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Teaching Mathematics in Senior High School: Learner Challenges and Instructional Practices in a Rural Public School at Eastern Potia National High School

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Abstract

Mathematics education in rural secondary schools continues to face persistent challenges related to learner preparedness, instructional resources, and contextual constraints. This study examined the learner challenges and instructional practices in teaching Mathematics in Senior High School at Eastern Potia National High School, a rural public school in the Philippines. Using a qualitative case study design, data were gathered through semi-structured interviews with Mathematics teachers, classroom observations, and analysis of instructional documents. Thematic analysis revealed two major domains: (1) learner-related challenges, including weak foundational skills, low mathematics self-confidence, language barriers, and limited home academic support; and (2) instructional practices employed by teachers, such as contextualized teaching, scaffolded instruction, differentiated activities, and adaptive assessment strategies. Findings indicate that while rural learners face compounded academic and socio-economic challenges, teachers employ flexible and learner-centered practices to mitigate learning gaps. The study highlights the importance of contextualized mathematics instruction, sustained teacher support, and targeted interventions to improve learning outcomes in rural Senior High School settings. Implications for curriculum implementation, teacher professional development, and rural education policy are discussed.

Keywords: Mathematics education, rural schools, Senior High School, instructional practices, learner challenge

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Introduction

Mathematics plays a critical role in developing learners' logical reasoning, problem-solving abilities, and readiness for higher education and employment. In the Philippine Senior High School (SHS) curriculum, Mathematics subjects such as General Mathematics, Statistics and Probability, and specialized tracks require learners to demonstrate higher-order thinking and application of concepts. However, achieving these learning goals remains a challenge in rural public schools where contextual constraints often intersect with learner readiness.

Rural schools in developing contexts frequently contend with limited instructional resources, large class sizes, and learners with diverse academic backgrounds. Studies have shown that learners entering Senior High School often possess gaps in foundational numeracy skills, which significantly affect their performance in advanced mathematics (Kilpatrick, Swafford, & Findell, 2001). These gaps are further intensified in rural areas due to poverty, limited parental educational support, and reduced access to supplementary learning materials.

Teachers in rural settings are therefore required to adapt instructional practices to meet learners' needs while working within systemic limitations. Research emphasizes that effective mathematics instruction in disadvantaged contexts relies heavily on contextualization, scaffolding, and responsive pedagogy (Boaler, 2016; Darling-Hammond et al., 2020). Despite this, empirical studies focusing specifically on Senior High School mathematics teaching in rural Philippine schools remain limited.

This study addresses this gap by examining learner challenges and instructional practices in teaching Mathematics at Eastern Potia National High School. By documenting teachers' experiences and classroom practices, the study seeks to contribute context-based evidence to the discourse on rural mathematics education.

Objectives of the Study

This study aimed to:

1. Identify the major challenges encountered by Senior High School learners in Mathematics at Eastern Potia National High School.
2. Examine the instructional practices employed by Mathematics teachers in addressing these challenges.

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3. Explore how contextual factors in a rural public school influence Mathematics teaching and learning.

Methodology

Research Design

The study employed a qualitative case study design to provide an in-depth examination of Mathematics teaching and learning in a specific rural school context. This design allowed for rich descriptions of learner challenges and instructional practices as experienced by teachers.

Research Site and Participants

The study was conducted at Eastern Potia National High School, a rural public secondary school offering Senior High School programs. Participants included six Mathematics teachers handling SHS classes across different strands. Teachers were selected through purposive sampling based on their teaching experience and direct involvement in SHS Mathematics instruction.

Data Collection

Data were collected using multiple qualitative methods to ensure depth and triangulation of findings. Semi-structured interviews were conducted with Mathematics teachers to elicit their perceptions of learner challenges and the instructional strategies they employed in Senior High School Mathematics classes. Classroom observations were carried out to capture actual teaching practices, levels of learner engagement, and instructional adaptations implemented during lessons. In addition, document analysis was undertaken to examine lesson plans, learning modules, and assessment tools used in Mathematics classes, providing supplementary evidence on instructional planning and assessment practices.

Data Analysis

Data were analyzed using thematic analysis following Braun and Clarke's (2006) six-phase framework. Transcripts and observation notes were coded, categorized, and synthesized into major themes. Triangulation across data sources enhanced the credibility and trustworthiness of the findings.

