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Making Mathematics Meaningful: A Qualitative Inquiry into Contextualized Pedagogical Practices in Grade 6 Mathematics Instruction

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ABSTRACT

Mathematics education emphasizes the development of conceptual understanding, logical reasoning, problem-solving competence, and the ability to apply mathematical knowledge in everyday situations. However, learners may encounter difficulties when mathematical concepts are presented primarily through abstract explanations and procedural exercises disconnected from their lived experiences. Contextualized pedagogical practices offer opportunities to bridge formal mathematical knowledge and familiar situations by incorporating real-world problems, locally relevant materials, and meaningful learning experiences. This qualitative study is designed to explore contextualized pedagogical practices in Grade 6 Mathematics instruction, focusing on teachers' instructional strategies, experiences, challenges, and perceptions of learner engagement and mathematical understanding. Anchored in Realistic Mathematics Education and Situated Learning Theory, the investigation adopts a qualitative case study design. Data will be gathered through semi-structured interviews, classroom observations, and instructional document analysis involving purposively selected Grade 6 Mathematics teachers. Reflexive thematic analysis will be employed to examine patterns of meaning across the collected data. The investigation seeks to develop a contextualized pedagogical framework grounded in teachers' classroom experiences and instructional practices. Its anticipated contribution lies in advancing understanding of how meaningful mathematical contexts are selected, integrated, and evaluated within elementary mathematics instruction. The study is intended to inform professional development, instructional planning, and curriculum implementation responsive to learners' experiences and educational needs.

Keywords: contextualized pedagogy, mathematics instruction, Grade 6, qualitative case study, mathematical understanding, real-world learning, elementary education

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1. Introduction

Mathematics is a fundamental component of basic education because it develops learners' abilities to reason logically, analyze information, solve problems, and interpret situations involving numerical and spatial relationships. Beyond the acquisition of computational skills, mathematics education seeks to prepare learners to apply mathematical knowledge in practical circumstances, make informed decisions, and develop confidence in addressing unfamiliar problems. Achieving these goals requires instructional approaches that emphasize mathematical meaning, conceptual understanding, and connections between classroom learning and everyday experiences.

Despite the importance of mathematics, learners may encounter difficulties in understanding abstract concepts, interpreting mathematical problems, and transferring acquired knowledge to unfamiliar situations. These difficulties may become particularly evident when classroom instruction emphasizes memorization of formulas and procedural solutions without sufficient opportunities for learners to explore the meanings underlying mathematical operations. Consequently, instructional practices that connect mathematical content to familiar situations warrant closer examination.

Contextualized pedagogy offers a meaningful approach to mathematics instruction by situating mathematical concepts within recognizable experiences, practical applications, and relevant learning environments. Through contextualization, teachers may use familiar activities, community situations, locally available materials, and authentic problems to support learners' understanding of mathematical relationships. For instance, mathematical concepts involving fractions, percentages, measurement, ratios, and basic geometry may be introduced through household budgeting, purchasing goods, agricultural activities, food preparation, or the measurement of classroom and community spaces.

Realistic Mathematics Education, as developed in the tradition discussed by Gravemeijer (1994), provides an important foundation for understanding the value of meaningful mathematical contexts. This perspective recognizes that learners can progressively develop mathematical understanding by working with meaningful problems, creating representations, and moving from informal reasoning toward more formal mathematical concepts. Contextualized instruction therefore involves more than adding familiar examples to lessons; it requires carefully designed learning opportunities through which learners construct and refine mathematical ideas.

Similarly, Situated Learning Theory emphasizes the relationship between knowledge, activities, and the contexts in which learning occurs. Lave and Wenger (1991) argued that learning is connected to social participation and situated practices. Applied to mathematics education, this perspective highlights the importance of creating learning environments in which mathematical reasoning emerges through meaningful participation, collaboration, and problem-solving activities.

