

# Teacher Variables, Student Engagement and Academic Performance in the Last Mile Schools

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## Abstract

This study explored how teacher-related variables influence student engagement and academic performance in mathematics among Grade 9 learners in Last Mile Schools in Glan, Sarangani Province. Recognizing the persistent challenges faced by remote and underserved communities—such as teacher shortages, limited resources, and geographic isolation—the research aimed to understand which instructional practices contribute most significantly to meaningful student learning in mathematics.

The study sought to determine the extent to which teacher variables such as attendance, frequency of quizzes, assignments, and board work affect student engagement and academic performance in mathematics. It also aimed to examine how students' participation, homework completion, attendance, and attitude toward mathematics are related to their overall academic performance.

Using a descriptive-correlational design, the study involved complete enumeration of mathematics teachers and Grade 9 students from four identified Last Mile Schools. Data were collected through validated survey instruments and academic records, focusing on teacher variables, measures of student engagement, and the General Point Average (GPA) of students in mathematics.

Results revealed that both teachers and students rated instructional practices and engagement as consistently very high. Assignments and board work were particularly influential, with strong positive correlations to student engagement. However, no statistically significant relationship was found between teacher variables and academic performance. This suggests that while instructional behaviors influence engagement, other factors may play a more prominent role in determining academic outcomes.

The study highlights the importance of teacher consistency and interactive strategies in fostering student engagement in mathematics, especially in marginalized school settings. Insights from this research may guide policy makers, school leaders, and educators in designing context-sensitive interventions to improve mathematics education in Last Mile Schools.

**Keywords:** *teacher variables, student engagement, academic performance, Last Mile Schools, mathematics education*



## Introduction

Students in remote and underserved areas known as Last Mile Schools face persistent challenges in mathematics education. Globally and locally, mathematics is consistently reported as a difficult subject, and the Philippines ranks among the lowest in international assessments such as PISA. Research has emphasized the influence of teacher-related variables—such as attendance, assessment practices, and interactive instruction—on student engagement and academic performance. However, the extent to which these factors affect learning in Last Mile Schools remains underexplored. This study addresses this gap by examining how specific teacher variables influence Grade 9 students' engagement and performance in mathematics in selected Last Mile Schools in Glan, Sarangani Province.

### Teacher Variables and Student Engagement

A growing body of literature underscores the critical influence of teacher-related factors on student engagement, especially in mathematics education. Darling-Hammond et al. (2020) emphasize that teacher presence, classroom structure, and emotional support are integral to student participation and motivation. In similar contexts, Kraft, Blazar, and Hogan (2018) report that instructional practices that are consistent, clear, and inclusive significantly enhance student engagement and reduce learning fatigue. These findings resonate with the conditions in Last Mile Schools, where teachers often struggle with regular attendance and structured delivery due to systemic constraints.

Black and Wiliam (2018) further argue that formative assessments—such as quizzes, assignments, and active learning strategies—play a substantial role in shaping students' willingness to engage. These assessments serve not only as diagnostic tools but also as opportunities for students to actively reflect on their learning progress. In the Philippine setting, Cruz and Balagtas (2022) reveal that schools with routine formative assessments experience higher student participation rates and more favorable learning outcomes, particularly in mathematics.

### Teacher Variables and Academic Performance

Teacher effectiveness, as measured by consistency in instructional delivery and use of pedagogical tools, directly correlates with improved student academic performance (Hattie, 2009; Hanushek, 2011). In rural and underserved schools, the importance of teacher attendance is magnified. Glewwe et al. (2014) found that absenteeism among teachers in remote schools often leads to prolonged learning interruptions and diminished student achievement.

In addition, Cooper, Robinson, and Patall (2019) highlight the value of assignments and board work as predictors of student retention and academic success. When teachers assign regular, well-structured tasks and involve students in solving problems on the board, learners are more likely to develop problem-solving skills, self-confidence, and academic resilience. In the Philippine context, David, Albert, and Vizmanos (2020) note that mathematics performance



among rural students remains significantly below the national average, primarily due to inconsistent teacher presence and lack of structured learning opportunities.

