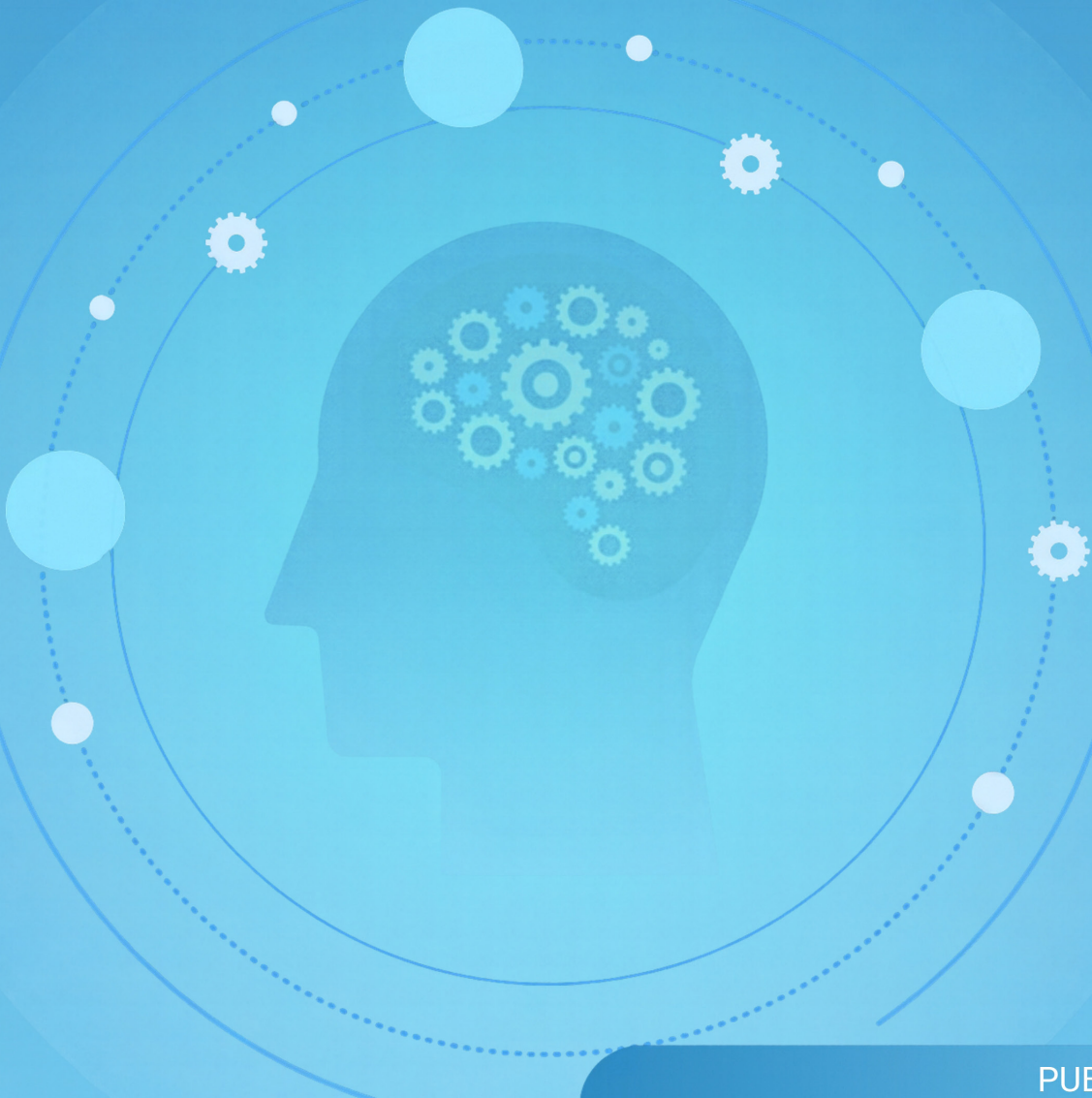




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Teaching Practices in Mathematics and Learners' Learned Competencies

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ABSTRACT

Teaching practices in Mathematics play a crucial role in shaping learners' understanding of mathematical concepts. In today's 21st-century classroom, there is an increasing demand for learners who can not think critically. The study aimed to determine the level of teachers' teaching practices in Mathematics and learners' learned competencies. Particularly, this study sought to identify the level of teachers' teaching practices in Mathematics; find out the level of learners' learned competencies; and determine the significant relationship between teacher-respondents' assessment of their teaching practices in Mathematics and learners' learned competencies. The study involved one hundred fifty-two (152) Grade 5 teachers and three hundred six (306) Grade 5 learners selected as respondents and used a descriptive-correlational research design. The universal sampling technique was employed in this study. The instruments were patterned and modified, and the statistical treatments used were the mean, standard deviation, and Pearson Correlation. Findings revealed that the majority of the teacher-respondents assessed the teaching practices, which resulted in a level of highly practiced. The learners' learned competency is at the level of very satisfactory. The correlation between teachers' teaching practices and learners' learned competency was significant; it was linear and directly proportional. The study concludes that problem-based learning and order of operations have contributed positively to students' understanding and performance in applying the correct order of operations. It recommends that teachers should strengthen the use of concrete, representational abstract and conduct more activities on factors and multiples to further improve learners' learned competency.

INTRODUCTION

Background of the Study

Teaching practices in mathematics play a crucial role in learners' comprehension and knowledge application. The methods teachers employ in the classroom have a direct impact on how students comprehend and master mathematical concepts. The Philippines' performance in the International Student Assessment (PISA) 2022 program raises questions regarding the growth of students' mathematical knowledge and abilities. Compared to the OECD average of 69 percent, only 16 percent of Filipino students achieved at least Level 2 proficiency, which is the baseline level of low mathematical proficiency. This indicates that a large number of Filipino students find it difficult to exhibit basic mathematical knowledge and abilities. This highlights how crucial it is to investigate instructional strategies that could support students in strengthening and developing essential mathematical skills.

The study looks at three important teaching strategies that are well known for having an impact on students' learning. The three-stage Concrete Representational Abstract (CRA) approach aids students in understanding mathematical concepts. Mathematical modeling, which links mathematical ideas to real-world scenarios, and problem-based learning (PBL), which enhances students' comprehension through problem-solving and encourages them to analyze, collaborate, and apply knowledge to

find solutions rather than focusing on memorization or methodical procedures.

Learned Competency is a skill that learners need to demonstrate after instruction. The four key areas are Divisibility Rules that will determine if a number is divisible by 2, 3, 4, 5, 6, 8, 9, and 10; Order of Operations that solves expressions using PEMDAS/GEMDAS; Factors and Multiples, which involves finding factors, multiples, GCF, and LCM; Finally, Four Fundamental Operations Involving Fractions focuses on addition, subtraction, multiplication, and division of fractions.

These reveal how far students can calculate, examine, and apply mathematics to solve problems. Understanding these competencies enables students to perform appropriate calculations, utilize proper mathematical procedures, and solve equations in an orderly manner.

As stated by the Department of Education (2022), "students are expected to grasp divisibility rules, order of operations, factors and multiples, and the four basic operations with fractions, and to use them in both math problems and everyday contexts". Examining these three teaching practices alongside the learned competencies students have developed allows teachers to present lessons more effectively, which greatly influences students' comprehension and application of mathematical concepts. These competencies serve as the basis for higher-level mathematics. However, a large number of students are having difficulty with the

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application of these skills in real-life situations. Focusing on the mathematical teaching practices applied in the classroom and the skills that students develop can assist in finding out which methods effectively foster the mastery of critical mathematical skills and contribute to the overall improvement of Mathematics instruction.