Results and Findings

Analysis of the qualitative data from interviews, classroom observations, and document analysis yielded two major thematic domains: learner challenges in Mathematics and instructional practices employed by teachers. These themes illustrate the complex realities of teaching Mathematics in a rural Senior High School context and the strategies teachers employ to respond to learners' needs.

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Theme 1: Learner Challenges in Senior High School Mathematics

This theme captures the academic, affective, linguistic, and socio-contextual difficulties experienced by learners, as consistently observed and reported by Mathematics teachers.

Weak Foundational Skills

Teachers consistently reported that many learners entered Senior High School with limited mastery of basic arithmetic, algebraic manipulation, and problem-solving skills. These gaps hindered learners' ability to engage meaningfully with more advanced mathematical concepts required in the Senior High School curriculum.

"Marami sa kanila hirap pa sa basic operations, kaya kapag algebra o word problems, agad silang nawawala." (Teacher 2)

Classroom observations confirmed that learners struggled with tasks involving fractions, equations, and multi-step procedures, often requiring repeated teacher intervention. This finding suggests that foundational learning gaps accumulated in earlier grade levels persist into Senior High School, particularly in rural settings. Similar studies have shown that weak numeracy foundations significantly affect learners' performance in higher-level Mathematics (Kilpatrick et al., 2001; OECD, 2019). Without sufficient mastery of prerequisite skills, learners experience difficulty in conceptual understanding and problem-solving.

Low Mathematics Self-Confidence and Anxiety

Teachers observed that many learners exhibited low confidence and heightened anxiety when engaging with Mathematics tasks. Learners were often reluctant to answer questions, avoided board work, and expressed fear of making mistakes.

"Kahit alam na nila, takot silang mag-answer. Parang may trauma na sila sa Math." (Teacher 4)

This lack of confidence frequently resulted in passive classroom participation and reduced persistence when solving challenging problems. The findings align with research indicating that mathematics anxiety negatively influences learner engagement and achievement (Ashcraft & Krause, 2007). Repeated experiences of failure can diminish learners' self-efficacy, reinforcing avoidance behaviors (Bandura, 1997). In rural contexts, limited access to remediation and academic support may further intensify these affective barriers.

Language and Comprehension Difficulties

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Teachers reported that learners struggled with mathematical word problems due to limited reading comprehension and unfamiliarity with mathematical terminology, particularly when instruction and assessment were conducted in English.

"Naiintindihan nila ang computation, pero kapag word problem na, hindi na nila ma-translate." (Teacher 1)

Observations showed that learners often misinterpreted problem requirements, leading to incorrect solutions despite understanding the underlying procedures. This finding highlights the intersection of language proficiency and Mathematics learning. Previous studies emphasize that comprehension of mathematical language is essential for problem-solving (Schleppegrell, 2007). In multilingual and rural contexts, language barriers may impede learners' ability to construct meaning from mathematical texts, underscoring the need for linguistically responsive instruction.

Limited Home Academic Support

Participants emphasized that most learners lacked academic support at home. Parents were often unable to assist with Mathematics tasks due to limited formal education or were preoccupied with livelihood activities.

"Walang tumutulong sa bahay. Kaya kung hindi nila nakuha sa klase, doon na lang." (Teacher 6)

As a result, learners had limited opportunities for practice and reinforcement outside school hours. This finding reflects broader socio-economic constraints affecting rural learners. Research suggests that home academic support plays a crucial role in reinforcing school learning (Hill & Tyson, 2009). In rural communities, economic demands and parents' educational backgrounds may limit their capacity to support learners academically, placing greater instructional responsibility on schools and teachers.

Theme 2: Instructional Practices in Teaching Mathematics

This theme describes the adaptive and learner-centered instructional practices employed by teachers to address the identified challenges.

Contextualized Teaching Strategies

Teachers regularly contextualized Mathematics lessons by integrating real-life examples drawn from learners' daily experiences, such as farming activities, household budgeting, and community-based scenarios.