### **Challenges in Last Mile Schools**

Last Mile Schools are characterized by geographical isolation, limited infrastructure, and a scarcity of qualified teachers (DepEd, 2021). These factors contribute to a learning environment where student engagement and academic achievement are often compromised. Salazar, Garcia, and De Jesus (2021) document that the lack of active instructional strategies leads to student disinterest, particularly in mathematics. Similarly, Ganal and Guiab (2019) observe that teachers in remote schools often default to passive instruction methods, further disengaging learners.

Despite initiatives such as the Last Mile Schools Program by the Department of Education, substantial disparities persist. Reyes (2021) points out that interventions often lack follow-through and do not adequately address the core issues of teacher readiness and classroom engagement strategies. Garcia and Santos (2020) recommend more localized and data-driven teacher development programs to respond to the contextual challenges of these schools.

### **Statement of the Problem**

Mathematics continues to be one of the most challenging subjects for Filipino learners, particularly those enrolled in Last Mile Schools—educational institutions in geographically isolated and underserved communities. Despite national efforts to improve educational outcomes, such as the Department of Education’s Last Mile Schools Program, students in these settings consistently underperform in mathematics due to multiple compounding factors, including limited instructional resources, inconsistent teacher attendance, and the lack of structured assessment and engagement strategies.

While previous studies have acknowledged the importance of teacher-related variables in enhancing student performance, there remains a notable gap in understanding how specific teacher practices—such as class attendance, frequency of quizzes and assignments, and use of board work—affect student engagement and academic performance in mathematics within the context of Last Mile Schools.

This study seeks to address this research gap by examining the influence of teacher variables on student engagement and academic performance in mathematics among Grade 9 learners in four identified Last Mile Schools in Glan, Sarangani Province. The results of this study are expected to provide evidence-based insights that can inform targeted instructional interventions and policy decisions aimed at improving mathematics outcomes in marginalized communities.

To guide this investigation, the study aims to answer the following research questions:

1. What is the level of teacher-related variables in terms of:



- 1.1. Teacher attendance?
- 1.2. Frequency of quizzes?
- 1.3. Frequency of assignments?
- 1.4. Frequency of board work activities?
2. What is the level of student engagement in terms of:
  - 2.1. Participation?
  - 2.2. Attendance?
  - 2.3. Homework completion?
  - 2.4. Attitude toward mathematics?
3. What is the level of students' academic performance in mathematics?
4. Is there a significant relationship between teacher-related variables and student engagement?
5. Is there a significant relationship between teacher-related variables and students' academic performance?

## Methodology

### Research Design

This study employed a descriptive-correlational design to examine the influence of teacher-related variables on student engagement and academic performance in mathematics among Grade 9 students in Last Mile Schools in Glan, Sarangani Province. The descriptive aspect documented instructional practices such as teacher attendance, frequency of quizzes, assignments, and board work. The correlational aspect determined the relationships between these teacher practices and student outcomes, using Pearson's  $r$  and Spearman's  $\rho$  as appropriate.

### Research Locale and Respondents

The study was conducted in four DepEd-classified Last Mile Schools: Elena Mepana Integrated School, E. Alegado Integrated School, Gulo Integrated School, and Lanao Ka Panglao Integrated School. These schools, located in geographically isolated barangays, reflect diverse cultural and economic contexts that impact mathematics education.

Respondents included all Grade 9 students ( $N = 197$ ) and mathematics teachers ( $N = 8$ ) from the selected schools. A complete enumeration technique was employed to ensure inclusivity and eliminate sampling bias.



### Data Collection Instrument

The study used a validated survey instrument comprising three parts:

1. Teacher Variables: Measured using a 5-point Likert scale, assessing frequency of teacher attendance, quizzes, assignments, and board work (adapted from Kraft & Dougherty, 2013; Stronge, 2018).
2. Student Engagement: Captured via self-report surveys assessing participation, homework completion, attendance, and attitude toward mathematics (Fredricks et al., 2004; Middleton et al., 2021).
3. Academic Performance: Reflected in students' General Point Average (GPA) in mathematics from school records, interpreted using DepEd's K-12 grading standards.

### Validity and Reliability

The instrument was validated by a panel of six education experts and pilot-tested for reliability. Content Validity Ratio (CVR) and Cronbach's Alpha were used to confirm instrument appropriateness and internal consistency.

### Data Collection Procedure

Formal permissions were secured from relevant authorities. School heads and guidance coordinators assisted in survey administration, with ethical protocols (e.g., informed consent, confidentiality) strictly observed. Data collection was scheduled to avoid disruptions in academic activities.