LITERATURE REVIEW

Teaching Practices in Mathematics

According to Luzano (2025), Mathematics education highlights the essential role of high-quality teaching practices and educators in promoting effective learning settings. This requires a balance between theory and practice, underscoring the essential role of Mathematics teachers in maintaining instructional quality (Konig *et al.*, 2021). Viewing Mathematics education as a complex web of social practices expands the perspective needed to improve teaching and learning. Likewise, Benderbal and Djedoui (2024) stressed that adjusting teaching approaches to contemporary educational requirements has become a central topic in recent mathematics education literature.

In today's technology-driven era, researchers have pointed out that traditional teaching approaches often fail to enhance students' skills in mathematical concepts. Instead, contemporary strategies highlight the importance of active learning, problem-based approaches, and the integration of digital tools to foster deeper comprehension and critical thinking.

Concrete Representational Abstract

According to Ali (2022), concrete representational abstract facilitates the growth of mathematical abilities at all levels and types of education. Using phase-specific manipulatives, the instructor first demonstrates the skill during each phase (e.g., the g.blocks tallies or numbers), after which students are guided through practice problems before being asked to complete them on their own. Students advance to the following stage after they show mastery (Ebner *et al.*, 2025).

Further, the level of understanding can be meaningfully connected through this instructional sequence: a graduated, conceptually supported approach. Math-challenged middle school students frequently had problems in previous grades. When dealing with increasingly complex content like rational numbers and integers, even those who were initially proficient may face difficulties. They might rely on outdated guidelines when trying to solve problems (Bryant *et al.*, 2020). This difficulty exacerbates more general problems with student performance, with subpar math results continuing to be a problem. One common explanation is a lack of fundamental understanding of basic mathematics, especially integer operations (Zainudin *et al.*, 2022). Effective teaching strategies are essential for addressing this. The use of integer chips as manipulatives in the concrete stage is suggested by this study.

Students' interest is piqued, active participation is

encouraged, and learning outcomes are improved with manipulatives, real-world materials, or objects that they can physically touch. For instance, Algebra tiles are especially useful for teaching Algebra because they offer a visual depiction of operations involving variables and numbers (Abdul-Karim *et al.*, 2023). In order to facilitate understanding, mathematical concepts must be depicted in more tangible ways because they are abstract mental constructs. External representations bridge the gap between abstract concepts and students' comprehension by embodying the essential characteristics of concepts (Gallo-Toong, 2020). When teachers use the Concrete-Representational-Abstract consistently across lessons and subject areas, it works best (Morin, 2020). According to Satsangi (2021), educators must make sure that pupils show comprehension at the concrete level before proceeding to representational, and at representational before abstract.

Witzel and Riccomini (2022) updated review that Concrete Representational Abstract (CRA) improves conceptual understanding and procedural fluency. It was found that moving from manipulatives to visual representations and finally symbols reduces math anxiety and increases mastery in operations and problem-solving. Hence, Flores and Hinton (2021) stated the effects of the Concrete Representational Abstract (CRA) Sequence on the Performance of Elementary Students in Fractions and Problem Solving. Moreover, students taught with the Concrete Representational Abstract (CRA) scored significantly higher in factors, multiples, and operations with fractions than those taught with traditional instruction (Magno & Sembrano, 2023).

Nguyen and Le (2024), who emphasized that visual aids such as diagrams and charts serve as a critical bridge in the CRA framework, helping learners transition from concrete experiences to abstract mathematical understanding. Similarly, Bautista and Cruz (2023) found that Philippine Grade 5 teachers who frequently use visual representations reported higher learner comprehension in number sense topics. This is further supported by Carbonneau, Marley, and Selman (2022), whose meta-analysis confirmed that visual representations improve understanding and memory by allowing students to see connections between concepts instead of relying only on verbal explanation.

According to Sarama and Clements (2022), who explained that pattern blocks can be useful during the concrete phase of CRA because they help students better understand place value and mathematical operations. Similarly, Mendoza and Torres (2023) found that teachers in the Philippines often use visual aids instead of specific manipulatives like pattern blocks because of limited resources. However, teachers also recognized that using more hands-on materials could help students develop a better understanding of mathematical concepts. In addition, Bouck, Park, and Nickell (2021) emphasized that giving students hands-on experiences with manipulatives before introducing mathematical symbols can lead to

deeper and longer-lasting understanding. Bouck, Park, and Nickell (2021), also found that because of limited time, teachers tend to skip the concrete and representational stages and proceed with formulas and symbols. Similarly, Sarama and Clements (2022) stressed that hands-on materials and visual aids are critical for students to truly comprehend Mathematics. Flores and Hinton (2023) also noted that CRA is among the least implemented approaches, yet its increased utilization can make Mathematics more accessible and engaging for learners.

Similarly, Reyes and Santos (2023), who stated that pupils exposed to concrete representational abstract had higher learned competencies in mathematics compared to traditional instruction. Learners showed increased mastery and confidence when teachers used concrete materials, drawings/diagrams, and gradual movement to abstract problems. Similarly, Witzel and Riccomini (2021) highlight that concrete representational abstract is an evidence-based instructional strategy. Teachers should continue and strengthen concrete representational abstract by giving learners hands-on experiences, pictorial representations, and structured guidance to the abstract level. This approach builds both accuracy and confidence in solving mathematical problems.

Mathematical Modeling

Taite and DiNapoli (2025) outlined the benefits of mathematical modeling and emphasized how it could make Mathematics more interesting and approachable for a larger group of students. They pointed out that modeling tasks, which are frequently open-ended, lower entry barriers while providing challenging and complex opportunities for students ready to take on more difficult tasks. Expanding on this, Spooner (2024) emphasized how crucial it is for educators to find a balance between letting students work on their own and offering non-prescriptive guidance when needed.

Teachers can act as models, for example, by showing how modeling tasks can be completed, scaffolding student learning. Hidayat *et al.* (2025) concur with these viewpoints. He also identified the need for instructional strategies that enhance the effectiveness of mathematical modeling instruction. Collectively, these studies suggest that mathematical modeling is most effective when it combines accessibility, teacher guidance, and strategic instructional approaches to foster deeper student engagement and understanding. Expert teachers structure modeling tasks to include all phases and require students to interpret and evaluate results in the original context. (Blum & Borromeo Ferri, 2021). When teachers facilitate group modeling, students develop and compare different mathematical models to solve complex problems (English & Watson, 2020).

According to Blum and Borromeo Ferri (2023), mathematical modeling enables students to relate mathematical ideas to real-world situations, which enhances the significance and comprehension of lessons.

Likewise, Santos and Villanueva (2022) discovered that Filipino Grade 5 teachers who regularly employ modeling techniques assist learners in developing their reasoning abilities by having them solve problems in situations they are familiar with.

Additionally, Stillman Brown and Galbraith (2021) stressed that modeling demonstrates to learners that mathematics is not just about memorizing formulas but also about using concepts to solve problems and make decisions in real-world situations.

Savery and Duffy (2022) highlighted that clearly defining the problem is the cornerstone of problem-based learning and that teachers play a crucial role in guiding learners through questioning, corroborating this conclusion. In a similar vein, Reyes and Ocampo (2023) discovered that Filipino Grade 5 teachers who support problem identification assist learners in structuring their ideas and selecting suitable approaches for resolving real-world mathematical challenges. Hmelo-Silver and Barrows (2021) also pointed out that Problem-Based Learning (PBL) fosters the development of self-assured, autonomous, and critical thinkers by letting students investigate, clarify, and validate their solutions.

