefit more from instruction that responds to their identified competencies and learning gaps than from simply receiving additional exposure to the same regular classroom instruction. Within this perspective, assessment identifies areas of difficulty, while targeted tutoring provides opportunities for explicit teaching, guided practice, representations, mathematical language, problem solving, and repeated engagement with essential concepts. These principles connect the ARAL Mathematics approach with established evidence on mathematics intervention and provide a basis for examining its potential contribution to Grade 4 numeracy development. The review therefore considers intervention effectiveness in relation to the quality and structure of instruction rather than additional instructional time alone. This perspective is particularly relevant to ARAL-Mathematics because the program incorporates assessment, learner grouping, structured tutorials, trained tutors, appropriate resources, and continuous monitoring.

Despite the broader evidence supporting mathematics tutoring and targeted intervention, ARAL-Mathematics is relatively recent. Its effectiveness cannot yet be assumed to be consistent across grade levels, schools, districts, and divisions. Direct research specifically examining the effectiveness of ARAL-Mathematics among struggling Grade 4 learners remains limited. This gap provides the rationale for conducting a literature review rather than drawing conclusions from primary learner data that have not been collected. The study synthesizes available research on mathematics difficulties, foundational numeracy, tutoring, remediation, and instructional strategies and relates this evidence to the design and implementation features of the ARAL Math Program. Specifically, the review examines the evidence supporting ARAL-Mathematics and its potential contribution to improving the numeracy performance of struggling Grade 4 learners. It considers research-supported instructional practices, potential strengths of the ARAL approach, possible implementation challenges, and areas requiring further investigation. The review also recognizes that conclusions concerning the long-term effectiveness of ARAL-Mathematics should continue to develop as additional Philippine implementation and evaluation evidence becomes available.

The study is most directly aligned with Sustainable Development Goal 4: Quality Education because it focuses on improving access to effective learning support for elementary learners experiencing difficulties in mathematics. Strengthening foundational numeracy contributes to the broader goal of ensuring that learners develop essential competencies needed to participate meaningfully in succeeding levels of education. The ARAL Math Program also reflects the principle of addressing differences in learners' educational needs through targeted intervention. By examining evidence on tutoring, remediation, structured instruction, and learning recovery, the review contributes to understanding how educational support may be made more responsive to learners who have not yet achieved expected mathematics competencies.

The study contributes primarily to educational and institutional sustainability. From an educational perspective, addressing foundational mathematics difficulties during the elementary years may help sustain learning progression by strengthening competencies needed for more advanced mathematical concepts. Evidence-informed intervention can also assist in preventing unresolved learning gaps from continuing into higher grade levels. From an institutional perspective, the review may support more informed implementation of learning recovery initiatives by highlighting the importance of assessment, structured tutoring, instructional quality, suitable learning resources, and monitoring. Examining these elements within the context of SDO Cagayan, District II may help connect national learning recovery directions with research-supported practices appropriate to elementary mathematics intervention. Overall, the study contributes to sustainable educational improvement by synthesizing evidence that can guide the continuing development and implementation of targeted mathematics support. Rather than assuming that a newly implemented program is already effective, the literature review provides an evidence-informed basis for understanding its potential, its implementation requirements, and the areas in which further research remains necessary.

2. Materials and Methods

2.1 Research Design

The study employed a structured literature review design involving the identification, screening, organization, appraisal, and synthesis of relevant academic and policy sources. The design was appropriate because no new data were collected from learners, teachers, or schools. Instead, the study examined existing evidence on mathematics interventions that may support struggling Grade 4 learners and assessed how these findings relate to the ARAL Math Program. The review followed principles of transparent evidence synthesis described in the JBI Manual for Evidence Synthesis (Aromataris et al., 2024). Relevant elements of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses were also considered in organizing the identification, selection, and reporting of literature (Page et al., 2021). As the study was a structured literature review rather than a statistical meta-analysis, the selected evidence was analyzed through qualitative and thematic synthesis.