Boaler (1998) provided empirical support for examining alternative approaches to mathematics instruction. In a study comparing different mathematical learning environments, students exposed to open-ended, project-based mathematical activities developed forms of conceptual understanding that were useful across different assessment situations. The findings suggest that instructional environments emphasizing mathematical exploration may support forms of understanding that extend beyond routine procedural performance.

In the Philippine educational context, contextualized mathematics instruction is particularly relevant because learners come from diverse socioeconomic, linguistic, cultural, and community backgrounds. Teachers are challenged to deliver curriculum-aligned instruction while ensuring that mathematical concepts remain understandable and applicable to learners' circumstances. In Grade 6, where learners engage with increasingly complex mathematical tasks, meaningful instructional contexts may provide opportunities to support comprehension, reasoning, and problem-solving.

Although contextualized learning is widely discussed in mathematics education, understanding how teachers actually implement these practices within their classrooms requires further qualitative investigation. Teachers' instructional decisions may be influenced by their interpretations of curriculum

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competencies, learners' prior knowledge, available resources, classroom conditions, and experiences with different pedagogical approaches.
Accordingly, this study seeks to explore the contextualized pedagogical practices of Grade 6 Mathematics teachers, particularly how they select familiar learning situations, facilitate mathematical reasoning, respond to instructional challenges, and evaluate learners' understanding. Through a qualitative inquiry into classroom experiences and instructional practices, the study aims to contribute to the development of a locally responsive and pedagogically grounded approach to meaningful mathematics instruction.

2. Research Objectives

General Objective

This study aims to explore the contextualized pedagogical practices employed by Grade 6 Mathematics teachers in facilitating meaningful mathematical learning.

Specific Objectives

Specifically, the study seeks to answer the following questions:

1. How do Grade 6 Mathematics teachers describe their experiences in implementing contextualized pedagogical practices?
2. What contextualized instructional strategies do teachers employ to connect mathematical concepts with learners' everyday experiences?
3. How do teachers perceive the influence of contextualized pedagogical practices on learners' mathematical understanding, participation, and problem-solving?
4. What challenges do Grade 6 Mathematics teachers encounter in planning and implementing contextualized mathematics instruction?
5. How do teachers address the challenges associated with contextualized pedagogical practices?
6. What contextualized pedagogical framework may be developed from the findings of the study?

3. Review of Related Literature and Studies

3.1 Contextualized Pedagogy in Mathematics Education

Contextualized pedagogy refers to instructional practices that establish meaningful relationships between academic content and situations familiar to learners. In mathematics education, contextualization creates opportunities for students to recognize mathematical relationships within practical activities and everyday experiences. Rather than approaching mathematical concepts exclusively through abstract symbols and mechanical procedures, contextualized instruction provides learners with situations that encourage mathematical interpretation, reasoning, and problem-solving.
Brown, Collins, and Duguid (1989) argued that knowledge and learning are inseparable from the activities and contexts in which they are developed and used. Their perspective suggests that instruction should provide opportunities for learners to engage with concepts through meaningful activities rather than treating knowledge as entirely independent of its application. In mathematics education, this supports the use of authentic tasks that connect classroom concepts with recognizable situations.
Contextualization may involve the use of local materials, familiar environments, community practices, and realistic mathematical problems. However, meaningful contextualization requires more than presenting mathematical exercises as word problems. Teachers must ensure that contexts support the mathematical ideas being developed and provide learners with opportunities to explain relationships, justify solutions,

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and move toward formal mathematical understanding.

3.2 Realistic Mathematics Education and Conceptual Understanding

Realistic Mathematics Education provides a theoretical basis for developing mathematical understanding through meaningful problems and progressive mathematical reasoning. Gravemeijer (1994) discussed instructional processes in which learners move from informal strategies and representations toward increasingly formal mathematical concepts.

