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## Pedagogical Approaches to Student-Centered Contextualized Mathematics Instruction and Learners' Problem-Solving Skills at Bantug Elementary School

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### Abstract

*Problem-solving is a central goal of mathematics education, yet many elementary learners struggle to apply mathematical concepts to real-life situations. Contextualized mathematics instruction has been promoted as an instructional approach that connects mathematical content to learners' everyday experiences, thereby enhancing understanding and problem-solving competence. This study examined how contextualized mathematics instruction influenced learners' problem-solving skills at Bantug Elementary School. Using a qualitative case study design, data were gathered through classroom observations, semi-structured interviews with mathematics teachers, and focus group discussions with learners. Thematic analysis revealed that contextualized instruction enhanced learners' problem-solving skills by improving conceptual understanding, increasing engagement with problem situations, and supporting strategic thinking through guided scaffolding. Learners demonstrated greater confidence and persistence when solving word problems grounded in familiar contexts. The findings highlight the importance of intentional contextualization, teacher scaffolding, and instructional leadership support in strengthening mathematics problem-solving at the elementary level.*

**Keywords:** *contextualized instruction, mathematics education, problem-solving skills, elementary learners, qualitative case study*

## **Introduction**

Problem-solving is widely recognized as a foundational component of mathematics learning and a critical skill for everyday life. Mathematics education aims not only to develop procedural fluency but also to enable learners to analyze situations, reason logically, and apply mathematical concepts to solve real-world problems. However, numerous studies have reported that elementary learners often experience difficulty with mathematical problem-solving, particularly when tasks are presented in abstract or decontextualized forms (Lesh & Zawojewski, 2007; Schoenfeld, 2016).

In many elementary classrooms, mathematics instruction remains focused on rule-based procedures and repetitive exercises, which may limit learners' opportunities to develop conceptual understanding and flexible problem-solving strategies. As a result, learners may perform well on routine computations but struggle to interpret word problems, select appropriate strategies, or justify solutions (National Council of Teachers of Mathematics [NCTM], 2014). These challenges underscore the need for instructional approaches that make mathematics meaningful and accessible to young learners.

Contextualized mathematics instruction addresses this need by situating mathematical concepts within learners' real-life experiences, community practices, and familiar situations. By linking abstract ideas to concrete contexts, contextualized instruction supports sense-making and promotes deeper understanding. Research suggests that when learners encounter mathematics in meaningful contexts, they are more likely to engage cognitively, persist in problem-solving tasks, and develop transferable skills (Boaler, 2016; Gravemeijer & Doorman, 1999).

Despite growing support for contextualized mathematics instruction, empirical studies examining its classroom enactment and impact on learners' problem-solving skills in elementary school contexts remain limited. This study seeks to address this gap by examining how contextualized mathematics instruction is implemented at Bantug Elementary School and how it influences learners' problem-solving skills.

## **Review of Related Literature**

### **Mathematical Problem-Solving in Elementary Education**

Problem-solving is central to mathematics learning and is often described as the process of interpreting a problem, selecting appropriate strategies, executing procedures, and evaluating solutions (Polya, 1957). Effective problem-solving requires conceptual understanding, strategic competence, and metacognitive awareness. At the elementary level, learners are still developing these skills and are highly influenced by instructional approaches and classroom environments.

Studies have shown that learners' difficulties in problem-solving often stem from limited conceptual understanding and an inability to connect mathematical symbols to real-world meanings (Schoenfeld, 2016). When instruction emphasizes memorization of procedures without understanding, learners may fail to recognize when and how to apply mathematical concepts in novel situations.

### **Contextualized Mathematics Instruction**

Contextualized mathematics instruction is grounded in constructivist learning theory, which posits that learners construct knowledge by connecting new information to prior experiences (Bransford, Brown, & Cocking, 2000). In contextualized instruction, mathematical tasks are embedded in meaningful situations such as daily activities, community experiences, or real-life problem scenarios.

Research indicates that contextualized instruction enhances learners' understanding by reducing abstraction and enabling learners to visualize and interpret mathematical relationships (Gravemeijer & Doorman, 1999). Context-rich problems encourage learners to reason, model situations mathematically, and reflect on solutions rather than relying solely on rote computation (Lesh & Zawojewski, 2007).