According to Blum and Borromeo Ferri (2023), validation involves investigating the limitations of mathematical models, which is least used in classrooms, supporting this conclusion. Instructors frequently assist learners in building and utilizing models, but they are less likely to inquire as to whether the model maintains its accuracy under changing circumstances. In a similar vein, Santos and Villanueva (2022) discovered that Philippine Grade 5 teachers had the lowest scores when it came to methods for evaluating the applicability of models in various contexts. According to Stillman Brown and Galbraith (2021), students' critical thinking may be limited if they are not given the chance to challenge and refine models. Doerr and Årlebäck (2022), who found a strong positive relationship between teachers' use of modeling tasks and students' mathematical competencies. Modeling helps learners develop problem-solving, reasoning, and the ability to apply Mathematics in real-life contexts, leading to improved mastery. Moreover, Blum and Borromeo (2021) emphasize that when teachers regularly integrate modeling in instruction, learners' competencies improve because they learn to connect Mathematics to real-world situations. The study recommends continuous use of modeling to strengthen learners' conceptual understanding and application skills.

Problem-based Learning (PBL)

Bron and Prudente (2024) stated that Problem-Based Learning (PBL) is closely linked to the development of learners' creative thinking in Mathematics. This process-oriented approach capitalizes on the use of problems to stimulate learning through both independent and collaborative investigations, with meta-analytic evidence supporting its effectiveness in fostering mathematical creativity. Furthermore, Nurin *et al.* (2024) explained that

PBL, rooted in constructivist learning theory, emphasizes inquiry, collaboration, and real-world problem contexts as vehicles for developing both content knowledge and higher-order thinking skills. Unlike traditional instruction that relies on rote memorization and teacher-led demonstrations, PBL situates students as active participants in the learning process. This pedagogical shift is particularly significant in Mathematics, a subject often perceived by students as abstract, difficult, and disconnected from daily life (Slimane, 2024). Taken together, these studies highlight that PBL not only enhances mathematical creativity but also addresses the broader challenge of making Mathematics more meaningful and accessible to learners.

Effective PBL teachers scaffold the problem-solving process and promote student ownership by refraining from direct instruction. (Hung, Dolmans, & van Merriënboer, 2021). Highly effective PBL requires students to collaborate and take responsibility for identifying what they need to learn to solve the problem (Yew & Goh, 2021).

According to Savery (2022), problem-based learning increases learner engagement when teachers start with difficult and real-world problems. In a similar vein, Dela Cruz and Ramos (2023) discovered that Filipino Grade 5 teachers who regularly employ PBL through small-group discussions assist students in developing their capacity for cooperation and critical thinking. Additionally, Hmelo-Silver (2021) stressed that PBL shifts instruction away from teacher-centered approaches and provides students with more chances to reflect, ask questions, and apply mathematical ideas to practical scenarios.

Barrows and Hmelo-Silver (2022), also emphasized that using authentic, real-world problems helps students see the connection between classroom learning and their daily experiences. Similarly, Garcia and Santos (2023) found that Grade 5 teachers in Mindanao highly practice the use of real-life problems because it makes Mathematics more engaging and practical for learners. Hung, Jonassen, and Liu (2021) also reported that when teachers act as facilitators and allow learners to explore problems before introducing formulas, students become more independent, confident, and better at applying mathematical concepts to real-life situations.

Similarly, Drake and Reid (2022); accordingly, time pressures and curriculum demands often prevent teachers from consistently integrating various skills and concepts in mathematics instruction. Similarly, Lim and Bautista (2023) discovered that Grade 5 teachers in the Philippines performed the weakest in skill integration, as they often teach one concept at a time to ensure mastery. In addition, Vasquez and Slattery (2021) also explained that when lessons are taught in isolation, learners have fewer chances to see how mathematical concepts are linked and applied together to solve real-world problems. Savin-Baden and Major (2022), stated that Problem-Based Learning enhances student interest and engagement by offering real-world challenges instead of simple

formulas. Similarly, Reyes and Ocampo (2023) found that Grade 5 teachers often use PBL through teamwork and dialogue, which helps learners become more self-assured and practical problem-solvers. Hmelo-Silver (2021) also emphasized that PBL makes Mathematics more meaningful and student-centered by giving students the opportunity to think, question, and solve problems together.

According to Hmelo-Silver and Barrows (2022), who found a strong positive relationship between problem-based learning and students' mathematical and problem-solving competencies. Learners in problem-based learning classrooms showed higher mastery because they actively construct knowledge through real problems. Moreover, Savery (2021) emphasizes that increased use of problem-based learning improves learners' competencies. When teachers guide learners through authentic problems, learners develop deeper understanding, better retention, and more confidence in applying mathematical concepts.

Learned Competencies

The International Journal of Advanced Multidisciplinary Studies (2024) reported that in EOSY 2023–2024, most Grade 5 learners had low to average mastery, with scores ranging from 13% to 70. Students had significant trouble with both routine and non-routine multi-step problems, especially those with eight subtraction, multiplication, and division steps. However, mastery levels increased to 76% in the majority of competencies by EOSY 2024-2025, suggesting that learners can reach higher competency with the right help. DepEd learning materials from 2025 also emphasize that learned competency includes the capacity to accurately perform fractional operations and solve real-world GCF and LCM problems. Accordingly, students are deemed competent when they are able to accurately compute as well as explain and apply concepts to real-world scenarios.

Additionally, research from 2021 to 2025 demonstrates that learners' capacity to comprehend concepts, carry out procedures accurately, and apply mathematical skills to solve problems is how learned competency in Grade 5 mathematics is assessed.

These results are consistent with the PHINMA COC Senior High School Departments (2022) assessment of students' general Mathematics competencies using diagnostic tests to determine mastery levels and areas for development. In a similar vein, PHINMA Cagayan de Oro College of Management and Accountancy (2023) employs a competency-based curriculum to guarantee that students gain the values, knowledge, and abilities necessary for their line of work.

Additionally, Bernardo and Calleja (2021), who found a significant positive relationship between teachers' use of learner-centered practices and students' learned competencies in Mathematics. Learners performed better when teachers used hands-on activities, problem-based tasks, and real-life applications instead of traditional lecture methods. Furthermore, Kilpatrick and Findell

(2022) highlight that effective teaching practices that include manipulatives, authentic problems, and real-world applications significantly improve learners' mathematical understanding and performance. Learner-centered approaches lead to higher mastery of competencies.

Divisibility Rules

Divisibility rules are essential mathematical concepts in Grade 5 that enable students to quickly ascertain whether a given number is divisible by another number without the need for long division. The Department of Education (2022) states that students are expected to solve both routine and non-routine problems using the divisibility rules for 2, 3, 4, 5, 6, 8, 9, 10, 11, and 12. These skills fall under the category of numbers and number sense in the Most Essential Learning Competencies.

Additionally, Dela Cruz and Felipe (2021) talked about teaching the divisibility rules for 2, 5, 10, 3, 6, and 9 to students in Grade 5. In a similar vein, Villas (2024) and Nieves (2022) taught students how to use divisibility rules to solve problems involving factors and multiples as well as to identify common factors. According to these studies, understanding divisibility rules is a prerequisite for more advanced skills like determining GCF LCM and fraction simplification.

Carbonneau and Marley (2022), stated that effective teaching strategies and classroom activities help most learners reach a very satisfactory level in divisibility rules. Delos Reyes and Balita (2023) also found that Grade 5 learners in the Philippines performed well in divisibility rules, but they still needed more practice and reinforcing exercises to reach greater mastery. Caviola, Mammarella, and Lucangeli (2021) further explained that steady performance indicates strong foundational skills, and continued practice with teacher support can help learners attain better mastery.