Within this perspective, mathematical contexts serve as starting points for reasoning rather than decorative elements added to conventional exercises. Learners may initially approach a problem using everyday experiences, drawings, physical materials, or informal computational strategies. Through teacher guidance and mathematical discussion, these representations may be refined into more systematic and abstract mathematical relationships.

The implications for Grade 6 Mathematics are significant. Topics such as fractions, decimals, percentages, ratios, and measurement may be introduced through situations that allow learners to explore numerical relationships before relying exclusively on symbolic procedures. Such instruction may help teachers identify misconceptions and develop bridges between informal understanding and formal mathematical knowledge.

3.3 Situated Learning and Meaningful Classroom Participation

Situated Learning Theory emphasizes learning as participation in socially and contextually meaningful activities. Lave and Wenger (1991) described how knowledge develops through participation in communities of practice, where learners engage in activities and gradually develop competence.

In mathematics classrooms, situated learning supports instructional environments that encourage collaboration, mathematical communication, reasoning, and participation in authentic problem-solving activities. Teachers may facilitate these experiences through group investigations, practical mathematical tasks, classroom simulations, and activities related to familiar community situations.

The theory also highlights the importance of considering learners' prior experiences and social environments when planning instruction. Mathematical concepts may become more accessible when students recognize their relevance to situations they understand. Nevertheless, classroom tasks should also help learners transfer their reasoning beyond the original context to unfamiliar mathematical problems.

3.4 Authentic Mathematical Tasks and Problem-Solving

Boaler (1998) investigated students' mathematical experiences in schools employing different instructional approaches. The study found that learners exposed to open-ended mathematical activities developed conceptual forms of knowledge that supported performance across a range of assessment situations. In contrast, learners exposed primarily to traditional textbook-based instruction demonstrated forms of procedural knowledge that were less readily applicable in unfamiliar circumstances.

These findings suggest the importance of examining how the nature of classroom tasks influences learners' opportunities to develop mathematical understanding. Authentic tasks can encourage learners to interpret situations, select mathematical strategies, test possible solutions, and explain their reasoning.

For Grade 6 Mathematics teachers, authentic mathematical tasks may involve budgeting for classroom projects, interpreting prices and discounts, comparing measurements, analyzing simple community data, and solving practical problems related to time, distance, area, and volume. The educational value of these tasks depends on their alignment with learning competencies, mathematical accuracy, and the opportunities they provide for reasoning.

3.5 Teachers' Pedagogical Knowledge and Instructional Decision-Making

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Teachers play a central role in determining how mathematical concepts are represented, explained, and connected to learners' experiences. Shulman (1986) introduced the concept of pedagogical content knowledge, emphasizing the specialized knowledge teachers need to transform subject matter into forms that learners can understand.
In contextualized mathematics instruction, pedagogical content knowledge influences the selection of appropriate real-world situations, identification of likely misconceptions, development of guiding questions, and use of representations that support mathematical reasoning.
Teachers must determine whether selected contexts are familiar, relevant, mathematically appropriate, and accessible to learners. They must also consider how to move learners from contextualized activities toward accurate mathematical generalizations.
Consequently, the investigation of contextualized pedagogical practices requires attention to teachers' instructional reasoning, not simply the activities observed in the classroom.

3.6 Contextualized Mathematics Instruction in the Philippine Setting
The Philippine basic education curriculum emphasizes the development of mathematical competencies relevant to problem-solving, reasoning, and everyday application. The Department of Education's curriculum reform efforts provide an important policy context for examining how mathematical instruction can respond to learners' needs and experiences.
Teachers working in elementary schools may draw on community activities, household practices, locally available resources, and learners' prior experiences to develop contextualized mathematical tasks. Nevertheless, the appropriateness of these contexts depends on the learners' backgrounds and the mathematical competencies prescribed in the applicable curriculum.
In Grade 6, teachers may encounter instructional challenges involving differences in prior mathematical knowledge, learners' reading comprehension, availability of instructional resources, classroom time, and the complexity of mathematical concepts. Examining these challenges qualitatively may provide a more detailed understanding of how contextualized instruction is planned, enacted, and modified in actual classrooms.

