

Mathematics 4 curriculum implementation in Philippine public elementary schools

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ABSTRACT

Mathematics plays an important role in developing learners' reasoning, problem-solving, and practical skills needed in everyday life and further learning. However, limited local evidence describes how Mathematics 4 competencies are realized and what challenges teachers encounter in implementing the curriculum in public elementary schools. This study examined the realization of Mathematics 4 education in public elementary schools in Cauayan West District, City Division of Cauayan, Isabela. Using a descriptive survey design, the study involved 14 Mathematics 4 teachers representing 14 public elementary schools. Data were gathered through a researcher-made questionnaire and an informal interview and analyzed using frequency, percentage, weighted mean, and chi-square test. Findings showed that Mathematics 4 competencies were generally realized, with a grand weighted mean of 4.09. Teaching methods, techniques, instructional materials, assessment tools, and supervisory support were generally rated as effective to very effective. Teachers experienced moderate difficulties, particularly pupils' weak mastery of prerequisite concepts and limited resources. Significant differences in perceived setbacks were found according to educational attainment and present position.

Keywords: Mathematics 4, curriculum implementation, mathematics instruction, elementary teachers, teaching challenges.

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INTRODUCTION

Mathematics is a foundational area of elementary education. It develops learners' numeracy, reasoning, problem-solving, and decision-making skills. At the elementary level, however, mathematics learning requires more than the presentation of rules and procedures. Learners need opportunities to understand concepts, explain their reasoning, apply mathematical ideas, and connect classroom learning with everyday situations. The National Research Council (2001) emphasized that mathematical proficiency involves conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. These dimensions require purposeful and responsive classroom instruction.

In the Philippine setting, the implementation of mathematics education is guided by the K to 12 curriculum. Mathematics Grade 4 occupies an important position because learners at

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this level encounter increasingly complex concepts and are expected to apply mathematical knowledge to routine and nonroutine problems. Balagtas et al. (2019) found that the Grade 4 mathematics curriculum showed relatively strong alignment with the TIMSS assessment framework, while also pointing to the need for continuing curriculum improvement and appropriate support systems. Similarly, Barrot (2023) observed that the implementation of the Philippine K to 12 curriculum continues to face challenges involving instructional delivery, assessment, lesson preparation, technology integration, and teacher and school-leader support.

Effective mathematics instruction depends greatly on what teachers know and how they translate that knowledge into classroom practice. Hill et al. (2004) explained that teachers' mathematical knowledge for teaching is multidimensional. It includes not only knowledge of mathematical content but also knowledge of students and how mathematical ideas can be taught. In the words of Shulman (1986), effective teaching requires a combination of content knowledge and pedagogical knowledge. More recent Philippine evidence likewise indicates that mathematics teachers' pedagogical content knowledge is associated with important aspects of instructional management and classroom practice (Pangan & Magno, 2025).

The manner in which teachers present mathematics is equally important. Effective instruction may include explicit teaching, guided practice, problem solving, cooperative learning, mathematical discussion, questioning, visual representations, manipulatives, and technology-supported activities. The National Council of Teachers of Mathematics (2014) identifies productive teaching practices such as establishing meaningful mathematical goals, using representations strategically, facilitating mathematical discourse, posing purposeful questions, building procedural fluency from conceptual understanding, and supporting productive struggle. These practices shift mathematics teaching from simple transmission of information toward active mathematical learning.

According to Pellegrini et al. (2021), evidence from elementary mathematics programs indicates that instructional approaches differ in their effects on student achievement. Programs that strengthen classroom organization, management, and cooperative learning have demonstrated positive outcomes. Similarly, a recent meta-analysis reported substantial positive effects of structured cooperative learning on primary pupils' mathematics achievement, although the magnitude of the effect varies according to implementation and contextual conditions.

Instructional materials also influence how mathematical concepts are learned. Concrete and visual representations can help young learners connect abstract mathematical ideas with observable relationships. Angco and Angco (2024), in their synthesis of research on mathematics manipulatives, identified increased engagement, confidence, motivation, and mathematical proficiency among the benefits associated with appropriate use of manipulatives. Their findings also emphasized that materials are most useful when teachers plan their use carefully and possess the competence needed to integrate them into instruction.