### Statistical Treatment

Descriptive statistics (mean, standard deviation) were used to determine the levels of teacher practices, student engagement, and academic performance. Inferential statistics were applied to test relationships:

Pearson's  $r$ : For continuous variables (teacher practices vs. engagement).

Spearman's  $\rho$ : For ordinal data (teacher practices vs. GPA).

Significance Level: Set at  $p < 0.05$ .



## Results and Discussion

### Teachers' Instructional Practices: Teacher and Student Perspectives

**Table 1. Summary of the Teachers Variables as Perceived by the Teachers and Students.**

Indicators	Teacher			Students		
	Mean	SD	Verbal Description	Mean	SD	Verbal Description
Attendance of Teachers to Classes	4.83	0.40	Very High	4.64	0.69	Very High
Number of Quizzes	4.75	0.45	Very High	4.62	0.73	Very High
Assignments	4.70	0.24	Very High	4.69	0.68	Very High
Board Works	4.78	0.27	Very High	4.66	0.69	Very High
Mean	4.77	0.34	Very High	4.65	0.70	Very High
<b>Overall Mean</b>	<b>M=4.71, SD=0.52</b>			<b>Very High</b>		

Table 1 summarizes the teacher-related variables as perceived by both teachers and Grade 9 students in Last Mile Schools. Results show consistently very high implementation across all indicators—teacher attendance, quizzes, assignments, and board work—with mean scores ranging from 4.62 to 4.83.

Teachers reported a mean of 4.77 (SD = 0.34), with attendance scoring highest (M = 4.83). This reinforces the role of consistent teacher presence in promoting learning continuity (Stronge, 2018). Students' ratings (M = 4.65, SD = 0.70) closely align, validating the teachers' reports. High scores in assignments and board work also indicate strategies that promote participation and comprehension (Hattie, 2009; Middleton et al., 2021).

These findings affirm that instructional practices are well-executed, even in challenging environments. The consistency of these practices reflects established pedagogical standards that enhance engagement and academic performance (Kraft & Dougherty, 2013; Black & Wiliam, 2018), especially in marginalized settings where stability is critical (David et al., 2020; Bernardo & Mendoza, 2021).

**Student Engagement in Mathematics: Teacher and Student Perspectives**
**Table 2. Summary of the Extent of Students' Engagement in Mathematics as Perceived by the Teachers and the Students.**

Indicators	Teacher			Students		
	Mean	SD	Verbal Description	Mean	SD	Verbal Description
Participation	4.75	0.49	Very high Extent	4.64	0.69	Very High Extent
Homework Completion	4.33	0.93	Very High Extent	4.62	0.67	Very High Extent
Attendance	4.38	0.63	Very High Extent	4.62	0.67	Very High Extent
Attitudes Towards Mathematics	4.98	0.55	Very High Extent	4.66	0.69	Very High Extent
Mean	4.61	0.65	Very High Extent	4.63	0.68	Very High Extent
Overall Mean	<b>M=4.62, SD=0.67</b>			<b>Very High Extent</b>		

Table 2 presents the extent of student engagement in mathematics as perceived by both teachers and students. All indicators—participation, homework completion, attendance, and attitude—were rated at a very high extent, with overall means of 4.62 (SD = 0.67) for both respondent groups.

Teachers rated attitude toward mathematics highest (M = 4.98), reflecting their perception of students' positive disposition toward the subject. This supports findings by Middleton et al. (2021) that emotional engagement is critical in sustaining interest in mathematics. Students similarly rated all indicators highly, with scores ranging from 4.62 to 4.66, indicating strong alignment in perceptions.

High engagement levels in participation and homework completion suggest effective classroom practices and student accountability, both of which are linked to improved academic outcomes (Fredricks et al., 2004; Cooper, Robinson, & Patall, 2019). The minimal variance between teacher and student responses further strengthens the reliability of these results, suggesting consistent experiences across the learning environment.

These findings affirm that students in Last Mile Schools demonstrate high engagement in mathematics, which is essential in overcoming learning barriers in underserved contexts (Darling-Hammond et al., 2020).