In line with the study of Torres and Dela Peña (2023) that found that Grade 5 learners in the Philippines had a very satisfactory level of divisibility rules when the lessons were provided with examples and interactive tasks. Activities can be done to learn and apply the divisibility rules easily, but it needs to be practiced regularly to be able to reach a higher level of skill (Kilic & Cakiroglu, 2022). As Nunes and Bryant (2021) say, competent teaching develops essential foundational skills in number properties, and continued practice is essential for the continued growth and maintenance of student proficiency.

Flores and Hinton (2023) found that learners with the lowest foundational math scores usually require additional support, reinforcement, and practice to effectively apply rules. Moreover, Reyes and Manaloto (2022) found that identifying specific challenges and providing remedial teaching result in improved understanding of divisibility rules by struggling Grade 5 pupils. Moreover, Gersten, Jordan, and Flojo (2021) highlighted the significance of not neglecting learners who are not doing well and that they can achieve the expected level of competence through specific interventions and continuous teacher support.

Order of Operations

In Grade 5 Mathematics, order of operations is a crucial skill that helps students solve multi-step mathematical expressions in the right order. As part of the Most Essential Learning Competencies, students are expected to solve multi-step problems using the order of operations (PMDAS or GMDAS) according to the Department of Education (2022). In order to achieve this competency, students must apply grouping, multiplication, division, addition, and subtraction in the proper order. Current educational resources from 2021 to 2024 also emphasize how crucial this ability is.

According to Dela Rosa (2023), students in Grade 5 should be able to correctly apply PMDAS or GMDAS in a sequence of more than two operations on whole numbers. As well, Triguero (2023) incorporated order of operations as a fundamental math lesson for fifth graders. According to these sources, mastering PMDAS\GMDAS enables students to solve routine and real-world problems with accuracy and logical reasoning.

Additionally, Boaler and Staples (2022), who noted that sequential instruction and regular practice lead to highly satisfactory and steady performance in the order of operations. Likewise, Mendoza and Lopez (2023) revealed that students in Grade 5 in the Philippines got high average scores with low variability on the order of operations due to the use of demonstration and drill methods. In addition, Rittle-Johnson, Schneider, and Star (2021) stated that consistent performance also reflects good basic skills, and continuous practice with the teacher's help helps learners achieve greater mastery.

Booth, Barbieri, and Koedinger (2022), also found that applying the order of operations correctly helps learners avoid mistakes and provides a sound foundation for algebra. Santos and Cruz (2023) also found that many Grade 5 learners in the Philippines reached very satisfactory levels in the order of operations through step-by-step instruction and practice.) Rittle and Star (2021) further clarified that although many students gain the basic skills to solve expressions with multiple operations, ongoing practice and support are critical to those who have not yet achieved full mastery.

Boaler and Staples (2022), who state that regular practice, clear illustrations, and guided exercises greatly improve learners' performance in the order of operations. Likewise, Mendoza and Lopez (2023) stated that Grade 5 students in the Philippines got good results in order of operations due to the effective use of demonstration and drill activities. Rittle-Johnson, Schneider, and Star (2021) further stated that classroom demonstrations and sufficient practice time help learners develop accuracy, confidence, and a consistent understanding when applying the correct steps of mathematical operations.

Factors and Multiples

In Grade 5 Mathematics, factors and multiples are essential ideas that support students' growth in number sense and problem-solving abilities. The Department of Education (2022) states that common factors, common

multiples, GCF, and LCM of two numbers are among the Most Essential Learning Competencies that students should be able to identify. As a measure of learned competency, the 2025 DepEd Learning Exemplar places additional emphasis on resolving real-world GCF and LCM problems. Classroom-based resources from 2021 to 2024 also emphasize this goal. Nierves (2022) talked about teaching students how to find multiples and common factors, as well as the GCF and LCM of two to three 10-digit numbers. Likewise, Villas (2024) included exercises on using divisibility rules to find multiples and factors. According to these sources, learners can solve both routine and non-routine problems with accuracy if they have a solid understanding of factors and multiples. This was supported by Clarke and Roche (2022), who stated that learners do well on factors and multiples because the concepts are abstract, and structured practice helps to ensure consistent performance. Similarly, Torres and Dimaculangan (2023) revealed that the Grade 5 learners' performance in factors and multiples in the Philippines was satisfactory and recommended remediation and enrichment through differentiated activities. Additionally, Nunes, Bryant, and Watson (2021) stated that practice and exercise are helpful for acquiring basic skills, but the ability to transfer concepts to complex problems requires more opportunities for problem-solving and tailored support.

In this respect, Nunes, Bryant and Barros (2021) argue that "many learners can identify factors and multiples at a satisfactory level but need help to differentiate between them and apply them to more difficult problems. Similarly, Santos and Rivera (2023) found that the Grade 5 learners in the Philippines performed satisfactorily in factors and multiples and that drills, games, and real-life exercises helped improve their skills. Verschaffel, Depaepe, and Van Dooren (2022) elaborated that structured activities and regular practice are crucial for students to enhance their precision and self-assurance in addressing problems related to factors and multiples.

According to Clark and Kamii (2022), some learners have difficulties in differentiating between factors and multiples and need explicit instruction, guided practice, and real-world examples to develop. Dela Cruz and Villanueva (2023) also found that a small group of Grade 5 learners needed remediation in factors and multiples and that concrete materials and immediate feedback helped build their confidence. Additionally, Fuchs, Powell, and Schumacher (2021) also emphasize that struggling learners can improve their accuracy in solving problems related to factors and multiples with frequent practice and appropriate teaching methods.

In line with the study of Clarke and Roche (2022), who stated that factors and multiples are challenging for learners because they require comprehending numerical relationships and distinguishing between various concepts, and need structured activities and concrete examples. Torres and Dimaculangan (2023) also found that factors and multiples had the lowest performance

among Grade 5 competencies in the Philippines, showing that step-by-step exercises and relatable examples helped learners improve. Nunes, Bryant, and Watson (2021) also noted that using concrete materials, collaborative tasks, and prompt feedback can greatly help learners deepen their understanding and achieve mastery of factors and multiples.

Four Fundamental Operations Involving Fractions

The Department of Education (2022) states that students should be able to add, subtract, multiply, and divide simple fractions and mixed numbers with or without regrouping. These abilities are essential for students to correctly solve both everyday and real-world problems. This competency is also emphasized in recent educational materials from 2021 to 2024. According to Dela Rosa (2023-2024), students in Grade 5 should be able to execute all four operations on fractions, including mixed numbers (Triguero, 2023). Similarly, the Grade 5 curriculum covered all four operations involving fractions. Additionally, exercises and word problems requiring students to apply addition, subtraction, multiplication, and division of fractions in real-world scenarios were provided by textbook authors Nivera and Marcelino (2024) and Medes (2023).

Siegler, Fazio, and Pyke (2022) noted that consistent instruction, practice, and reinforcement help learners achieve commendable performance in the four basic operations with fractions. Bautista and Ramos (2023) similarly found that Grade 5 learners in the Philippines showed consistent and very satisfactory fraction operation skills as a result of structured practice. These studies support the findings of Van Hoof *et al.* (2021), which explained that maintaining performance requires differentiated activities, reinforcement, and real-life problem-solving tasks to develop accuracy, confidence, and mastery.

According to Siegler, Fazio, and Pyke (2022), who stated that effective teaching strategies and problem-solving activities help most learners develop the skills needed to perform the fundamental operations with fractions correctly. Bautista and Ramos (2023) also found that many Grade 5 learners in the Philippines achieved very satisfactory scores in fraction operations due to structured practice and reinforcement. Van Hoof *et al.* (2021) further explained that consistent practice and appropriate support are important to maintain learners' understanding and ensure all students achieve competency.