Language is another important consideration in mathematics teaching. Mathematical ideas are communicated through words, symbols, diagrams, explanations, and classroom interaction. In multilingual classrooms, language can either support or constrain understanding. Research in Philippine mathematics classrooms suggests that teachers may use Filipino, English, and local languages to clarify mathematical meanings and sustain classroom interaction. Morata and Fulay (2024) reported that mathematics teachers experienced challenges associated with language and the medium of instruction, particularly when instructional conditions changed. More recently, Philippine research on translanguageing has shown how teachers use linguistic and other semiotic resources to support mathematical understanding and classroom communication.

Assessment should likewise form part of daily mathematics instruction rather than occur only after a lesson or grading period. Wiliam (2007) argued that assessment becomes

formative when evidence of learning is used to determine subsequent teaching and learning decisions. In mathematics, teachers can gather such evidence through questioning, observation, written work, discussion, performance tasks, quizzes, and other classroom activities. Cagas et al. (2020) demonstrated the importance of examining formative assessment practices within the Philippine classroom context and developed an observation protocol intended to capture teachers' assessment behaviors. A recent systematic review also found that formative assessment can support mathematics learning when it is implemented regularly, linked to clear learning intentions, and accompanied by meaningful feedback.

Teacher preparation and continuing professional development are also central to effective implementation. Mathematics teachers encounter changing curriculum requirements, diverse learner needs, and increasing expectations for higher-order thinking and problem solving. Bonghanoy et al. (2019) found that mathematics teachers in the Philippines viewed professional development more positively when training addressed actual classroom concerns and enabled teachers to redesign instructional plans and materials. Dicediquin et al. (2023) likewise reported a need to strengthen questioning, differentiated instruction, and strategies for developing higher-order thinking in Philippine mathematics classrooms.

Classroom management provides the conditions in which mathematics learning takes place. A well-managed classroom allows learners to participate, ask questions, collaborate, use materials, and engage in mathematical tasks without unnecessary disruption. Freiberg et al. (2009) found that classroom and instructional management can contribute to student achievement. Thus, classroom management should not be viewed separately from mathematics instruction. It is part of the environment that allows effective teaching and learning to occur.

Despite these established principles, the realization of a curriculum at the classroom level cannot be assumed from the existence of curriculum standards alone. There may be differences between intended competencies and their actual classroom implementation. Teachers may also encounter limitations involving instructional materials, assessment practices, professional development, classroom management, supervision, time, and learner diversity. Philippine studies have documented several of these implementation concerns, but evidence specific to the realization of Mathematics 4 instruction in public elementary schools in the City Division of Cauayan remains limited.

The present study addresses this local need. It examines the extent to which Mathematics 4 learning competencies are realized and describes the practices used by teachers in terms of instructional methods, techniques, strategies and approaches, instructional materials, assessment tools, administrative and supervisory support, and classroom management. It also identifies the setbacks encountered by teachers and determines whether these differ according to selected teacher characteristics.

The study is particularly relevant because effective curriculum implementation depends on the interaction of teachers, learners, instructional resources, assessment, leadership, and the school context. Findings from the study may provide a basis for targeted professional development, closer instructional supervision, appropriate intervention, and improved support for Mathematics 4 teachers in the City Division of Cauayan.

This study is anchored primarily on the constructivist view of learning, pedagogical content knowledge, and formative assessment.

The constructivist perspective views learning as an active process in which learners develop understanding through interaction with ideas, experiences, representations, and other people. Mathematics learning therefore requires opportunities for learners to explore relationships, explain procedures, solve problems, compare strategies, and construct meaning.

The National Research Council (2001) similarly emphasized that mathematical proficiency develops through the integration of conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition.

Vygotsky's (1978) sociocultural perspective further explains the importance of interaction in learning. Mathematical understanding can develop through dialogue, guided participation, collaboration, and teacher scaffolding. In classroom practice, this means that teachers do not merely provide answers. They guide learners through questions, explanations, representations, examples, and feedback. Mathematical discourse is therefore an important part of instruction. Kazemi and Stipek (2012) found that classroom discourse can promote conceptual thinking when teachers encourage students to explain and justify their mathematical ideas.

The second theoretical foundation is pedagogical content knowledge. Shulman (1986) proposed that effective teaching requires more than mastery of subject matter. Teachers must also know how particular concepts can be represented and explained to learners. Hill et al. (2004) extended this perspective to mathematics by demonstrating that teachers' mathematical knowledge for teaching includes knowledge of content as well as knowledge of students and content. In the Philippine context, Pangan and Magno (2025) likewise highlighted the relevance of teachers' pedagogical content knowledge to instructional management.