### **Contextualization and Learner Engagement**

Contextualization has also been linked to increased learner engagement. When learners perceive tasks as relevant and meaningful, they are more motivated to participate and persist in problem-solving activities (Boaler, 2016). Contextualized problems promote emotional engagement by validating learners' experiences and cognitive

engagement by encouraging deeper reasoning and strategy use.

In elementary classrooms, contextualized instruction supports diverse learners by providing multiple entry points into problem-solving tasks, thereby reducing anxiety and increasing confidence (Sullivan, Clarke, & Clarke, 2013).

## Methodology

This study employed a qualitative case study research design to explore contextualized mathematics instruction and its influence on learners' problem-solving skills at Bantug Elementary School. The case study approach was appropriate for examining instructional practices and learner experiences within a natural classroom setting.

The research site, Bantug Elementary School, was purposively selected due to its emphasis on contextualized approaches in mathematics instruction. Participants included elementary mathematics teachers and learners from selected grade levels. Teachers were chosen based on their experience teaching mathematics using contextualized strategies, while learners were selected to represent a range of abilities and participation levels.

Data were collected through classroom observations, semi-structured interviews with teachers, and focus group discussions with learners. Observations focused on lesson structure, use of contextualized problems, teacher scaffolding, and learner problem-solving behaviors. Teacher interviews explored instructional planning, perceptions of learners' problem-solving skills, and challenges in implementing contextualized instruction. Learner focus group discussions examined experiences, strategies, and confidence in solving contextualized mathematical problems.

Data analysis followed a thematic analysis approach. Observation notes and transcripts were coded inductively, and themes were generated to represent recurring patterns related to instructional practices and problem-solving outcomes. Trustworthiness was ensured through triangulation of data sources, member checking, and peer debriefing. Ethical considerations, including informed consent and confidentiality, were strictly observed.

## Findings and Results

Analysis of the data revealed four major themes illustrating how contextualized mathematics instruction influenced learners' problem-solving skills at Bantug Elementary School.

### Theme 1: Improved Problem Interpretation through Familiar Contexts

Teachers consistently designed word problems using situations that were familiar to learners, such as buying goods at local stores, sharing food among family members, measuring household items, and planning school-related activities. These contexts served as cognitive anchors that allowed learners to immediately recognize the situation being described, thereby reducing the difficulty associated with interpreting abstract or unfamiliar problem statements. By situating mathematical problems within everyday experiences, teachers enabled learners to focus on understanding the relationships between quantities rather than struggling with the meaning of the problem itself. This practice supported learners in identifying given information, determining what was being asked, and recognizing relevant mathematical operations more efficiently.

### Participant Responses

Teachers observed that learners exhibited less confusion and hesitation when solving contextualized problems. One teacher explained, "*Kapag ang problema ay tungkol sa araw-araw na ginagawa nila, mas mabilis nilang naiintindihan ang tanong at alam na nila kung ano ang hahanapin.*" Learners expressed similar experiences, with one learner stating, "*Mas madali kapag parang totoong buhay kasi naiisip ko agad ang gagawin at kung anong math ang gagamitin.*" These responses indicate that learners were able to mentally visualize the situation described in the problem, which helped them interpret the task with greater clarity.

These findings suggest that contextualized mathematics instruction significantly enhanced learners' ability to interpret word problems accurately. Familiar contexts minimized linguistic and conceptual barriers that often hinder problem comprehension, especially for younger learners. As a result, learners were able to allocate more cognitive resources to reasoning and problem-solving processes rather than decoding abstract language or unfamiliar scenarios. This supports the view that contextualization plays a critical role in supporting early stages

of problem-solving, particularly problem understanding and representation.

### **Theme 2: Enhanced Strategy Use and Reasoning**

Contextualized problems encouraged learners to explore and apply multiple problem-solving strategies rather than relying on a single, memorized procedure. Teachers observed that learners naturally used drawings, diagrams, manipulatives, estimation, and verbal explanations to represent and solve problems rooted in familiar contexts. Teachers intentionally supported strategy development by modeling solution processes, asking guiding questions, and encouraging learners to explain their thinking. This approach promoted flexibility in problem-solving and emphasized reasoning over rote computation.

