Studies in Interdisciplinary Horizons
https://sih-journal.com | eISSN: 3082-5792
Volume 2 Issue No. 1 | 2026
Received: January1, 2026 | Accepted: February 25, 2026 | Published: March 31, 2026

Article

Teaching Mathematics at Sta. Maria National High School: Pedagogical Practices and Their Influence on Student Learning

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Abstract

This study examined the pedagogical practices employed in teaching Mathematics at Sta. Maria National High School and analyzed their influence on student learning. Guided by a mixed-methods research design, the study investigated how instructional strategies, classroom practices, and assessment approaches affect students' academic performance, engagement, and conceptual understanding in Mathematics. Quantitative data were collected through a survey on pedagogical practices and students' Mathematics grades, while qualitative data were gathered through interviews and focus group discussions with selected teachers and students. The quantitative findings revealed that Mathematics teachers commonly utilized direct instruction and guided problem-solving, complemented by learner-centered strategies such as collaborative activities and formative assessment. Correlational analysis indicated a moderate positive relationship between learner-centered pedagogical practices and students' academic achievement and engagement, suggesting that interactive and participatory approaches enhance learning outcomes. The qualitative findings further revealed four major themes: enhanced student engagement through interactive teaching, the importance of teacher guidance and instructional clarity, challenges in implementing learner-centered strategies, and the role of assessment as a tool for learning. Students reported increased motivation and better understanding when teaching strategies encouraged active participation, while teachers acknowledged contextual challenges such as large class sizes and limited instructional time. Overall, the findings demonstrate that pedagogical practices significantly influence student learning in Mathematics. The study concludes that a balanced integration of clear instruction, learner-centered strategies, and formative assessment fosters meaningful learning experiences. The results provide valuable insights for improving Mathematics instruction, guiding teacher professional development, and strengthening school-based interventions to enhance student learning outcomes.

Keywords: *Mathematics teaching, pedagogical practices, student learning, secondary education, learner-centered instruction*

1. Introduction

Mathematics education plays a critical role in developing learners' logical reasoning, problem-solving abilities, and analytical thinking skills, which are essential for academic success and everyday decision-making. In secondary education, effective Mathematics teaching is particularly vital, as it lays the foundation for higher-order thinking and future academic and career pathways. However, students' achievement in Mathematics is influenced not only by curriculum content but also by the pedagogical practices employed by teachers. Teaching strategies, classroom management, assessment methods, and instructional approaches significantly shape how students understand, engage with, and apply mathematical concepts.

In many public secondary schools, including Sta. Maria National High School, Mathematics teachers face persistent challenges such as diverse learner abilities, low student motivation, math anxiety, and limited instructional resources. These challenges highlight the importance of examining how teachers' pedagogical practices affect student learning. Understanding the relationship between teaching approaches and student outcomes can provide valuable insights into improving instructional effectiveness and learner engagement.

This study investigates the pedagogical practices used in teaching Mathematics at Sta. Maria National High School and analyzes their influence on student learning. By examining both teacher practices and student experiences, the study aims to contribute evidence-based insights that can inform instructional improvement, professional development, and school-level interventions designed to enhance Mathematics learning outcomes.

Globally, Mathematics education has been a central concern of educational reforms due to consistently reported difficulties in student achievement and engagement. Research has shown that students' performance in Mathematics is strongly linked to the quality of instruction they receive, particularly the strategies teachers use to present concepts, facilitate problem-solving, and assess understanding (Hattie, 2009). Traditional teacher-centered approaches, which emphasize rote memorization and procedural drills, have often been associated with superficial learning and limited conceptual understanding (Boaler, 2016).

In response, contemporary educational frameworks advocate for learner-centered, inquiry-based, and constructivist approaches to Mathematics instruction. Studies suggest that strategies such as problem-based learning, collaborative activities, and formative assessment promote deeper understanding and higher student engagement (Kilpatrick et al., 2001; NCTM, 2014). Teachers' beliefs and pedagogical choices influence not only academic performance but also students' attitudes toward Mathematics, including confidence and motivation (Philipp, 2007).

In the Philippine context, national and international assessments have raised concerns about students' Mathematics performance, emphasizing the need to examine classroom practices at the school level (Bernardo et al., 2018). Public secondary schools often operate within constraints such as large class sizes and limited resources, making the role of effective pedagogy even more critical. Despite these realities, there remains limited localized research focusing on how Mathematics teachers' pedagogical practices influence student learning in specific school settings such as Sta. Maria National High School. This study addresses this need by providing a focused examination of teaching practices and their impact on learners.

Research consistently highlights the significant influence of pedagogical practices on student learning in Mathematics. Hattie (2009) emphasized that teacher effectiveness, particularly instructional clarity and feedback, has a strong impact on student achievement. Similarly, Darling-Hammond et al. (2017) found that student-centered teaching practices promote deeper learning and improve academic outcomes across subject areas, including Mathematics.