The third foundation is formative assessment. According to Wiliam (2007), assessment supports learning when teachers use evidence of students' understanding to make instructional decisions. This perspective is especially relevant to mathematics because errors can reveal misconceptions that require immediate clarification. Effective Mathematics 4 teachers therefore need to monitor pupils' understanding continuously and adjust instruction when necessary. Cagas et al. (2020) emphasized the importance of developing assessment practices that are appropriate to Philippine classroom conditions.

These perspectives converge on a common principle: effective mathematics teaching is responsive. Teachers need adequate mathematical and pedagogical knowledge. Learners need opportunities to participate actively. Assessment evidence must inform instruction. Instructional resources and classroom management should support meaningful mathematical engagement.

Statement of the problem

This study examined the implementation of Mathematics 4 education in the public elementary schools in the City Division of Cauayan. Specifically, it sought to answer the following questions:

1. What is the profile of the teachers handling Mathematics 4 in terms of age, gender, civil status, highest educational attainment, latest performance rating, length of teaching experience, present position, and mathematics related in service training attended?
2. What are the Mathematics 4 learning competencies, and to what extent are they realized?
3. How is the teaching of Mathematics 4 described in terms of methods, techniques, strategies, and approaches, instructional materials, assessment tools, administrative and supervisory support, and classroom management strategies?
4. What setbacks do teachers encounter in teaching Mathematics 4, and to what extent are these experienced?
5. Is there a significant difference in the teachers' perceptions of the setbacks encountered when grouped according to selected profile variables, particularly gender, civil status, highest educational attainment, latest performance rating, present position, and length of teaching experience?

METHODOLOGY

The study employed the descriptive survey method, which is appropriate for describing existing conditions and characteristics of a particular group (Calmorin, 1994; Good & Scates, 1986). The study was conducted in the public elementary schools of Cauayan West District, City Division of Cauayan, Isabela.

The participants were 14 teachers handling Mathematics 4, representing 14 public elementary schools in the district. There was one teacher-participant from each school: Alinam Elementary School, Cauayan West Central School, Don Faustino N. Dy Memorial Elementary School, Minante II Elementary School, Naganacan Elementary School, Nagrumbuan Elementary School (Main), Nagrumbuan Elementary School (Annex), Nungnungan I Elementary School, Nungnungan II Elementary School, Pinoma Elementary School, San Antonio Elementary School (Main), San Antonio Elementary School (Annex), San Francisco Elementary School, and Sillawit Elementary School. Thus, the study covered all 14 identified Mathematics 4 teachers from the participating schools. The primary data-gathering instrument was a researcher-made questionnaire, supported by an unstructured interview. The questionnaire was developed from a review of related literature and studies. It covered the teachers' profile, realization of Mathematics 4 learning competencies, pedagogy, instructional materials, assessment tools, administrative and supervisory support, classroom management practices, and setbacks encountered in teaching Mathematics 4. The questionnaire was pretested among Mathematics 4 teachers from other districts in the City Division of Cauayan who were not included in the study. Feedback from the pretesting, adviser, and Dean of the Graduate School was incorporated into the final instrument. The standard Mathematics 4 learning competencies were excluded from the try-out because these were prescribed by the Department of Education.

An informal interview was also conducted to obtain additional information and to check the consistency of the questionnaire responses. The interviews were conducted during the administration and retrieval of the questionnaire. The researcher initially obtained permission from the Schools Division Superintendent of the City Division of Cauayan before administering the research instruments. The questionnaire was distributed through an online link communicated by the school heads to the teacher-participants. Selected participants were subsequently invited to Google Meet for the informal interview.

The data were organized, tallied, and analyzed using appropriate descriptive and inferential statistical tools. Frequency and percentage were used to describe the teachers' profile in terms of age, gender, civil status, educational attainment, teaching experience, performance rating, present position, and Mathematics-related in-service training. Weighted mean was used to determine the extent of realization of the Mathematics 4 learning competencies and to describe the reported effectiveness or adequacy of pedagogy, instructional materials, evaluative tools, administrative and supervisory support, classroom management practices, and the extent of setbacks encountered. Chi-square test was employed to determine whether significant differences existed in the teachers' responses when grouped according to the selected profile variables. The level of significance was set at 0.05.