"Kapag iniugnay mo sa buhay nila, mas naiintindihan nila kahit mahirap ang lesson." (Teacher 3)

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These strategies were observed to increase learner interest and participation during discussions. Contextualized instruction helps learners connect abstract mathematical concepts to meaningful experiences, enhancing comprehension and retention. This finding supports literature advocating contextualized and culturally responsive pedagogy, particularly in rural and marginalized settings (Boaler, 2016; Gay, 2018).

Scaffolded and Step-by-Step Instruction

Scaffolding emerged as a central instructional practice. Teachers broke down complex concepts into smaller, manageable steps and provided guided practice before allowing learners to work independently.

"Hindi pwedeng isang explanation lang. Dahan-dahan, step by step talaga." (Teacher 5)

This approach allowed learners to gradually build understanding and confidence. Scaffolded instruction aligns with Vygotsky's concept of the Zone of Proximal Development, where learners benefit from guided support before achieving independent mastery. Studies have consistently shown that scaffolding improves conceptual understanding in Mathematics (Hattie, 2012).

Differentiated Learning Activities

To address diverse learner abilities, teachers implemented differentiated activities, including remedial tasks for struggling learners and enrichment exercises for those who progressed faster.

"May ibang activity para sa mga hirap, may dagdag naman para sa mabilis." (Teacher 1)

Differentiation was often done informally due to time and resource constraints. Differentiated instruction acknowledges learner diversity and promotes equitable learning opportunities. Research indicates that differentiation can improve learner engagement and achievement when aligned with learners' readiness levels (Tomlinson, 2014).

Adaptive Assessment Practices

Teachers modified assessment practices by providing alternative outputs, allowing partial credit, and emphasizing formative feedback over purely summative evaluation.

"Mas importante na makita ko kung may natutunan sila, hindi lang ang score." (Teacher 4)

Assessments were used as tools for monitoring progress and guiding instruction. Adaptive and formative assessment practices support learning by providing timely feedback and reducing performance anxiety. Black and Wiliam (2009) emphasize that formative assessment enhances learner achievement, particularly in subjects perceived as difficult such as Mathematics.

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Discussion

The findings affirm existing literature that rural Senior High School learners face multifaceted challenges in Mathematics, particularly related to foundational skills and affective factors such as confidence and anxiety (OECD, 2019). These challenges underscore the cumulative nature of learning gaps, which become more pronounced at higher grade levels.

The instructional practices identified in this study align with learner-centered and inclusive pedagogical approaches. Contextualization and scaffolding reflect principles of effective mathematics teaching that emphasize sense-making and gradual release of responsibility (Hattie, 2012). Teachers' adaptive strategies demonstrate professional agency in responding to contextual constraints, despite limited resources.

However, while instructional adaptations help mitigate learner difficulties, systemic support remains crucial. Sustainable improvement in rural mathematics education requires aligned curriculum support, continuous professional development, and interventions targeting early numeracy.

Conclusion

Teaching Mathematics in Senior High School within a rural public school context presents complex challenges shaped by learner readiness and socio-economic conditions. This study revealed that learners at Eastern Potia National High School experience persistent difficulties in foundational skills, confidence, and comprehension. In response, teachers employ contextualized, scaffolded, and differentiated instructional practices to support learning.

The study highlights the resilience and adaptability of Mathematics teachers in rural settings while emphasizing the need for stronger institutional and policy support. Enhancing Mathematics education in rural Senior High Schools requires a holistic approach that addresses both learner challenges and instructional conditions.

Implications

To address the identified challenges in Senior High School Mathematics, curriculum support should be strengthened through the implementation of structured bridging and remediation programs for learners with weak foundational skills. These programs may focus on reinforcing essential numeracy, algebraic concepts, and problem-solving skills to better prepare learners for higher-level Mathematics subjects. In addition, sustained teacher professional development is necessary, particularly training that emphasizes contextualized and differentiated mathematics instruction suited to diverse learner abilities in rural settings. Continuous capacity-building initiatives can equip teachers with effective strategies to address learning gaps and enhance learner engagement. At the policy and school levels, greater support should be provided

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through the allocation of adequate resources and instructional materials that are responsive to rural contexts, including localized learning materials and appropriate teaching aids. Finally, future research is recommended to extend this study by conducting multi-site and mixed-methods investigations to examine the long-term effects of instructional practices on learner achievement and engagement in rural Mathematics education, thereby strengthening the evidence base for informed policy and practice.

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