Tomlinson and Imbeau (2022) mentioned that students who scored in the good range generally understood most procedures but still needed more practice and review to reach mastery. In line with this, Garcia and Santos (2023) found that Grade 5 learners in the Philippines with 85%-89% scores in fraction operations benefited from more exercises and differentiated activities to correct errors and improve performance. Fuchs, Fuchs, and Malone (2021) elaborated that teachers should provide intervention for struggling students and challenge those who have

already mastered the skill because learners have different competency levels.

Theoretical Framework

This study is anchored on Constructivist Learning Theory, originally proposed by Jean Piaget. This theory views learning as an active process where students acquire knowledge through their learning experiences rather than traditional learning. The study assumes that effective teaching practices enable Grade 5 learners to construct mathematical understanding and improve achievement in the four key competencies.

On the other hand, the learned competencies used in this study are based on the Most Essential Learning Competencies (MELCs) in Mathematics Grade 5 issued by the Department of Education (2022). According to DepEd (2022), Grade 5 learners are expected to study divisibility rules for 2, 3, 4, 5, 6, 8, 9, 10, 11, and 12; solve multi-step problems using the order of operations (PMDAS or GMDAS); find common factors, common multiples, GCF, and LCM; and perform the four fundamental operations involving fractions and mixed numbers. These competencies are the basis for assessing the performance of learners in number sense and problem-solving. Furthermore, DepEd competencies are integrated and applied in classroom teaching, as evidenced in the recent educational materials from 2021-2024 such as the works of Dela Rosa (2024) and Nierves (2022).

Constructivist Learning Theory also suggests that learners actively build knowledge through meaningful experiences, exploration, and collaboration. In this case, the independent variable is the teaching practices, and the dependent variable is the competencies acquired by the learners. The independent variable consists of the Concrete Representational Abstract (CRA) approach, Mathematical Modeling, and Problem-Based Learning (PBL). The Concrete Representational Abstract approach guides students from using concrete manipulatives to visual representations and abstract math concepts.

Conceptual Framework

The study is premised on the fact that effective teaching strategies can greatly influence the learners' understanding and mastery of Mathematics. This is based on Constructivist Learning Theory, in which knowledge is constructed by the learner through hands-on experiences, investigation, and collaboration. Teaching practices are recognized as the independent variable, while the competencies that learners attain are seen as the dependent variable.

The independent variable includes Concrete Representational Abstract (CRA), Mathematical Modeling, and Problem-Based Learning (PBL). The Concrete Representational Abstract (CRA) strategy helps students move from concrete manipulatives to visual representations to abstract mathematical ideas. Mathematical Modeling links Mathematics to real-life situations. Problem-Based Learning (PBL) develops

learning through active participation and social interaction.

The study's dependent variable is the learners' learned competencies based on divisibility rules, order of operations, factors and multiples, and the four basic operations involving fractions. Learners are required to master these skills to improve learning outcomes. Therefore, the conceptual framework indicates that the use of Concrete Representational Abstract (CRA), Mathematical Modeling, and Problem-Based Learning (PBL) could lead to better competencies in Grade 5 Mathematics. As cited by the Department of Education, these competencies align with the Most Essential Learning Competencies (MELCs). Thus, the framework examines how the identified teaching practices relate to learners' mastery of core mathematics competencies. The research is based on the assumption that good teaching strategies can have an impact on the learners' understanding and mastery of Mathematics.

Statement of the Problem

This study aimed to determine the teaching practices in mathematics and learners' learned competencies in selected schools in the Division of Bukidnon for the School Year 2025-2026. It specifically sought to answer the following questions:

1. How do the teacher-respondents assess their teaching practices in Mathematics in terms of concrete representational abstract, mathematical modeling and problem-based learning?
2. What is the learners' level of learned competencies based on divisibility rules, order of operations, factors and multiples, four fundamental operation involving fractions?
3. Is there a significant relationship between the teacher-respondents assessment of their teaching practices in Mathematics and learners' learned competencies?

Scope and Limitations

This study focused on determining the teaching practices in Mathematics and learners' learned competencies in selected schools in the Division of Bukidnon for the School Year 2025-2026. The respondents were the one hundred fifty-two (152) Grade 5 teachers and three hundred six (306) learners in the schools where this study was conducted. The independent variables were limited to three (3) teaching practices in Mathematics in terms of Concrete Representational Abstract (CRA), Mathematical Modeling, and Problem-Based Learning (PBL). The indicators of the independent variables were generally developed based on the three teaching practices. Furthermore, the dependent variables were also limited on divisibility rules, order of operations, factors and multiples, and four fundamental operations involving fractions, covering only the first quarter competencies of MELCs (DepEd, 2022). Classroom assessments, observations, and outputs from learners in mathematics were evaluated based on these competencies. The

objective is to ascertain the degree to which teaching practices influence academic performance.

Further, this study highlights the significance of instructional methods in not only enhancing academic success but also in promoting the overall intellectual growth of students by showcasing the competencies learned by the learners as the primary outcome. Additionally, this research was confined to specific schools and grade levels within the Division of Bukidnon, focusing solely on Mathematics instruction as a means to enhance academic performance. The investigation does not encompass other subject areas or external influences; thus, the results should be understood within the particular context and timeframe of the study, recognizing that the ability to generalize to wider contexts may be restricted. The teaching practices examined in this study are applied within Mathematics classrooms. By concentrating on teaching methodologies, the research seeks to determine which strategies are most effective in engaging learners and promoting the enhancement of their performance.

MATERIALS AND METHODS

Research Design

The descriptive-correlational research design was used in this investigation. Descriptive design is a method where a researcher describes a certain phenomenon or the characteristics of a population without trying to change or manipulate the results. This includes actual observations, surveys, and case studies. In terms of correlational aspects, it seeks to determine whether there is a connection between teaching practices and learned competencies, meaning are these practices influence students' thinking skills.

According to Siedlecki (2021), descriptive research design is a scientific approach used to observe and describe a subject's behavior without influencing it. Additionally, Tuthill *et al.* (2021) stated that it provides a detailed examination of characteristics, behaviors, and trends, and identifies patterns and relationships within data. Further, Shinija (2024) cited that this approach is used to determine the characteristics of a population or phenomenon. Descriptive research design gives clear guidance on how these teaching practices affect students' learning through observations of the use of concrete materials to abstract symbols in a real classroom setup.

Study Setting

This study was conducted in the selected schools of the Division of Bukidnon. It is located in a landlocked province surrounded by Misamis Oriental on the north, Agusan del Sur and Davao del Norte on the east, Davao del Sur, Davao City, North Cotabato on the south, and Lanao del Sur on the west. It has 491 public elementary schools whose graduates are served by 66 secondary schools and 49 integrated schools. Noting cultural diversity, the Division of Bukidnon houses seven indigenous peoples' tribes: Higaonon, Talaandig, Bukidnon, Tigwahanon, Umayamnon, Matigsalog, and

Manobo.

It is the largest division among the 14 Divisions in Region X. As of July 2022, according to the Inventory of Personnel, Bukidnon has 10,279 teaching and non-teaching personnel. Even if Bukidnon is partitioned into two divisions, the half is still the largest among the 10 Divisions in Region X, a provincial division. It always takes a long trip for the teachers and the field officials, including stakeholders, to reach the Division Office located in the City of Malaybalay. To the North, the farthest municipalities are Malitbog and Talakag, and it takes the officials of the Division Office to pass through Cagayan de Oro City. To the South, the farthest are the municipalities of Pangantucan, Damulog, Kadingilan, and Kitaotao. The travel takes at most three hours by bus to reach the destination. This situation greatly affects the delivery of resources for education, the need for technical assistance, the supervision of instruction, and the monitoring of DepEd programs, projects, and activities.