RESULTS AND DISCUSSION

The findings indicate that the implementation of Mathematics 4 in the public elementary schools of Cauayan West District was generally positive, although several classroom-level difficulties remained. The results suggest that the teachers were able to realize the prescribed competencies and employ varied instructional practices. At the same time, the findings point to persistent concerns related to pupils' prior knowledge, curriculum demands, resources, and the need to adapt instruction to diverse learners.

The learning competencies in Mathematics 4 were generally realized, as shown by a grand weighted mean of 4.09. Among the five major areas, Number and Number Sense obtained the highest mean (4.17), followed by Geometry (4.12), Patterns and Algebra (4.10), and Measurement (4.07). Statistics and Probability obtained the lowest mean (3.98), although it was still classified as realized.

These results indicate that the teachers were generally able to cover and implement the expected competencies. The relatively lower result for Statistics and Probability, however, deserves attention. Competencies in this area require pupils to organize, interpret, and reason from data and to understand basic ideas of chance. The lower mean may suggest that these competencies require more sustained practice and contextualized activities. This is important because mathematical proficiency involves more than procedural accuracy. It also includes conceptual understanding, strategic competence, reasoning, and the ability to apply mathematics in different situations (National Research Council, 2001).

The teachers also reported using a broad range of teaching methods. The overall mean was 4.09, interpreted as effective. Demonstration (4.38), hands-on learning (4.35), game-based learning (4.33), technology integration (4.32), and problem-based learning (4.30) were among the strongest methods. In contrast, lecture obtained the lowest mean (3.40) and was only moderately effective.

This pattern is significant. It shows a movement away from predominantly teacher-centered instruction toward more active forms of mathematics learning. Demonstration, hands-on activities, problem solving, games, and technology give pupils opportunities to see, manipulate, discuss, and apply mathematical concepts. Such practices are consistent with the view that mathematical understanding develops when learners actively engage with mathematical ideas rather than merely receive procedures from the teacher. The relatively lower rating of lecture also suggests that teachers may recognize the limitations of relying heavily on direct transmission of information.

The techniques used by the teachers were rated even more favorably, with an overall mean of 4.31, interpreted as very effective. The strongest technique was the use of manipulative and visual aids (4.40), followed by differentiated instruction (4.37) and fostering a positive attitude toward mathematics (4.35). Linking mathematical concepts to practical situations also received a high rating (4.30).

The result highlights the importance of making mathematics concrete and meaningful. Manipulatives and visual representations can help pupils move from concrete experiences toward abstract mathematical ideas. Differentiated instruction is equally important in a classroom where learners differ in prior knowledge, ability, pace, and learning needs. These findings are consistent with the principles of effective mathematics teaching advanced by the National Council of Teachers of Mathematics (2014), particularly the use of representations, purposeful questioning, meaningful tasks, and productive mathematical engagement.

The approaches used in teaching Mathematics 4 were also rated very effective, with a mean of 4.29. Discovery, process, constructivist, integrative, formative, collaborative, and concrete-representational-abstract approaches all received high evaluations.

Taken together, the results for methods, techniques, and approaches show a consistent instructional pattern. Teachers are not relying on a single way of teaching mathematics. Instead, they appear to combine several approaches according to the lesson and perceived needs of the learners. This is a strength of the implementation because mathematics concepts vary in complexity and require different forms of representation, explanation, practice, and application.

Instructional materials were viewed differently when their availability or adequacy was considered separately from their perceived effectiveness. Their overall adequacy obtained a mean of 3.69, interpreted as adequate. Visual materials were the most adequate (4.12), while audio-visual materials obtained the lowest mean (3.44). At the same time, the overall perceived effectiveness of instructional materials was high, with a mean of 4.27, interpreted as very effective. Electronic interactive materials obtained the highest rating (4.33), followed by audio-visual (4.31) and visual materials (4.29).

The difference between adequacy and effectiveness is noteworthy. Teachers may be using available materials effectively even when the overall supply is only adequate. This suggests that instructional quality does not depend solely on the quantity of resources. Teacher competence in selecting and using materials also matters. Still, the adequacy result indicates room for improvement, particularly in providing richer multimedia and technology-supported resources.