Constructivist approaches to Mathematics teaching encourage learners to actively construct knowledge through exploration and problem-solving. Kilpatrick et al. (2001) identified conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition as key strands of mathematical proficiency, all of which are influenced by teaching strategies. Boaler (2016) further argued that flexible and inquiry-based teaching practices reduce math anxiety and foster positive learning attitudes.

Assessment practices also play a crucial role in Mathematics learning. Black and Wiliam (1998) demonstrated that formative assessment significantly enhances student achievement by providing timely feedback and guiding instructional adjustments. Likewise, Brookhart (2011) emphasized that assessment for learning supports students' self-regulation and understanding.

Classroom management and learning environment are additional factors affecting Mathematics achievement. Evertson and Weinstein (2006) noted that well-managed classrooms promote engagement and maximize learning time. Meanwhile, the use of instructional materials and representations has been shown to support conceptual understanding, particularly among struggling learners (Reys et al., 2014).

Teachers' beliefs about Mathematics and learning also influence their instructional decisions. Philipp (2007) found that teachers' beliefs shape their choice of strategies and expectations of students. In the Philippine setting, Bernardo et al. (2018) reported that instructional quality and teacher practices significantly predict Mathematics achievement among Filipino learners.

Moreover, student perceptions of teaching practices are closely linked to motivation and engagement. Fraser (2015) highlighted that positive classroom interactions and supportive teaching practices enhance students' attitudes toward Mathematics. Similarly, Schoenfeld (2016) emphasized the importance of teaching practices that promote sense-making rather than rote performance.

Collectively, these studies underscore the critical role of pedagogical practices in shaping Mathematics learning outcomes across diverse educational contexts.

Although numerous studies have examined the relationship between pedagogical practices and student learning in Mathematics, most existing research focuses on broad educational systems or international contexts. There is a noticeable lack of localized, school-based studies that examine how specific pedagogical practices influence student learning within Philippine public secondary schools. In particular, limited empirical research has been conducted at the school level to explore both teachers' instructional practices and students' learning experiences in Mathematics at Sta. Maria National High School. This gap highlights the need for a context-specific investigation that integrates teacher practices, student perceptions, and learning outcomes. Addressing this gap, the present study seeks to provide localized evidence that can inform instructional improvement and policy decisions aimed at strengthening Mathematics education in similar school settings.

2. Objectives of the Study

This study aims to comprehensively examine the pedagogical practices employed by Mathematics teachers at Sta. Maria National High School and determine how these practices influence students' learning outcomes. Specifically, it seeks to identify and describe the dominant instructional strategies, teaching approaches, classroom management techniques, assessment methods, and use of instructional materials utilized in Mathematics instruction. The study also aims to analyze the extent to which these pedagogical practices affect students' understanding of mathematical concepts, problem-solving skills, engagement, motivation, and overall academic performance. In addition, it intends to explore students' perceptions and learning experiences in relation to the teaching strategies used by their Mathematics teachers, as well as teachers' perspectives on the effectiveness and challenges of their instructional practices. Finally, the study aims to generate evidence-based insights that may serve as a basis for improving Mathematics instruction, enhancing teacher professional development, and strengthening school-level interventions to promote more effective and learner-centered Mathematics teaching at Sta. Maria National High School.

3. Methodology

This study employed a mixed-methods research design, combining quantitative and qualitative approaches to comprehensively examine the pedagogical practices used in teaching Mathematics at Sta. Maria National High School and their influence on student learning. The quantitative component focused on determining the relationship between teachers' pedagogical practices and students' academic performance, engagement, and understanding of mathematical concepts. The qualitative component explored students' and teachers' perceptions and experiences to provide deeper insights into how instructional practices affect learning.

The respondents of the study included selected Mathematics teachers and students from Sta. Maria National High School. Teachers were chosen through purposive sampling based on their direct involvement in Mathematics instruction, while students were selected using stratified random sampling to ensure representation across grade levels. Quantitative data were gathered using a researcher-developed survey questionnaire and students' Mathematics grades, while qualitative data were collected through semi-structured interviews and focus group discussions.

Quantitative data were analyzed using descriptive statistics and correlational analysis to determine patterns and relationships between teaching practices and student learning outcomes. Qualitative data were analyzed using thematic analysis to identify recurring themes related to instructional strategies, learner engagement, and perceived effectiveness of teaching methods. Ethical considerations such as informed consent, confidentiality, and voluntary participation were strictly observed throughout the study.

4. Results

Quantitative Results

Table 1. Pedagogical Practices Used by Mathematics Teachers

Pedagogical Practice	Mean	Interpretation
Direct instruction and explanation	4.21	Highly practiced
Guided problem-solving	4.08	Highly practiced

Pedagogical Practice	Mean	Interpretation
Collaborative/group activities	3.74	Often practiced
Use of instructional materials/visual aids	3.62	Often practiced
Formative assessment and feedback	3.89	Often practiced

The results indicate that Mathematics teachers frequently employ direct instruction and guided problem-solving. Learner-centered strategies such as group work and formative assessment are also evident, though used slightly less consistently.