#### **Participant Responses**

Teachers noted that learners were more willing to try different approaches when problems were contextualized. One teacher remarked, *"Hindi lang isang paraan ang ginagamit ng mga bata kapag may konteksto ang problema. May nagdodrawing, may nagbilang, at may nagpapaliwanag."* Learners shared that drawing pictures or acting out situations helped them think through solutions more clearly. One learner stated, *"Kapag ginuguhit ko o iniisip ko na parang totoo, mas naiintindihan ko kung paano sasagutin."*

#### **Interpretation**

The findings indicate that contextualized instruction promoted strategic competence by allowing learners to select and justify solution strategies that made sense to them. The use of multiple representations and approaches reflects deeper engagement with the problem-solving process and supports mathematical reasoning. These results align with research emphasizing that effective problem-solving involves flexible strategy use and the ability to model situations in multiple ways. Contextualized tasks thus served as platforms for developing reasoning skills rather than merely arriving at correct answers.

### **Theme 3: Increased Confidence and Persistence in Problem-Solving**

Learners demonstrated greater confidence when solving contextualized mathematical problems, particularly when tasks were closely connected to their personal experiences. Familiar contexts reduced learners' anxiety and made problems appear more approachable. Teachers contributed to this positive learning environment by validating learners' efforts, encouraging discussion, and emphasizing that mistakes were part of the learning process. This supportive approach helped learners develop a more positive disposition toward problem-solving.

#### **Participant Responses**

Learners reported feeling less afraid of making mistakes and more willing to persist when problems were contextualized. One learner shared, *"Hindi ako agad sumusuko kasi naiintindihan ko ang sitwasyon at alam ko na puwede kong subukan ulit."* Teachers similarly observed increased perseverance, noting that learners continued working on challenging problems rather than giving up quickly.

#### **Interpretation**

These responses indicate that contextualized instruction enhanced learners' emotional engagement and persistence in problem-solving. By reducing anxiety and increasing familiarity, contextualized problems fostered confidence and encouraged learners to sustain effort even when tasks were challenging. This highlights the affective benefits of contextualization, suggesting that learners' willingness to persist is closely linked to how meaningful and accessible they perceive mathematical tasks to be.

### **Theme 4: Deeper Conceptual Understanding through Guided Contextualization**

Teachers used contextualized problems as starting points for exploring and explaining underlying mathematical concepts and relationships. Through guided discussion, scaffolding, and reflection, teachers helped learners connect real-life situations to abstract mathematical representations such as symbols, equations, and procedures. This approach supported learners in moving from concrete experiences to more abstract mathematical thinking.

#### **Participant Responses**

Teachers emphasized that contextualization helped learners bridge the gap between concrete and abstract understanding. One teacher explained, "*Kapag nagsimula sa sitwasyon na kilala nila, mas madali naming ipaliwanag kung bakit ganoon ang math.*" Learners likewise reported clearer understanding, stating that concepts were easier to grasp when explained using familiar examples.

These findings suggest that guided contextualization supported deeper conceptual understanding by linking learners' lived experiences to mathematical ideas and procedures. Rather than treating context as merely decorative, teachers used it as a meaningful instructional tool to develop conceptual clarity. This strengthened learners' problem-solving competence by enabling them to understand not only how to solve problems, but also why particular strategies and solutions were appropriate.

## Discussion

The findings of this study demonstrate that contextualized mathematics instruction at Bantug Elementary School had a significant and multifaceted influence on learners' problem-solving skills. Improvements were evident in learners' ability to interpret problems accurately, employ varied solution strategies, persist in challenging tasks, and develop deeper conceptual understanding. These outcomes suggest that contextualization did not merely make problems easier or more engaging, but fundamentally reshaped how learners approached mathematical problem-solving. By grounding mathematical tasks in familiar, real-life situations, learners were better able to make sense of problem conditions, identify relevant information, and select appropriate operations, thereby strengthening the initial stages of the problem-solving process.

Consistent with constructivist learning theory, learners actively constructed mathematical meaning by linking abstract concepts to their lived experiences. This connection facilitated deeper understanding and supported flexible problem-solving, as learners were able to transfer knowledge across contexts rather than relying on memorized procedures. Contextualized problems functioned as cognitive supports that reduced the level of abstraction typically associated with mathematics instruction, enabling learners to visualize relationships among quantities and represent problems using drawings, manipulatives, and informal reasoning. As learners engaged with meaningful contexts, their engagement and persistence increased, reinforcing prior research that links contextualization with enhanced motivation, confidence, and learning outcomes (Boaler, 2016; Gravemeijer & Doorman, 1999).