Print materials were particularly useful. Their effectiveness obtained a mean of 4.23, with textbooks receiving the highest rating (4.42). This suggests that conventional resources remain important despite the growing use of digital materials. For elementary mathematics, textbooks, charts, flash cards, measuring tools, and concrete objects can provide stable references and repeated opportunities for practice.

The evaluative tools used to gauge pupils' performance were considered very effective, with an overall mean of 4.33. Quarterly assessment obtained the highest mean (4.35), followed by performance tasks (4.33) and written works (4.30). The results indicate that teachers use several forms of assessment rather than depending exclusively on written tests. This is desirable because mathematical learning involves knowledge, procedures, reasoning, application, and performance. Assessment becomes more useful when evidence from different tasks is considered in judging pupils' progress. As Wiliam (2007) explained, assessment should provide information that helps teachers determine what learners understand and what instructional adjustments are needed.

Administrative and supervisory support was another strong component of Mathematics 4 implementation. Supervisory support obtained an average weighted mean of 4.37, interpreted as very effective. The strongest areas included school heads' knowledge of effective instructional strategies (4.45), ensuring strategies that support effective learning (4.43), and using surveys and observations to identify appropriate professional-development needs (4.42).

This finding suggests that school leadership provides an important enabling condition for mathematics instruction. Teachers are more likely to sustain effective practices when school heads provide instructional guidance, resources, professional support, and opportunities for collaboration. The finding also indicates that supervision is not viewed merely as compliance monitoring. At its strongest, it functions as instructional assistance.

Despite these favorable findings, teachers continued to experience several setbacks. The overall weighted mean was 2.70, interpreted as moderately difficult. The most serious concern was pupils' lack of mastery of core mathematical concepts from previous grades (2.79). Other major difficulties included the need to develop varied teaching strategies (2.77),

managing the pressure to achieve deep understanding while covering the curriculum (2.75), the complexity and cumulative nature of mathematics (2.73), and inadequate resources (2.72).

The pattern is important because the main problems are not limited to teachers' willingness or instructional effort. Many difficulties arise from conditions that teachers cannot solve independently. Pupils who enter Grade 4 with weak foundational knowledge require additional remediation before they can successfully engage with more advanced competencies. Mathematics is cumulative; weaknesses in earlier concepts can therefore affect later learning. The findings also suggest a tension between curriculum coverage and depth of understanding. Teachers may know that pupils need conceptual learning, but time and curriculum demands can make sustained remediation and exploration difficult.

Resource limitations further complicate the situation. Although instructional materials were considered effective when available, their overall adequacy was only moderate. This supports the view that the effectiveness of instruction depends not only on teachers' pedagogical practices but also on the resources available to support those practices.

The chi-square results provide additional insight. Teachers' perceptions of setbacks did not significantly differ according to age, with a computed value of 7.071 against a critical value of 12.592 at the 0.05 level with 6 degrees of freedom. Thus, the null hypothesis was accepted. Likewise, there was no significant difference according to gender, with a computed value of 0.294, which was lower than the critical value of 3.841 at 0.05 with 1 degree of freedom.

Civil status also did not significantly influence teachers' perceptions of the setbacks. In practical terms, these findings suggest that the difficulties encountered in teaching Mathematics 4 are largely shared across teachers rather than being confined to a particular demographic group. The challenges appear to be structural and instructional in nature.

Two variables, however, produced significant differences. Teachers' perceptions differed significantly according to highest educational attainment. The computed chi-square value was 5.091, higher than the critical value of 3.841 at the 0.05 level with 1 degree of freedom. The null hypothesis was therefore rejected. A significant difference was also found according to present position, with a computed value of 3.949, exceeding the critical value of 3.841 at the same significance level and degree of freedom.

These findings suggest that educational preparation and professional position may shape how teachers perceive instructional difficulties. Teachers with different academic backgrounds may possess different levels of pedagogical knowledge, confidence, and experience in responding to classroom problems. Likewise, professional position may be associated with differences in responsibilities, experience, and exposure to instructional leadership. However, the findings should be interpreted cautiously because the study involved only 14 teachers. The small number of respondents limits the generalizability of the statistical results.