In the context of Malitbog, student performance reflects both the opportunities and challenges present in the community. There are 29 elementary schools in the district with a total enrolment of 4513 for SY 2025-2026. The municipality's status was later upgraded to a 2nd class municipality following Department of Finance (DOF) Order No. 23-08, dated July 29, 2008. This reclassification was based on established financial criteria and was implemented through an Executive Order with concurrence from BLGF/DOF MC 01-M (16)08, dated November 24, 2008.

Moreover, Education has also grown along with the community. Manolo Fortich has many public elementary and secondary schools located across its 22 barangays. These schools help provide basic education to children in both rural and more developed areas. They are supervised by the Department of Education (DepEd) Bukidnon Division, which provides teachers, learning materials, training, and curriculum guidelines.

Furthermore, Baungon is a municipality in Bukidnon located in Northern Mindanao. It is part of the province's 1st congressional district. The area was originally home to the Higaonon people, who lived in the uplands and depended on farming, hunting, and trading along the rivers. As more settlers came from Misamis Oriental and other parts of Mindanao, Baungon's fertile land became important for agriculture. The municipality is known for producing crops such as corn, rice, and vegetables. Today, Baungon has 16 barangays and covers an area of about 328.34 square kilometers. Its population reached 39,151 in 2024.

Research Respondents

The respondents of this study were the one hundred fifty-two (152) Grade 5 teachers who held the positions of Teacher I, Teacher II, Teacher III, and Master Teacher I, and three hundred six (306) Grade 5 learners of the selected schools in the Division of Bukidnon.

Sampling Techniques

The researcher employed a universal sampling technique to arrive at the desired number of respondents, which was one hundred fifty-two (152) teachers. The respondents were selected based on the criteria of the study, which means those teachers who use the three teaching practices in Mathematics as their strategy and those learners who are in direct contact with them were chosen to participate in the study. This is to make the results valid and reliable. To reach three hundred six (306) learners, a ratio of 1: 2 teacher-learner respondents was applied, together with two learners who volunteered to answer the test. The result was that three hundred six (306) students were obtained. As to the selection of student-respondents, the researcher used random sampling so that everybody had the chance to be selected.

Research Instruments

There are two (2) sets of questionnaires that were used in gathering the data for this study to measure the teacher's teaching practices in Mathematics and learners' learned competencies. They provide a structured way of collecting data that directly addresses the research questions or objectives. It serves as the tool through which information is gathered from respondents, ensuring that the data collected is valid, reliable, and relevant to the study.

Set 1 dealt with the teachers' teaching practices in Mathematics in terms of concrete representational abstract, mathematical modeling, and problem-based learning. The variables were taken from Jean Piaget Constructivist Theory and the indicators were patterned and modified to ensure they fit the specific population and which was answered by the Grade 5 teachers. This was done to complete the requirements of ten (10) indicators in each domain. It utilizes a four-point Likert rating system format for the respondents to answer the survey questions: 4-At all Times, 3- Most of the Time, 2- Sometimes, and 1- Never.

Set II was a forty (40) item test questions for learners based on their learned competencies in terms of divisibility rules, order of operations, factors and multiples, and four(4) fundamental operations involving fractions. The test questionnaire used in the study was developed based on the Most Essential Learning Competencies (MELCs) prescribed by the Department of Education (DepEd). Each variable consists of ten (10) items: 1-10 for divisibility rules, 11-20 for order of operations, 21-30 for factors and multiples, and 31-40 for four fundamental operations involving fractions and was assessed through their scores during the test.

Validity and Reliability of the Instrument

The questionnaires are subject to validity and reliability testing to ensure their correctness and effectiveness. To evaluate the validity of the content of each instrument. Three panel experts in the field of Mathematics were

formed: a Graduate School Professor, a Mathematics Senior High Teacher, and a Mathematics High School Teacher. The content validation was conducted in April 2026. Using their expertise in the field of education, they ensured that the instrument was properly evaluated to fit the objective of the study. However, during the evaluation of the study, the panel found that the dependent variable, which is the Critical Thinking Skills, did not align with the objective of the study. Based on the panel's recommendation. It was then decided to change the dependent variable from Critical Thinking Skills to Learned Competencies, which was more suited and appropriate to the study.

The pilot testing for the research study was conducted in April 2026. The pre-testing was performed to evaluate the clarity, relevance, and reliability of the research instrument before the actual administration. The pilot test also helped identify possible issues in the questions, instructions, and procedures, allowing the researchers to make necessary revisions and improvements. The results of the pilot testing served as a basis for ensuring that the research instrument was appropriate and ready for the main data-gathering process. It involved a random sample of thirty (30) Grade 5 teachers and sixty (60) Grade 5 learners in the selected schools of the Division of Bukidnon. Respondents during the pre-testing were not included in the actual conduct of the final questionnaire distribution. Cronbach's alpha was utilized to ensure that the results of the study would be valid and trustworthy. The result revealed a Cronbach's alpha coefficient of 0.90 for teachers' teaching practices in Mathematics scale and 0.95 for learners' learned competencies scale, with a total scale of 0.925. This indicates good internal consistency and reliability. This further suggests that the items consistently measure the intended construct and that the instrument is sufficiently reliable for actual use in the study.

Statistical Treatment of Data

The mean, standard deviation, and Pearson Correlation were used to analyze the data collected from the patterned, modified, and validated questionnaire. Each method serves a distinct function in addressing the problem statement.

For Problem 1, the level of teachers' teaching practices in Mathematics in terms of concrete representational abstract, mathematical modeling, and problem-based learning was assessed using the mean and standard deviation.

For Problem 2, the learners' level of learned competency based on divisibility rules, order of operations, factors and multiples, and four basic operations involving fractions was determined using the mean and standard deviation.

For Problem 3, the strength and direction of the relationship between teachers' teaching practices in Mathematics and learners' learned competencies were determined using Pearson Correlation.

Ethical Considerations

The researcher sought approval from the adviser after the evaluation and revision of the manuscript to ensure that the findings of the research study were of good quality. The letter request was sent to the Schools Division Superintendent for the approval of the permit to conduct the study.

Further, the researcher went to the schools where the study was conducted to meet with the school heads and ask permission to allow their teachers and participate in the study. They were assured that their answers would be confidential. After gathering the data, the researcher prepared a copy of the manuscript for the adviser to check to ensure the data was correct and complete. It was then forwarded to the research coordinator for final review and preparation for final presentation. After it was presented, the researcher incorporated all the corrections and suggestions of the panel members. The manuscript

then underwent plagiarism and grammar checks before the adviser and panel members signed and approved the paper.

RESULTS AND DISCUSSION

This section discusses the results and discussion gathered from the survey questionnaires on teaching practices given to the respondents to determine the level of teachers' teaching practices in Mathematics and learners' learned competencies of the selected schools in the Division of Bukidnon for the School Year 2025-2026. The data were presented in tabular form for better appreciation.

Results

Problem 1: How do the teacher-respondents assess their teaching practices in Mathematics in terms of concrete representational abstract, mathematical modeling and problem-based learning?

Table 1: Summary Distribution of the Teacher-Respondents Assessment of Teaching Practices in Mathematics

Variable	Mean	SD	Interpretation
Concrete Representation Abstract	3.64	0.55	Highly Practiced
Mathematical Modeling	3.65	0.56	Highly Practiced
Problem-Based Learning	3.71	0.65	Highly Practiced
Overall	3.67	0.59	Highly Practiced

Legend:

3.26- 4.00 *At all Times/Highly Practiced*

1.76- 2.50 *Sometimes/ Slightly Practiced*

2.51- 3.25 *Most of the Time/ Practiced*

1.00- 1.75 *Never/Not Practiced*

Table 1 shows the summary distribution of teacher-respondents' assessment of teaching practices in Mathematics with an overall mean of 3.67(SD=0.59), interpreted as Highly Practiced. This means that teachers used different teaching practices in teaching their lessons to make learning accessible to all kinds of learners. This implies that teachers recognize that learners have different learning needs, abilities, and ways of understanding lessons. By using varied teaching practices, teachers can give more learners the opportunity to participate, understand the lessons better, and learn in ways that work best for them.