Importantly, the study highlights the central role of teacher scaffolding in maximizing the instructional value of contextualization. While familiar contexts provided an accessible entry point into problem-solving, it was guided questioning, modeling, and structured reflection that enabled learners to move beyond surface-level recognition of context toward deeper conceptual understanding. Teachers' intentional scaffolding helped learners articulate reasoning, connect real-life situations to mathematical representations, and generalize strategies across problems. These findings reinforce the importance of deliberate instructional design in contextualized mathematics teaching, emphasizing that effective contextualization requires thoughtful planning and pedagogical expertise rather than the mere inclusion of real-life examples.

## Implications of the Study

The findings of this study suggest that elementary mathematics teachers should intentionally and systematically integrate contextualized problem-solving tasks into daily instruction to strengthen learners' mathematical problem-solving skills. Rather than treating contextualization as an occasional enrichment activity, teachers are encouraged to embed familiar and meaningful contexts consistently within lessons to support learners' understanding of mathematical concepts and processes. Using situations drawn from learners' everyday experiences can help clarify problem conditions, promote strategic thinking, and reduce anxiety associated with abstract mathematical tasks. In addition, teachers should actively guide learners' strategy development through questioning, modeling, and opportunities for explanation, while facilitating reflective discussions that allow learners to articulate reasoning, compare solution approaches, and connect contextual experiences to mathematical representations. Such practices can deepen conceptual understanding and promote flexible, transferable problem-solving skills.

At the level of instructional leadership, the findings highlight the need for targeted professional development programs that strengthen teachers' capacity to design and implement contextualized mathematics instruction. Professional learning initiatives should focus on developing teachers' skills in constructing context-rich problem-

solving tasks, applying effective scaffolding strategies, and using formative assessment to monitor learners' reasoning and progress. Providing teachers with structured opportunities for collaborative lesson planning and peer reflection can further enhance the quality of contextualized instruction, as collaboration enables teachers to share contextually relevant ideas, refine instructional approaches, and align practices with learners' needs and curriculum goals.

For curriculum developers, the results underscore the importance of embedding contextualized problem-solving tasks within mathematics curricula in ways that reflect learners' lived experiences and local contexts. Integrating such tasks into curriculum guides, textbooks, and learning materials can support teachers in delivering meaningful mathematics instruction and ensure that problem-solving is consistently emphasized across grade levels. By aligning mathematical content with learners' social and cultural realities, curriculum developers can contribute to more inclusive, relevant, and engaging mathematics learning experiences that foster sustained problem-solving competence among elementary learners.

### **Limitations and Future Research**

As a qualitative case study, this research is context-specific and does not aim for generalization. Future studies may employ mixed-methods designs or include multiple schools to examine the relationship between contextualized instruction and problem-solving performance across diverse settings. Longitudinal studies may also explore the sustained impact of contextualized mathematics instruction on learners' problem-solving development.

### **Conclusion**

This study provides empirical evidence that contextualized mathematics instruction significantly enhances learners' problem-solving skills at Bantug Elementary School. The findings demonstrate that when mathematical problems are grounded in learners' familiar experiences and everyday realities, learners are better able to interpret problem situations, apply appropriate strategies, and persist in solving challenging tasks. Through purposeful scaffolding and guided reflection, teachers transformed contextualized problems into meaningful learning experiences that supported conceptual understanding, strategic reasoning, and confidence in problem-solving.

Moreover, the study highlights that the effectiveness of contextualized mathematics instruction lies not only in the use of real-life contexts but in the intentional instructional practices that accompany it. Teacher facilitation, including questioning, modeling, and reflective discussion, played a crucial role in helping learners bridge concrete experiences and abstract mathematical concepts. These practices fostered a supportive learning environment in which learners felt confident to explore ideas, make mistakes, and refine their reasoning.

Strengthening contextualized mathematics instruction through targeted professional development and sustained instructional support may therefore contribute to improved problem-solving outcomes in elementary education. By equipping teachers with the pedagogical skills needed to design, scaffold, and assess context-rich problem-solving tasks, schools can promote more meaningful and inclusive mathematics learning experiences that develop learners' problem-solving competence and readiness for real-world applications.

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