### Academic Performance of Grade 9 Students in Mathematics

**Table 3. Level of Academic Performance of Grade 9 in Mathematics per School**

School	GPA (in percent)	Verbal Description
School A	85.00	Satisfactory
School B	88.00	Very Satisfactory
School C	84.00	Satisfactory
School D	85.00	Satisfactory
<b>Overall Performance</b>	<b>85.50</b>	<b>Satisfactory</b>

Table 3 presents the average mathematics performance of Grade 9 students across four Last Mile Schools. The overall mean GPA was 85.50%, which falls within the “Satisfactory” category based on Department of Education grading standards. While School B achieved a “Very Satisfactory” rating (GPA = 88.00%), the other schools reported “Satisfactory” performance ranging from 84.00% to 85.00%.

These results suggest that, despite high engagement levels and positive perceptions of teacher instructional practices (as reported in earlier tables), student academic outcomes remain moderate. This gap may be attributed to factors beyond classroom instruction, such as limited access to learning resources, unstable home learning environments, and systemic inequities common in remote school settings (David, Albert, & Vizmanos, 2020; OECD, 2019).

The findings align with national trends indicating that students in rural areas consistently perform lower than their urban counterparts in mathematics assessments (DepEd, 2022). This underscores the need for complementary support strategies, such as improved learning infrastructure, continuous teacher training, and targeted remediation, to raise achievement levels in Last Mile Schools (Ganal & Guiab, 2019).

### Relationship Between Teacher Variables and Student Engagement in Mathematics

**Table 4. Results of Pearson-r Correlation Analysis between Teacher variable and the Extent of Student Engagement in Mathematics among Grade 9 Students.**

Indicators	Student Engagement	Homework Completion in Math	Attendance in Math Class	Attitude towards Math	Overall Engagement
Teacher Attendance in Class	.187* (.028)	.167 (.051)	.222* (.009)	.248* (.004)	<b>.238*</b> <b>(.005)</b>
Frequency of Quizzes in Math	.239* (.001)	.255* (.003)	.247* (.004)	.279* (.001)	<b>.308*</b> <b>(.000)</b>
Assignments Provided in Math	.359* (.000)	.352* (.000)	.339* (.000)	.432* (.000)	<b>.426*</b> <b>(.000)</b>

<b>Board Exercises in Math</b>	<b>Work in</b>	.330* (.000)	.315* (.000)	.312* (.000)	.376* (.000)	<b>.384*</b> <b>(.000)</b>
<b>Overall Teacher Variable</b>		<b>.331*</b> <b>(.000)</b>	<b>.317*</b> <b>(.000)</b>	<b>.312*</b> <b>(.000)</b>	<b>.376*</b> <b>(.000)</b>	<b>.384*</b> <b>(.000)</b>

\*Significant at the .05 level (two-tailed).

Table 4 displays the Pearson-r correlation results between teacher variables and the extent of student engagement in mathematics among Grade 9 students. All indicators showed positive and statistically significant correlations at the  $p < .05$  level.

The strongest correlations were observed between assignments and student engagement, particularly with students' attitudes toward mathematics ( $r = .432, p = .000$ ) and overall engagement ( $r = .426, p = .000$ ). This indicates that regular and meaningful assignment tasks foster deeper involvement and positive learning attitudes (Cooper et al., 2019; Hattie, 2009).

Board work exercises also demonstrated robust associations with engagement, especially with attitude ( $r = .376, p = .000$ ) and participation ( $r = .330, p = .000$ ). These findings support evidence that interactive strategies like board work promote active learning and problem-solving skills (Middleton et al., 2021).

The overall teacher variable significantly correlated with overall student engagement ( $r = .384, p = .000$ ), suggesting that consistent and structured teaching practices have a substantial impact on learner involvement. Although the correlation for teacher attendance was the weakest ( $r = .238, p = .005$ ), it remains significant, aligning with prior studies emphasizing the foundational role of teacher presence in student learning (Stronge, 2018).

These results affirm that teacher-led instructional activities—particularly assignments, board work, and assessments—are critical drivers of student engagement in mathematics, especially in marginalized educational settings where student motivation can be fragile (Darling-Hammond et al., 2020; Bernardo & Mendoza, 2021).