2.2 Locale of the Study

The study was contextualized within SDO Cagayan, District II. The division and district served only as the educational context to which the findings of the literature may be relevant and were not treated as sources of primary data. This approach allowed the review to consider how evidence on mathematics interventions may inform ARAL-Mathematics implementation for struggling Grade 4 learners without making unsupported claims about actual learner performance or program outcomes in the district. The review primarily considered literature published from 2021 to 2026 to reflect recent developments in mathematics education, intervention, and learning recovery. Earlier sources were retained only when they provided essential theoretical, methodological, or policy foundations.

2.3 Sources of Evidence

The review drew on peer-reviewed academic literature, policy documents, government issuances, and institutional reports relevant to numeracy development, mathematics intervention, tutoring, learning recovery, and ARAL-Mathematics. Struggling Grade 4 learners constituted the population of educational interest, although no learners, teachers, tutors, or school personnel participated directly because the study involved no primary data collection. Evidence involving other elementary grade levels was also considered when the findings were relevant to mathematics remediation, learning recovery, or instructional strategies applicable to Grade 4 learners.

2.4 Sample and Sampling Procedure

The sample consisted of scholarly and official sources selected according to their relevance to the objectives of the review. Sources were included when they addressed numeracy development, mathematics learning difficulties, tutoring, remedial mathematics, targeted interventions, learning recovery, or the policy and implementation foundations of the ARAL Program. Priority was given to studies involving elementary-aged learners, particularly those who were struggling, at risk of mathematics difficulties, or performing below expected proficiency levels. Sources published between 2021 and 2026 were prioritized. International studies were included when their findings could inform mathematics intervention practices relevant to ARAL-Mathematics, while Philippine government documents were retained when they provided direct information about program objectives, structure, target learners, or implementation. Sources with limited relevance, inadequate information, unsupported opinion, duplicate publication, unreliable web content, or unclear authorship or institutional responsibility were excluded. Older materials were retained only when they had clear foundational or policy relevance. Selection was based on the quality and usefulness of the evidence rather than on a predetermined number of studies. Credibility of the publication source, methodological clarity, relevance, recency, and applicability to elementary mathematics intervention were considered. Methodological principles outlined by Aromataris et al. (2024) guided the assessment of relevance and credibility. Government policies and institutional reports were used primarily to establish the legal and implementation context of ARAL rather than as evidence of program effectiveness.

2.5 Research Instrument

Because the study was a literature review, no questionnaire, test, interview guide, or other respondent-based research instrument was used. Instead, a structured review process served as the basis for identifying, assessing, and organizing relevant evidence. Literature was obtained from scholarly search platforms, journal databases, publisher repositories, and official government and institutional sources, including Google Scholar, ERIC, ScienceDirect, SpringerLink, Wiley Online Library, SAGE Journals, Frontiers, the Department of Education, LawPhil, and international education and assessment organizations. Search terms included combinations of “ARAL Program,” “ARAL Mathematics,” “numeracy intervention,” “foundational numeracy,” “Grade 4 mathematics,” “struggling mathematics learners,” “elementary mathematics intervention,” “mathematics tutoring,” “remedial mathematics,” “learning recovery,” and “mathematics achievement.” Terms such as “Philippines,” “DepEd,” and “elementary learners” were used when necessary to refine the search.

2.6 Data Gathering Procedure

Relevant literature was identified through iterative searches conducted throughout the preparation of the review. This approach allowed newly identified studies and official documents to be incorporated as the synthesis developed without imposing an artificial fixed search date. Reference lists of highly relevant publications were also examined to identify additional sources. Priority was given to peer-reviewed journal articles, systematic

reviews, meta-analyses, government issuances, and authoritative institutional reports. Potential sources were initially screened according to their titles and available summaries. Relevant publications were then examined more closely based on their objectives, educational setting, intervention characteristics, research design, findings, and relevance to struggling mathematics learners. Information was extracted according to the major concerns of the review, including intervention characteristics, instructional strategies, tutoring arrangements, intervention duration and intensity, mathematical representations, learning materials, assessment, progress monitoring, and reported effects on mathematics or numeracy performance. For Philippine sources, information related to learning recovery, learner identification, tutoring, ARAL-Mathematics, and implementation mechanisms was also considered. Related findings were subsequently grouped according to recurring issues, similarities, and differences across the reviewed literature. Following screening for relevance, credibility, recency, and applicability to the objectives of the review, 20 scholarly, policy, legal, and institutional sources were retained for the final synthesis.