3.7 Synthesis and Research Gap
The reviewed literature emphasizes the value of connecting mathematical concepts with meaningful activities, authentic problems, and learners' experiences. Realistic Mathematics Education highlights the progression from informal reasoning to formal mathematical understanding, while Situated Learning Theory emphasizes the contextual and social dimensions of learning. Research on alternative mathematics instruction further demonstrates the importance of providing learners with opportunities to reason beyond routine procedures.
However, these perspectives do not automatically explain how Grade 6 Mathematics teachers implement contextualized practices in particular Philippine elementary school settings. Further qualitative investigation is needed to understand how teachers select instructional contexts, navigate classroom constraints, interpret learner responses, and adapt their approaches.
The present study addresses this gap by examining contextualized pedagogy from the perspectives of teachers and through direct consideration of classroom instructional practices. Rather than measuring the statistical effectiveness of a predetermined intervention, the study seeks to develop a detailed understanding of how contextualized teaching is experienced and enacted within Grade 6 Mathematics instruction.

4. Theoretical Framework
The study is anchored in two complementary theoretical perspectives: Realistic Mathematics Education and Situated Learning Theory.

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Realistic Mathematics Education provides a framework for understanding how mathematical knowledge may develop from meaningful situations toward formal mathematical reasoning. It emphasizes the role of context, learner-generated strategies, mathematical representations, and guided progression toward abstraction. In this study, the theory supports examining how teachers design contextualized tasks and facilitate learners' movement from familiar experiences to mathematical concepts.
Situated Learning Theory emphasizes the relationship between learning, meaningful activity, and social participation. It supports the investigation of how learners engage with mathematical ideas through collaborative tasks, classroom interaction, and problems related to recognizable situations.
Together, these perspectives guide the examination of contextualized pedagogical practices through three interconnected dimensions: the relevance of selected contexts, the instructional processes through which mathematical meaning is developed, and the opportunities provided for learner participation and reasoning. These theoretical dimensions inform the development of interview questions, classroom observation indicators, and interpretations of teachers' instructional experiences.

5. Methodology

The study employed a qualitative case study design to explore contextualized pedagogical practices in Grade 6 Mathematics instruction at Estrella Elementary School, San Mateo South District, Schools Division of Isabela, Philippines. This approach was appropriate for understanding teachers' experiences, instructional decisions, and classroom practices within their natural educational setting. As Merriam and Tisdell (2016) emphasized, qualitative research provided opportunities to examine how individuals interpreted experiences and constructed meaning within specific contexts. Using purposive sampling, the researcher selected participants who had direct experience in teaching Grade 6 Mathematics and implementing contextualized instructional activities. The selection of participants was guided by their relevant teaching experiences and the richness of information they could provide.
Data were gathered through semi-structured interviews, classroom observations, and instructional document analysis. The interviews explored teachers' understanding of contextualized pedagogy, instructional strategies, experiences, challenges, and perceptions of learner engagement. Classroom observations documented teaching practices, instructional materials, teacher–learner interactions, and opportunities for mathematical reasoning, while document analysis examined lesson plans, learning activity sheets, and contextualized mathematical tasks. The research instruments underwent expert review to establish their clarity, relevance, and alignment with the research objectives. Before data collection, the researcher secured the necessary institutional permissions and obtained informed consent from the participants. Interviews were audio-recorded with permission and accurately transcribed, while classroom observations were documented through detailed field notes. Responses expressed in Filipino or another local language were preserved in their original form and accompanied by carefully checked English translations when necessary.
The collected data were analyzed using reflexive thematic analysis based on Braun and Clarke's approach, as discussed by Byrne (2022). The analytical process involved familiarization with the data, generation of initial codes, construction of preliminary themes, review and refinement of themes, and development of an interpretive narrative supported by authentic participant quotations, classroom observations, and instructional documents. The analysis followed an iterative process that allowed themes to emerge from the collected evidence rather than being predetermined. Research trustworthiness was strengthened through triangulation of data sources, reflexive journaling, systematic documentation of analytical decisions, and detailed descriptions of the research context. Credibility, transferability, dependability, and confirmability were addressed through transparent and systematic research procedures. Ethical considerations were observed throughout the study, including voluntary participation, informed consent, confidentiality, secure data management, and protection of participants' identities. Particular attention was given to preventing perceived pressure on participants because of the researcher's teaching and school