### Relationship Between Teacher Variables and Academic Performance in Mathematics

**Table 5. Results of Spearman's Rho Correlation Analysis between Teacher Variable and Academic Performance in Mathematics among Grade 9 Students.**

Indicators	Teacher Attendance in Class	Frequency of Quizzes in Math	Assignments Provided in Math	Board Work Exercises in Math	Overall Teacher Variable
<b>Academic Performance</b>	.192 (.808)	.577 (.423)	.192 (.808)	.439 (.581)	<b>.448</b> <b>(.552)</b>

\*Significant at the .05 level (two-tailed).



Table 5 presents the results of the Spearman's Rho correlation analysis examining the relationship between teacher variables and the academic performance of Grade 9 students in mathematics. While positive correlations were observed across all indicators, none reached statistical significance ( $p > .05$ ), suggesting that the association between the perceived teacher practices and academic outcomes was not strong enough to be conclusive.

Among the variables, the frequency of quizzes showed the strongest (though not significant) correlation with academic performance ( $r = .577, p = .423$ ), followed by board work exercises ( $r = .439, p = .581$ ) and overall teacher variable ( $r = .448, p = .552$ ). These trends are consistent with previous findings that formative assessment and active learning strategies are positively linked to performance (Black & Wiliam, 2018; Kraft & Dougherty, 2013), but the current results indicate that these relationships may be influenced by other moderating factors.

The weak correlations observed for teacher attendance and assignments ( $r = .192, p = .808$ ) may reflect the complex interplay of variables affecting academic achievement in marginalized school contexts. Issues such as home environment, access to learning materials, and student readiness may also significantly impact performance, independent of teacher practices (OECD, 2019; DepEd, 2022).

Although this study did not find significant direct effects of teacher variables on academic performance, the consistent positive directions of the coefficients suggest a potential relationship that warrants further investigation with larger samples or more refined instruments. These findings echo calls for holistic interventions that address both instructional quality and systemic barriers to learning in Last Mile Schools (David, Albert, & Vizmanos, 2020).

## Conclusion

This study investigated the relationship between teacher variables—specifically attendance, frequency of quizzes, assignment provision, and board work—and their influence on student engagement and academic performance in mathematics among Grade 9 students in Last Mile Schools in Glan, Sarangani Province.

Findings revealed that both teachers and students perceived teacher-related instructional practices to be implemented at a very high level, with consistent and structured teaching routines evident across schools. Student engagement in mathematics was also rated to be at a very high extent, particularly in attitudes toward the subject and participation. These observations affirm that teachers in Last Mile Schools exert substantial instructional effort despite resource limitations.

The Pearson-r correlation results indicated a significant and positive relationship between teacher variables and student engagement, with the strongest associations seen in the frequency of assignments and board work. These findings reinforce the importance of interactive and formative instructional strategies in fostering motivation and engagement in mathematics. However, Spearman's rho correlation showed no statistically significant relationship between



teacher variables and students' academic performance, suggesting that while instructional practices enhance engagement, other factors may influence achievement outcomes.

Overall, the results suggest that in resource-constrained environments such as Last Mile Schools, teacher engagement and consistency play a pivotal role in sustaining student interest and participation in mathematics, even if these efforts do not always translate directly into measurable academic gains.

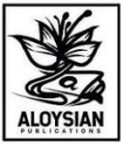
### **Recommendations**

Based on the findings and conclusion of the study, the following recommendations are proposed:

1. **Enhance Capacity-Building for Teachers-** The Department of Education and local school authorities should provide continuous training focused on differentiated instruction, student-centered strategies, and contextualized formative assessment to further improve mathematics teaching in Last Mile Schools.
2. **Strengthen Support for Learner Engagement Programs.** - Initiatives that encourage student participation, such as math clubs, peer tutoring, and activity-based learning, should be institutionalized to complement the strong teacher-led practices and sustain students' positive attitudes toward mathematics.
3. **Address Non-Instructional Barriers to Performance.** - Since academic performance was not significantly linked to teacher variables, further investigation should be conducted to assess the impact of home learning conditions, access to learning resources, and student nutrition or health on performance.
4. **Institutionalize Monitoring of Instructional Practices.** - Schools should adopt regular, non-punitive monitoring systems to ensure that instructional best practices—especially assignments, quizzes, and board work—are consistently implemented and adapted based on student needs.
5. **Conduct Further Research.** - Future studies should explore the mediating variables between teacher practices and academic achievement, possibly integrating qualitative data to capture students' lived experiences and learning challenges in remote school settings.

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