2.7 Data Analysis Techniques

The selected literature was analyzed through thematic synthesis. Findings were compared and organized around major themes, including numeracy difficulties among struggling elementary learners, the effectiveness of tutoring and targeted mathematics intervention, instructional practices associated with improved mathematics performance, implementation factors influencing intervention outcomes, and the relevance of these findings to ARAL-Mathematics and Grade 4 learners. Greater consideration was given to evidence from systematic reviews, meta-analyses, well-designed intervention studies, and findings consistently supported across multiple sources. When studies produced differing findings, these differences were examined in relation to learner characteristics, intervention design, duration, instructional approach, and educational setting rather than being combined into a single conclusion. The analysis also distinguished general evidence on mathematics interventions from direct evidence concerning the ARAL Math Program. Since ARAL-Mathematics is a relatively recent Philippine initiative, available evidence specifically evaluating its outcomes remains developing. Conclusions were therefore drawn cautiously by examining how the program's major features correspond with evidence-supported mathematics intervention practices. The synthesized findings were interpreted in relation to struggling Grade 4 learners and the educational context of SDO Cagayan, District II without assuming that the same outcomes had already occurred locally.

3. Results and Discussion

3.1 Evidence on Mathematics Recovery for Struggling Elementary Learners

3.1.1 Foundational Numeracy Difficulties and Targeted Support

Across the reviewed sources, struggling learners were found to experience difficulties in areas such as number sense, basic operations, computation, mathematical language, problem solving, and connecting mathematical representations with abstract concepts. Nelson et al. (2022) found that mathematics intervention research addressed areas such as word-problem solving, fractions, computer-assisted learning, and strategy instruction, while also showing substantial variation in how mathematics difficulties were identified. Filiz and Güneş (2023) similarly found that numbers and operations were frequently targeted in primary mathematics interventions and that small-group instruction was commonly used. These findings indicate that intervention should address the specific nature of learners' difficulties rather than applying the same remediation to all struggling learners. This is especially important for Grade 4 learners because weaknesses from earlier grades may interfere with increasingly complex operations, fractions, measurement, and problem solving. Ruiz et al. (2024) further demonstrated that early domain-specific mathematical skills are related to later mathematics achievement. The ARAL Math Program reflects this principle by identifying incoming Grades 2, 3, and 4 learners classified as Not Proficient or Low Proficient for focused mathematics intervention (Department of Education, 2026).

3.1.2 Effectiveness of Targeted Mathematics Tutoring

Across the reviewed studies, tutoring emerged as one of the more consistently supported approaches for improving mathematics performance among struggling learners. Pellegrini et al. (2021) found tutoring to be among the more effective elementary mathematics interventions because it allows instruction to be adjusted according to learner performance and provides opportunities for immediate feedback and guided practice. Nickow et al. (2024) likewise reported positive effects of tutoring, particularly when support was provided regularly and during earlier grade levels. Philippine evidence also showed improvement through targeted mathematics support. In the mEducation program, learners in Grades 3 to 5 received weekly mathematics exercises and short phone-based tutorials matched to their skill levels, with improvements reported in basic operations and division performance (Department of Education, 2024). Taken together, these studies indicate that the value of tutoring lies not simply in providing additional instructional time, but in matching instruction to learners' current mathematical needs rather than relying on grade placement alone. For ARAL-Mathematics, dedicated tutorial sessions may provide struggling Grade 4 learners with additional opportunities to revisit concepts and correct misunderstandings. However, additional time should not simply repeat regular classroom instruction. Tutoring should instead focus directly on diagnosed learning gaps and progressively build learners' mathematical competence.