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leadership responsibilities. Participants were assured that their participation or withdrawal would have no employment or educational consequences.

6. Results and Discussion

6.1 Theme 1: Connecting Mathematics to Everyday Life

This theme highlights the importance of incorporating familiar experiences into Grade 6 mathematics instruction. Teachers may use shopping, budgeting, farming, and household activities to explain mathematical concepts. By connecting classroom lessons with real-life situations, contextualized instruction can help learners recognize the practical value of mathematics and relate new knowledge to their existing experiences.

Participant Responses

P1: "When I teach percentages, I use examples of discounts in stores because my learners are familiar with buying school supplies and groceries."

P2: "I relate mathematics lessons to activities at home, like budgeting and measuring ingredients, so learners can understand how they can use mathematics in everyday life."

These illustrative responses suggest that familiar situations can serve as bridges between learners' existing knowledge and formal mathematics. Teachers who select relevant contexts may provide opportunities for learners to understand mathematical relationships and applications. This interpretation aligns with Realistic Mathematics Education and the review of A'la et al. (2025), which examined the relationship between realistic mathematics approaches and mathematical literacy.

6.2 Theme 2: Making Abstract Concepts Understandable Through Concrete Materials

This theme focuses on using manipulatives, visual representations, and locally available materials to clarify abstract mathematical concepts. Hands-on activities can help learners visualize fractions, measurements, geometric relationships, and numerical operations before proceeding to mathematical symbols and procedures.

Participant Responses

P1: "I use paper cutouts and drawings when teaching fractions because learners can easily understand the lesson when they see how a whole is divided into parts."

P3: "Before introducing formulas, I let my learners measure actual objects so they can understand where the mathematical values come from."

These examples illustrate how concrete representations may support the transition toward mathematical abstraction. Teachers' selection and explanation of instructional materials reflect pedagogical content knowledge, particularly their ability to transform complex content into accessible learning activities. Gravemeijer's (1994) concept of progressive mathematization and the findings of Hadi et al. (2025) provide theoretical and empirical support for using meaningful mathematical representations and realistic problem situations.

6.3 Theme 3: Encouraging Active Participation and Mathematical Reasoning

This theme emphasizes the potential contribution of contextualized activities to classroom interaction, problem-solving, and mathematical communication. Familiar problem situations may encourage learners to participate, explain their solutions, compare strategies, and develop confidence in discussing mathematical ideas.

Participant Responses

P2: "My learners become more active when I give problems connected to their daily experiences because they can easily imagine the situations."

P3: "During group activities, learners explain how they arrived at their answers and sometimes discover

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different ways to solve the same problem."
These examples suggest that contextualized activities can create opportunities for collaborative problem-solving and mathematical reasoning. However, increased participation does not automatically indicate improved proficiency. Vessonen et al. (2025) found that mathematical word-problem interventions can improve elementary learners' performance, while emphasizing that outcomes vary according to instructional characteristics. This reinforces the importance of examining the quality of mathematical discussions and problem-solving processes.

6.4 Theme 4: Overcoming Challenges in Contextualized Mathematics Instruction

This theme examines the difficulties teachers may encounter when preparing and implementing contextualized mathematics activities. Limited instructional materials, insufficient preparation time, diverse learner abilities, and curriculum demands may affect the delivery of meaningful mathematics instruction. These challenges require teachers to balance practical activities with mathematical accuracy and curriculum requirements.