This suggests a blended pedagogical approach where traditional methods remain dominant, complemented by interactive strategies. Such balance supports structured content delivery while allowing opportunities for student engagement (Hattie, 2009; NCTM, 2014).

Table 2. Relationship Between Pedagogical Practices and Student Learning

Variable	r-value	Significance	Interpretation
Learner-centered strategies & achievement	0.53	$p < .01$	Moderate positive relationship
Formative assessment & engagement	0.57	$p < .01$	Moderate positive relationship
Direct instruction & conceptual understanding	0.41	$p < .05$	Low to moderate relationship

Learner-centered practices and formative assessment show stronger correlations with achievement and engagement than purely teacher-centered approaches.

These findings imply that while direct instruction supports understanding, student-centered strategies more effectively enhance engagement and performance—consistent with constructivist research (Kilpatrick et al., 2001; Black & Wiliam, 1998).

Qualitative Results

Theme 1: Enhanced Engagement Through Interactive Teaching

Students consistently reported higher engagement when teachers used problem-solving tasks, discussions, and collaborative activities. Interactive strategies helped reduce math anxiety and encouraged active participation during lessons.

Responses:

"Mas naiintindihan ko ang Math kapag may group problem solving at paliwanagan."

"Hindi nakakaantok ang klase kapag pinapaisip kami ng teacher."

These experiences affirm that learner-centered instruction fosters meaningful learning and motivation (Boaler, 2016; Fraser, 2015). Engagement emerges as a critical mediator between pedagogy and achievement.

Theme 2: Importance of Teacher Guidance and Clarity

Despite valuing interactive activities, students emphasized the need for clear explanations and step-by-step guidance, especially for complex topics such as algebra and geometry.

Responses:

"Kailangan pa rin talaga ng malinaw na paliwanag bago mag-activity."

"Mas madali ang Math kapag ine-explain muna nang maayos."

This highlights that effective Mathematics instruction requires both clarity and interaction. Instructional clarity remains a strong predictor of achievement (Hattie, 2009), reinforcing the value of structured teaching combined with active learning.

Theme 3: Challenges in Implementing Learner-Centered Strategies

Teachers acknowledged the effectiveness of interactive strategies but cited constraints such as limited time, large class sizes, and insufficient materials, which restrict consistent implementation.

Responses:

"Epektibo ang group work pero mahirap kapag marami ang estudyante."

"Kulang sa oras para sa mas maraming activities."

These challenges align with findings that contextual and institutional factors influence pedagogical choices (Darling-Hammond et al., 2017). Without systemic support, effective strategies may remain underutilized.

Theme 4: Assessment as a Tool for Learning

Students and teachers viewed quizzes, feedback, and practice exercises as helpful when used diagnostically rather than purely for grading.

Responses:

"Mas natututo ako kapag may feedback sa solution ko."

"Nakikita ko kung saan nahihirapan ang mga bata kapag formative assessment."

This supports the concept of assessment for learning, where feedback guides improvement and self-regulation (Black & Wiliam, 1998; Brookhart, 2011).

The quantitative and qualitative findings collectively demonstrate that pedagogical practices significantly influence student learning in Mathematics. Learner-centered strategies, when combined with clear instruction and formative assessment, promote higher engagement, understanding, and achievement. However, structural challenges limit full implementation, indicating the need for targeted professional development and institutional support.

5. Discussion

These findings support existing research emphasizing the effectiveness of learner-centered and constructivist approaches in Mathematics education (Boaler, 2016; Kilpatrick et al., 2001). The positive influence of formative assessment and feedback aligns with Black and Wiliam's (1998) assertion that assessment for learning enhances student achievement. Moreover, the role of classroom management and instructional clarity observed in this study reinforces Hattie's (2009) findings on teacher effectiveness. The results suggest that when teachers adopt flexible and responsive pedagogical practices, students demonstrate improved learning outcomes and attitudes toward Mathematics.

6. Conclusions

Based on the findings, the study concludes that pedagogical practices significantly influence student learning in Mathematics at Sta. Maria National High School. Learner-centered instructional strategies, supportive classroom environments, and effective assessment practices contribute positively to students' understanding, engagement, and academic performance. While traditional teaching methods remain prevalent, integrating interactive and student-focused approaches enhances learning experiences.

The study recommends continuous professional development for Mathematics teachers focusing on innovative teaching strategies, differentiated instruction, and assessment for learning. School administrators are encouraged to support instructional improvement by providing adequate resources and manageable teaching conditions. Future research may explore longitudinal effects of pedagogical practices on Mathematics achievement and examine similar contexts in other public secondary schools.

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