3.1.3 Explicit and Systematic Mathematics Instruction

Another consistent finding across the literature concerns the importance of systematic instruction, clear mathematical language, purposeful representations, number lines, word-problem instruction, and regular practice. Fuchs et al. (2021) recommended these approaches for elementary learners experiencing mathematics difficulties. Philippine evidence reported by Leonano et al. (2024) also showed improvement after an intervention combining explicit instruction with the Concrete Pictorial Abstract approach. Siller and Ahmad (2024) similarly found value in the use of concrete and virtual manipulatives in elementary mathematics. These findings indicate that structured instruction should support both procedural skills and conceptual understanding. Mathematical materials become useful when learners are explicitly helped to connect concrete objects, visual representations, verbal explanations, equations, and abstract concepts. For ARAL-Mathematics, instructional resources should therefore form part of a carefully sequenced process involving explanation, modeling, guided practice, correction of errors, and gradual independent application rather than functioning merely as additional worksheets or repetitive exercises.

3.1.4 Development of Problem-Solving and Computational Skills

Effective numeracy intervention should also extend beyond basic computation by developing learners' ability to understand and solve mathematical problems. Word problems are particularly demanding because learners must comprehend the situation, identify relevant information, choose an appropriate operation, perform the computation, and interpret the answer. Myers et al. (2022), in a meta-analysis of 52 mathematics word-problem intervention studies, found a large positive overall effect, although outcomes differed according to intervention dosage, group size, and design. These findings demonstrate that problem solving can improve through appropriate and structured instruction. Fuchs et al. (2021) likewise emphasized explicitly teaching learners how to understand and solve mathematical word problems. For struggling Grade 4 learners, simply providing more exercises may therefore be insufficient. ARAL-Mathematics should address both computational fluency and mathematical reasoning by helping learners recognize problem structures, represent quantities, select suitable operations, and evaluate whether their solutions are reasonable.

3.1.5 Learner Grouping and Continuous Assessment

Learners within the same grade level do not necessarily experience the same mathematical difficulties, which makes appropriate grouping and ongoing assessment particularly important in intervention programs. Filiz and Güneş (2023) found small-group instruction to be common among interventions for learners with mathematics difficulties. Gervasoni et al. (2026) similarly identified small-group mathematics interventions using representations, computational fluency, and explicit instruction among primary learners experiencing difficulties. These findings suggest that assessment should guide instruction throughout the intervention rather than function only as a final measure of achievement. Regular monitoring can determine whether learners require additional practice, alternative explanations, or progression to new competencies. The ARAL framework follows this principle by combining learner assessment with targeted instruction, while its summer guidelines emphasize structured practice directed toward identified learning gaps (Department of Education, 2026). Its effectiveness therefore depends on whether assessment results are actively used to adjust instruction rather than solely to classify learners at the beginning of the program.

3.1.6 Quality of Intervention Implementation

Mathematics interventions do not produce uniform outcomes, as their effectiveness can vary according to how programs are designed and implemented. Nelson et al. (2022) identified considerable variation across mathematics intervention research, Myers et al. (2022) found that dosage and group size contributed to differences in intervention effects, and Nickow et al. (2024) showed that tutoring outcomes varied according to program design and delivery. These results indicate that the effectiveness of intervention depends greatly on implementation. Tutor preparation, instructional frequency, learning materials, learner attendance, grouping, feedback, monitoring, and sufficient instructional time may affect outcomes. The ARAL implementing framework includes trained tutors, learning resources, assessment, and monitoring mechanisms (Department of Education, 2025), but their contribution depends on consistent implementation. The Philippine mEducation initiative also showed that targeted support may extend beyond conventional face-to-face remediation, with Department of Education (2024) reporting both numeracy support and greater parental involvement. Overall, the evidence suggests that the quality and targeting of instructional time are more important than simply increasing its quantity.