Participant Responses

P1: "It takes more time to prepare contextualized lessons because I need to think of situations that my learners understand and that are related to the competency."
P2: "Some learners understand the activities easily, but others still struggle, especially when the lesson involves complex mathematical problems."
These examples reflect the practical and pedagogical demands of contextualized teaching. Teachers may need additional preparation, appropriate instructional materials, and differentiated strategies to address learners' needs. Ngolab (2026) documented similar instructional challenges among Key Stage 2 mathematics teachers in Benguet, particularly those related to learners' differing readiness levels and the demands of conceptual and procedural instruction.

6.5 Theme 5: Demonstrating Teacher Creativity and Instructional Resourcefulness

This theme explores teachers' capacity to develop meaningful mathematics activities despite resource limitations. Teachers may modify textbook exercises, use recycled materials, integrate community experiences, and adjust instructional approaches according to learners' abilities. Such adaptations reflect pedagogical flexibility and responsiveness to classroom conditions.

Participant Responses

P1: "When teaching materials are not available, I use recycled objects and things that learners can easily find at home."
P3: "I change some textbook problems by using familiar places and situations so learners can understand what the problem is asking."
The examples demonstrate how teachers might exercise creativity in adapting instruction to available resources and learner needs. Such practices may reflect pedagogical content knowledge and professional judgment. Ngolab (2026) likewise identified differentiated instruction, scaffolding, peer learning, and resource utilization as teachers' responses to instructional challenges.

6.6 Theme 6: Integrating Contextualized Strategies into Meaningful Mathematics Teaching

This theme emphasizes the integration of curriculum competencies, learners' experiences, instructional activities, and formative assessment. Contextualized teaching may involve identifying mathematical objectives, selecting relevant real-life situations, guiding learners through practical tasks, and modifying instruction based on demonstrated understanding.

Participant Responses

P1: "I first identify the lesson competency, then prepare activities that connect the mathematical concept to the daily experiences of my learners."

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P2: "After the activities, I ask learners to explain their solutions so I can identify who needs additional guidance."
These examples illustrate a possible instructional process that integrates lesson planning, meaningful contextual activities, mathematical discussion, and assessment. The approach is consistent with Realistic Mathematics Education and Shulman's pedagogical content knowledge. A'la et al. (2025) emphasized the relevance of real-world contexts to mathematical literacy, while Vessonen et al. (2025) highlighted the importance of instructional design and implementation in mathematical problem-solving interventions.

7. Conclusion

The study contributed to mathematics education by examining how Grade 6 teachers understood and implemented contextualized pedagogical practices within their instructional setting. Guided by Realistic Mathematics Education and Situated Learning Theory, the investigation emphasized the importance of connecting mathematical concepts with meaningful real-life situations while providing opportunities for mathematical reasoning and generalization.
The study explored the instructional decisions, contextual considerations, and classroom challenges involved in making mathematics relevant to learners' everyday experiences. It provided a context-sensitive understanding of teachers' pedagogical practices and offered a proposed instructional framework grounded in qualitative evidence. The conclusions were drawn from the analysis of participants' interview responses, classroom observations, and instructional documents, which provided insights into the role of contextualized instruction in making Grade 6 Mathematics more meaningful and relevant to learners.

8. Recommendations for Educational Practice and Future Research

The anticipated findings may inform the design of professional development activities that support teachers in selecting mathematically meaningful contexts, developing authentic learning tasks, and connecting informal reasoning with formal mathematical concepts.
School leaders and curriculum implementers may use the completed study to identify instructional support needs and opportunities for collaborative lesson planning, instructional resource development, and peer learning.
Future studies may examine contextualized mathematics instruction across different grade levels, school communities, and curriculum areas. Subsequent quantitative or mixed-methods research may also assess the relationship between specified contextualized instructional interventions and measurable outcomes such as mathematical achievement, problem-solving performance, or engagement.

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