As observed, when the lessons are connected to what they already know, they understand better. Learners not only know the correct answers but also understand how they come up with those answers. Consistent use of concrete objects in teaching the lessons helps learners finally understand abstract concepts. Results also show that teachers use a student-centered approach in Mathematics lessons, giving learners space to explore and solve problems independently.

According to Bouck, Park, and Nickell (2021), manipulatives, diagrams, and real-life objects help students to visualize and understand difficult mathematical

concepts. Similarly, Sarama and Clements (2022) also pointed out that linking new lessons to previous knowledge and experience in everyday life allows students to investigate ideas and express their thinking, leading to a richer understanding. In addition, Magana and Coutinho (2023) also observed that learner-centered teaching practices allow students to solve problems on their own, making Mathematics more interesting and meaningful.

On the other hand, Problem-Based Learning obtained the highest variable with a mean of 3.71(SD=0.65), interpreted as Highly Practiced. This means that among the three practices in Mathematics, problem-based learning is the strategy that the majority of the teachers use in their Mathematics classes. This implies that teachers see problem-based learning as a useful approach in helping learners understand Mathematics through actual problems and meaningful situations. It gives learners the opportunity to think critically, explore different ways of solving problems, and apply their mathematical knowledge to situations they may encounter in real life.

Learners display greater interest and engagement in learning when they are given real-world problems to solve. It also shows that rather than just following a formula, learners get more chances to think critically, ask

questions, share ideas, and create their own solutions. Learners also gain from learning together and become more confident in expressing their answers through group work and discussions. The widespread use of Problem-Based Learning also shows that teachers are making Mathematics more applicable, meaningful, and learner-focused. It helps learners understand how to deal with problems they face in daily life.

This finding is supported by Savin-Baden and Major (2022), who stated that Problem-Based Learning enhances student interest and engagement by offering real-world challenges instead of simple formulas. Similarly, Reyes and Ocampo (2023) found that Grade 5 teachers often use PBL through teamwork and dialogue, which helps learners become more self-assured and practical problem-solvers. Hmelo-Silver (2021) also emphasized that PBL makes Mathematics more meaningful and student-centered by giving students the opportunity to think, question, and solve problems together.

However, Concrete Representation Abstract obtained the lowest variable with a mean of 3.64(SD=0.55), interpreted as Highly Practiced. This means that among the three teaching practices, teachers less frequently use the Concrete Representational Abstract (CRA) approach in teaching Mathematics concepts. This implies that teachers may have limited opportunities to use the

Concrete Representational Abstract approach when teaching Mathematics concepts.

When teachers do not have enough time to teach the lesson, they go directly into teaching formulas and symbols. However, some learners find it hard to understand the concept, especially those who still need guidance in learning the lessons. In some cases, teachers should limit the use of hands-on materials and visual representations because sometimes it takes up most of the time.

This is supported by Bouck, Park, and Nickell (2021), who found that because of limited time, teachers tend to skip the concrete and representational stages and proceed with formulas and symbols. Similarly, Sarama and Clements (2022) stressed that hands-on materials and visual aids are critical for students to truly comprehend Mathematics. Flores and Hinton (2023) also noted that CRA is among the least implemented approaches, yet its increased utilization can make Mathematics more accessible and engaging for learners.

Problem 2: What is the learners' level of learned competencies based on divisibility rules, order of operation, factors and multiples and four fundamental operation involving fractions? Table 2 shows the summary distribution of learners' level of learned competencies with an overall mean score of 7.74 (SD =

Table 2 : Summary Distribution of Learners' Level of Learned Competencies

Variable	Mean	SD	Interpretation
Divisibility Rules	7.63	0.42	Very Satisfactory
Order of Operations	8.96	0.32	Very Satisfactory
Factors and Multiples	6.72	0.73	Satisfactory
Four Fundamental Operations Involving Fractions	7.64	0.65	Very Satisfactory
Overall	7.74	0.53	Very Satisfactory

Legend:

9.00 - 10.00 Outstanding

3.00 – 4.00 Fairly Satisfactory

7.00 - 8.00 Very Satisfactory

0.00 - 2.00 Did not Meet Expectation

5.00 – 6.00 Satisfactory

0.53), interpreted as Very Satisfactory. This means that the majority of the learners were able to understand the lessons and acquire the knowledge and skills expected from them. This implies that their instructional activities, teaching approaches, and learning materials used have helped learners develop the competencies effectively.

This is a positive indication because it shows that most learners were able to keep up with the lessons and achieve the expected learning outcomes. The results are very positive, but they do show that there is still room for improvement. Teachers should continue to provide learners with enrichment activities, practice tasks, constructive criticism, and additional support to ensure that learners deepen their understanding and progress toward higher levels of mastery. That would allow

learners who were just under the line to get remediation or one-on-one help.

Supporting this is the statement by Hattie and Clarke (2022) that effective instructional strategies and feedback will move most learners to a good level of understanding with consistent performance. Reyes and Cruz (2023) also found that Grade 5 students in the Philippines got an average score of 62, which is classified as very satisfactory, with slight variations, which shows that the teaching techniques helped the learners to gain the expected competencies. Additionally, Black and Wiliam (2021) noted that these results are promising; teachers need to keep providing enrichment, practice, and differentiated activities to support learners to reach a higher level of mastery.

On the other hand, Order of Operation obtained the highest mean of 8.96 (SD = 0.32), interpreted as Very Satisfactory. This means that most of the learners were able to perform the correct procedure in solving mathematical problems. They can already identify which operation they are going to solve first to come up with the correct answers. The result implies that proper implementation of teaching strategies results in good performance in the order of operations.

Daily exercises and guided instruction help learners master the skill. This can also boost students' confidence in solving problems that can be applied in real-world scenarios. Therefore, teachers should continue to apply teaching strategies in presenting the lessons to improve the number of learners who get high scores.

This is also supported by Boaler and Staples (2022), who state that regular practice, clear illustrations, and guided exercises greatly improve learners' performance in the order of operations. Likewise, Mendoza and Lopez (2023) stated that Grade 5 students in the Philippines got good results in order of operations due to the effective use of demonstration and drill activities. Rittle-Johnson, Schneider, and Star (2021) further stated that classroom demonstrations and sufficient practice time help learners develop accuracy, confidence, and a consistent understanding when applying the correct steps of mathematical operations.

However, Factors and Multiples obtained the lowest mean of 6.72 (SD = 0.73), interpreted as Satisfactory. This means that learners have difficulty understanding the topic. This implies that learners need extra guidance

in mastering the skills.

Constant practice and more exercises should be provided to achieve good results and fully understand the ideas being presented. Teachers should also use real-life examples so that the lessons will be relatable and much easier to understand. Also, group collaboration should be encouraged so the learners learn to interact with each other. This shows that factors and multiples can be challenging for learners, since they require understanding number relationships, recognizing patterns, and applying mathematical rules correctly. Some learners may find it hard to tell factors and multiples apart or to use these concepts effectively when solving math problems.