3.1.7 Evidence Base and Need for Direct ARAL Math Evaluation

When considered collectively, the reviewed evidence indicates that the main instructional features of ARAL-Mathematics are broadly consistent with practices supported by mathematics intervention research. Targeted tutoring, proficiency-based support, systematic instruction, mathematical representations, focused practice, and continuous assessment have demonstrated positive outcomes across previous studies (Filiz & Güneş, 2023; Fuchs et al., 2021; Gervasoni et al., 2026; Nickow et al., 2024; Pellegrini et al., 2021). These findings support the instructional foundation of ARAL-Mathematics but do not establish that the program itself has already produced equivalent outcomes. Much of the available evidence comes from intervention studies conducted outside or before

the full implementation of ARAL, which was formally established through Republic Act No. 12028 in 2024. Direct empirical evaluation of ARAL-Mathematics therefore remains necessary. Future evaluation should consider not only assessment outcomes but also learner attendance, progression across competencies, tutor implementation, duration of intervention, and whether learning gains are sustained.

3.2 Relevance to Struggling Grade 4 Learners in SDO Cagayan, District II

Taken together, the available evidence suggests that mathematics support for struggling Grade 4 learners is most likely to be beneficial when learning needs are accurately identified, instruction is systematic, grouping is appropriate, and learner progress is regularly assessed. Relevant practices include focused tutoring, explicit instruction, meaningful mathematical representations, problem-solving opportunities, and continuous monitoring. Philippine evidence indicates that targeted mathematics interventions can be implemented in public-school contexts, with positive findings reported from mEducation and other mathematics interventions (Department of Education, 2024; Leonano et al., 2024). These findings provide an evidence-informed basis for considering ARAL-Mathematics within SDO Cagayan, District II, but they do not establish current numeracy performance or prove that ARAL has already improved learner outcomes locally because no primary data were collected. Differences in learners, settings, and intervention formats mean that existing evidence should guide rather than predetermine expectations. For Grade 4 learners, intervention should balance recovery of unfinished foundational competencies with preparation for current grade-level mathematics. In this sense, ARAL-Mathematics may serve as a bridge between learners' present understanding and the competencies they are expected to develop next. Overall, the literature supports the program's major instructional features while indicating that its actual effectiveness will depend on implementation quality and continued Philippine evaluation.

4. Conclusion & Recommendations

The literature indicates that targeted mathematics interventions can support struggling elementary learners when instruction is systematic, responsive to identified learning gaps, and supported by focused tutoring, explicit teaching, appropriate mathematical representations, regular practice, and continuous assessment. These principles are consistent with the major features of the ARAL Math Program, suggesting that it has a sound evidence-informed foundation for addressing numeracy difficulties among Grade 4 learners. However, the findings do not establish that ARAL-Mathematics has already produced measurable improvements in SDO Cagayan, District II because direct local empirical evidence remains limited. Its effectiveness therefore depends on how well implementation responds to learners' actual needs and applies appropriate instructional practices.

Schools implementing ARAL-Mathematics should prioritize accurate identification of numeracy difficulties, proficiency-based grouping, structured tutoring, explicit instruction, meaningful mathematical representations, and regular progress monitoring. For struggling Grade 4 learners, intervention should address unfinished foundational skills while remaining aligned with current grade-level mathematics competencies. Within SDO Cagayan, District II, implementation should also emphasize consistent tutor preparation, appropriate learning materials, manageable tutorial groups, and the continuous use of assessment results to guide instruction. Future research should directly evaluate ARAL-Mathematics implementation and outcomes in Philippine public schools to provide stronger local evidence for program improvement.

The study is limited by the availability of published research directly evaluating the ARAL Math Program, which remains a relatively recent national initiative. Much of the reviewed evidence came from broader studies on mathematics tutoring, remediation, learning recovery, and interventions conducted in different educational settings, including those outside the Philippines. Differences in learner characteristics, school contexts, intervention duration, and implementation conditions limit the direct application of these findings to Grade 4 learners in SDO Cagayan, District II. The study also relied entirely on existing accessible literature and did not collect primary data from learners, teachers, tutors, or schools; therefore, it can identify evidence-supported practices and potential implications but cannot determine the actual local effectiveness of ARAL-Mathematics.

5. Compliance with Ethical Standards

The study was conducted as a structured literature review based on existing academic publications, policy documents, government issuances, and institutional reports. No primary data were collected from learners, teachers, tutors, schools, or other human participants. Sources were selected and synthesized according to their relevance, methodological credibility, and applicability to the objectives of the review.

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