In contrast, teaching experience did not produce a significant difference in perceptions of setbacks. The computed chi-square value was 2.121, lower than the critical value of 9.488 at the 0.05 level with 4 degrees of freedom. The null hypothesis was therefore accepted. This suggests that length of service alone does not necessarily determine how teachers perceive the difficulties of teaching Mathematics 4. Overall, the findings present a generally favorable picture of Mathematics 4 implementation. The learning competencies were realized (4.09), teaching methods were effective (4.09), teaching techniques were very effective (4.31), instructional materials were perceived as very effective (4.27) but only adequate in availability (3.69), assessment tools were very effective (4.33), and supervisory support was very effective (4.37).

Yet, the 2.70 overall difficulty rating reveals that successful implementation does not mean the absence of problems. The central issue is the gap between what teachers are prepared to do and the conditions under which they have to do it. Teachers appear to employ varied and

generally effective practices, but they continue to work with pupils who have uneven foundations, limited resources, curriculum pressures, and diverse learning needs.

The findings therefore point to the need for a more targeted response. Strengthening Mathematics 4 instruction should focus not only on teacher strategies but also on remediation of foundational skills, differentiated instruction, adequate instructional resources, sustained professional development, and instructional supervision. These areas are interconnected. Improving one without addressing the others may have limited effect. The results support a school-based approach in which teachers, school heads, and instructional supervisors work together to address the specific conditions affecting mathematics learning.

CONCLUSION

Mathematics is a fundamental part of everyday life and human activity. Its importance extends beyond computation. It develops logical thinking, reasoning, problem-solving, and decision-making skills. In a rapidly changing and technology-driven world, mathematical knowledge remains essential for understanding information, interpreting situations, and responding to practical problems. As part of formal education, mathematics therefore deserves sustained attention not only because of its content but also because of the thinking processes that learners develop through it.

The findings of the study show that Mathematics 4 instruction in the public elementary schools of Cauayan West District was generally well implemented. The learning competencies were realized, and the teachers reported using varied instructional methods, techniques, and approaches. The use of manipulatives, visual materials, hands-on activities, strategic questioning, problem-solving tasks, and real-world applications indicates an effort to make mathematics more meaningful and accessible to learners. These practices should be sustained and further strengthened because pupils learn mathematics more effectively when they are given opportunities to see, explore, explain, apply, and discuss mathematical ideas.

The findings also indicate that effective mathematics teaching requires attention to the learners themselves. Teachers should recognize pupils' strengths and acknowledge their progress. Encouragement and constructive feedback can help develop confidence and a positive attitude toward mathematics. A supportive classroom is equally important. Pupils should feel comfortable asking questions, sharing solutions, making mistakes, and working with their classmates. Such an environment can lessen fear and anxiety and encourage greater participation in mathematical activities.

The study further emphasizes the need to focus on understanding rather than memorization. Teachers should help pupils see the logic and reasoning behind mathematical concepts instead of concentrating only on formulas and procedures. Meaningful classroom discussions can provide opportunities for learners to explain how they arrived at an answer and to compare different ways of solving a problem. Regular practice should accompany these activities, with immediate and constructive feedback to help pupils recognize and correct their errors.

Because mathematical learning is cumulative, important concepts should also be revisited regularly. Reviewing previously learned skills can strengthen retention and provide the foundation needed for more complex topics. Teachers should regularly assess pupils' progress and use assessment results to adjust instruction. Assessment should therefore serve not only to measure achievement but also to identify misconceptions, learning gaps, and areas requiring additional support.

Technology can provide another avenue for improving mathematics instruction. Where resources are available, digital learning tools and interactive software may be integrated with concrete and traditional materials. Technology, however, should complement rather than replace sound teaching practices. Its use should be guided by the learning objective and the needs of the pupils.

Finally, mathematics instruction should provide sufficient opportunities for reasoning and problem solving. Teachers need to expose pupils to tasks that require them to analyze situations, make decisions, explain their thinking, and apply mathematical concepts to real-life problems. Continued professional development may help teachers strengthen these practices and respond more effectively to differences in learners' abilities and needs.

Overall, the study concludes that effective Mathematics 4 instruction depends on more than curriculum coverage. It requires competent and responsive teachers, appropriate instructional materials, supportive classroom environments, meaningful assessment, regular practice, and opportunities for reasoning and problem solving. Future researchers may conduct similar studies using other variables, larger groups of respondents, or other school contexts to provide additional evidence on the factors that influence the teaching and learning of mathematics.

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