This finding is supported by Clarke and Roche (2022), who stated that factors and multiples are challenging for learners because they require comprehending numerical relationships and distinguishing between various concepts, and need structured activities and concrete examples. Torres and Dimaculangan (2023) also found that factors and multiples had the lowest performance among Grade 5 competencies in the Philippines, showing that step-by-step exercises and relatable examples helped learners improve. Nunes, Bryant, and Watson (2021) also noted that using concrete materials, collaborative tasks, and prompt feedback can greatly help learners deepen their understanding and achieve mastery of factors and multiples.

Problem 3: Is there a significant relationship between the teacher-respondents' assessment of their teaching practices in Mathematics and learners' learned competencies?

Table 3: Result of the Test on the Relationship Between Teacher-Respondents Teaching Practices in Mathematics and Learners'

Teaching Practices		Learners Learned Competencies				Overall
		Divisibility Rules	Order of Operation	Factors and Multiples	Four Fundamental Operations Involving Fractions	
Concrete Representational Abstrac	r- value p-value Interpretation	0.88 0.02 S	0.90 0.02 S	0.70 0.02 S	0.83 0.02 S	0.83 0.02 S
Mathematical Modelling	r- value p-value p-value	0.73 0.01 S	0.83 0.02 S	0.61 0.01 S	0.75 0.01 S	0.73 0.01 S
Problem-Based Learning	r- value p-value Interpretation	0.77 0.03 S	0.63 0.02 S	0.73 0.01 S	0.74 0.04 S	0.72 0.03 S

Legend:

S=Significant

NS= Not Significant

At 0.05 level of significance

Table 3 shows the relationship between teachers' teaching practices in Mathematics and learners' learned competencies, with the overall result showing that there is a significant relationship between the teaching

practices variables and the learners' learned competencies variables (r-value=0.83,p-value=0.02; r-value=0.73,p-value=0.01; r-value=0.72,p-value=0.03), respectively. Thus, the null hypothesis of no significant relationship

between teachers' teaching practices and learners' learned competencies is rejected. This means that when the level of teaching practices increases, the level of learners' learned competencies also increases. This implies that effective implementation of teaching practices has an influence on the learning performance of the learners.

As observed, when learners are provided with real objects as instructional materials and connected to real-life situations, they learn more about the topic. Using familiar and concrete materials makes lessons easier for learners to understand and relate to. It also encourages them to participate actively and share their own ideas and experiences. In this way, learning becomes more meaningful, enjoyable, and easier for learners to remember.

This finding is supported by Bernardo and Calleja (2021), who found a significant positive relationship between teachers' use of learner-centered practices and students' learned competencies in Mathematics. Learners performed better when teachers used hands-on activities, problem-based tasks, and real-life applications instead of traditional lecture methods. Furthermore, Kilpatrick and Findell (2022) highlight that effective teaching practices that include manipulatives, authentic problems, and real-world applications significantly improve learners' mathematical understanding and performance. Learner-centered approaches lead to higher mastery of competencies.

The Concrete Representational Abstract showed a significant relationship to learners' learned competencies, with an overall r -value = 0.83 and p -value = 0.02. This means that as teachers' use of concrete representational abstract increases, learners' level of learned competencies also increases. This implies that concrete representational abstract is an effective instructional strategy in developing learners' mathematical understanding.

As seen, teachers use concrete representational abstract strategies by providing the learners with manipulatives, drawings/diagrams, and guided transitions to abstract problems. This can further improve learners' mastery and confidence in mathematics. It can also help them connect what they see and do with the mathematical symbols and procedures they need to use. As a result, learners may become more confident, improve their understanding, and develop greater mastery of mathematics.

This finding is supported by Reyes and Santos (2023), who stated that pupils exposed to concrete representational abstract had higher learned competencies in mathematics compared to traditional instruction. Learners showed increased mastery and confidence when teachers used concrete materials, drawings/diagrams, and gradual movement to abstract problems. Similarly, Witzel and Riccomini (2021) highlight that concrete representational abstract is an evidence-based instructional strategy. Teachers should continue and strengthen concrete representational abstract by giving learners hands-on experiences, pictorial representations, and structured guidance to the abstract level. This approach builds

both accuracy and confidence in solving mathematical problems.

As to Mathematical Modeling, the result shows a significant relationship to learners' learned competencies with an overall r -value=0.73, p -value=0.01. This means that when teachers' use of mathematical modeling increases, learners' learned competencies improve. This implies that modeling tasks encourage learners to analyze, formulate, solve, and interpret results. This process strengthens their competencies in fundamental operations and other math skills because they see the purpose and use of mathematics.

Teachers use modeling activities by providing real-world problems, guiding learners to make assumptions, and letting them validate solutions. This can further enhance learners' mastery, confidence, and problem-solving skills in Mathematics. It gives them more opportunities to understand concepts clearly, practice different strategies, and learn from their mistakes. With continuous guidance and meaningful activities, learners can become more comfortable in solving mathematical problems and applying what they have learned to real-life situations.

This finding is supported by Doerr and Ärlebäck (2022), who found a strong positive relationship between teachers' use of modeling tasks and students' mathematical competencies. Modeling helps learners develop problem-solving, reasoning, and the ability to apply Mathematics in real-life contexts, leading to improved mastery. Moreover, Blum and Borromeo (2021) emphasize that when teachers regularly integrate modeling in instruction, learners' competencies improve because they learn to connect Mathematics to real-world situations. The study recommends continuous use of modeling to strengthen learners' conceptual understanding and application skills. Furthermore, Problem-Based Learning also showed a significant relationship to learners' learned competencies with an overall r -value=0.72, p -value=0.03. This also means that as teachers' use of problem-based learning is highly practiced, learners' level of learned competencies also increases. This implies that problem-based learning is effective in developing learners' understanding of mathematical concepts.

It is noticeable that problem-based learning makes Mathematics more meaningful, because learners solve problems in context and understand mathematical concepts better, leading to improved mastery of competencies. It also gives learners the opportunity to think critically, explore different ways of solving problems, and explain their reasoning. By connecting Mathematics to situations that learners can relate to, they can see the value of what they are learning and become more engaged in the lesson. This approach can also help learners become more confident and independent when facing mathematical challenges.

This finding is supported by Hmelo-Silver and Barrows (2022), who found a strong positive relationship between problem-based learning and students' mathematical and problem-solving competencies. Learners in problem-

based learning classrooms showed higher mastery because they actively construct knowledge through real problems. Moreover, Savery (2021) emphasizes that increased use of problem-based learning improves learners' competencies. When teachers guide learners through authentic problems, learners develop deeper understanding, better retention, and more confidence in applying mathematical concepts.

CONCLUSION

Based on the results and findings of this study, the following conclusions are drawn:

The study concludes that most teachers use problem-based learning as their teaching practice. They apply real-world problems in teaching Mathematics to help learners improve their understanding. Teachers allow them to explore and interact with each other to come up with their own answers. On the other hand, the most learned competency was the order of operation. Learners know how to solve problems following a step-by-step process. They know which operation to perform first to arrive at a correct answer. With the significant relationship between teachers' practices and learned competencies, the study concludes that the higher the level of teachers' teaching practices, the higher the level of learners' learned competencies.

Recommendations

On the basis of the results of this study, the following are recommended:

1. The school head should conduct seminar-workshop in Mathematics focusing on concrete representational abstract. They should promote the use of pattern blocks in teaching place value and operations to help learners understand the lesson from the concrete level to numbers and symbols.
2. Teachers should focus on providing more activities on factors and multiples to help learners improve their understanding. They should conduct remediation for at least 30 minutes per day on multiplication exercises, as it is the basic operation in learning factors and multiples.
3. Teachers should use mathematical modeling as a strategy in teaching Mathematics. They should provide different activities in solving mathematical problems that they may apply to real-life situations.

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