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Teacher's Pedagogical Practices and Learners' Attitude and Achievement in Mathematics 6: An Input to Professional Development Program for Mathematics Teachers

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Abstract

This study investigated the complex interplay between teachers' pedagogical practices, Grade 6 learners' attitudes toward mathematics, and academic achievement within the Geographically Isolated and Disadvantaged Areas (GIDA) of Kabugao District. Utilizing a descriptive-correlational and comparative design, the research assessed 15 Grade 6 teachers and their learners across mono-grade and multi-grade school classifications. Data were elicited through the P-MATHEX survey, the Attitude Toward Mathematics Inventory (ATMI), and the Rapid Mathematics Assessment (RMA). Statistical analysis revealed that while teachers frequently employ diverse pedagogical practices (Grand Mean = 3.99), school classification and educational attainment were not significant predictors of instructional frequency (P = .88). Furthermore, learners exhibited a "Transition (Proficient)" achievement level (Mean = 39.85) and a consistently positive attitude toward the subject (Mean = 3.70). Correlation analysis yielded a weak, non-significant relationship between pedagogical practices and learners' attitudes (r = .24) and achievement (r = -.37). No significant disparity was found in mathematics achievement between mono-grade and multi-grade settings (P = .31). The study concludes that the frequent application of current pedagogy does not invariably translate into heightened student outcomes, suggesting that academic resilience in rural settings is driven by intrinsic motivation and socio-cultural factors rather than instructional frequency alone. These findings informed the development of the Contextualized and Affective Mathematics Pedagogy (CAMP) Training Matrix, a professional development framework designed to transition educators from quantitative frequency to high-impact, qualitative instructional execution.

Keywords: Mathematics Pedagogy, Learner Attitude, Rural Education, GIDA, Academic Achievement

1. Introduction

Mathematics is a fundamental discipline that significantly influences learners' academic achievement, problem-solving abilities, and future career opportunities. As a core subject in basic education, mathematics develops logical reasoning, analytical thinking, and quantitative skills that are essential for lifelong learning and participation in a knowledge-based society. Despite its importance, many basic education institutions continue to face persistent challenges related to low learner proficiency, negative attitudes toward mathematics, and the need for more responsive, learner-centered, and context-sensitive pedagogical practices.

In the Philippine context, these challenges are further intensified by diverse learner backgrounds, disparities in teachers' pedagogical competencies, and the continuous shifts in curriculum implementation, particularly under the Department of Education's MATATAG Curriculum Framework, which emphasizes mastery of foundational competencies and meaningful learning experiences. Learners' attitudes toward mathematics—such as confidence, interest, and anxiety, interact with instructional practices to either enhance or hinder mathematical proficiency. Thus,

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understanding the dynamic relationship among learners' attitudes, proficiency levels, and teachers' pedagogical practices is crucial in improving the overall quality of mathematics education and strengthening instructional leadership (Estrellado, 2024; Hwang et al., 2018).

At the global level, international large-scale assessments reveal worrying trends in mathematics performance. Results from the Programmed for International Student Assessment (PISA) 2022 indicate a decline in average mathematics scores across OECD countries from 2018 to 2022, raising concerns about learners' capacity to apply mathematical knowledge in real-life situations (OECD, 2023). Similarly, Trends in International Mathematics and Science Study (TIMSS) results highlight wide performance disparities among countries, suggesting that systemic factors and teaching practices play a more decisive role than learner ability alone (IEA/TIMSS, 2019; Chen and Cui, 2019).

In Asia, mathematics performance presents a contrasting picture. Countries such as Singapore, Japan, South Korea, and China consistently excel in international assessments, largely due to strong curriculum coherence, rigorous teacher preparation, and sustained emphasis on mathematics instruction (IEA/TIMSS, 2019). However, many developing Asian countries continue to struggle with low mathematics achievement and weak learner motivation, reinforcing evidence that positive learner attitudes, such as confidence and interest, are closely associated with higher performance, while negative dispositions often lead to poor outcomes.

The Philippine mathematics education landscape remains a major concern. In TIMSS 2019, the Philippines ranked near the bottom, with an average mathematics score of approximately 297, indicating serious gaps in learners' mathematical proficiency (IEA/TIMSS, 2019). National and regional assessments, including SEA-PLM results, likewise reflect low levels of mastery in foundational mathematical competencies (DepEd, 2023). Studies attribute this performance to insufficient instructional resources, gaps in teacher readiness, frequent curriculum transitions, and inconsistent implementation of instructional support programs (DepEd, 2023; PIDS, 2023). Furthermore, many learners initially exhibit interest in mathematics but gradually develop anxiety and low self-confidence as content becomes more complex, a trend that underscores the importance of effective pedagogy and instructional leadership.

At the local level, Kabugao District in Apayao exemplifies these national challenges, often in more intensified forms. As a geographically isolated and disadvantaged area (GIDA), schools in Kabugao face limited facilities, multigrade classroom arrangements, teacher retention issues, and contextual constraints related to language, culture, and socioeconomic conditions. These factors significantly affect both teaching practices and learners' engagement in mathematics. Local studies and school reports indicate that teachers experience difficulty fully implementing national mathematics programs due to curriculum demands, learner diversity, and classroom realities. Nevertheless, contextualized initiatives, such as the use of Sci-Math board games and interactive instructional materials, have demonstrated promising results in improving learner interest and conceptual understanding, suggesting that pedagogical practices tailored to local contexts can positively influence learner attitudes and proficiency (Galut, 2022; Mamba, 2025).

Given these realities, there is a compelling need to examine how learners' attitudes toward mathematics, their level of proficiency, and teachers' pedagogical practices are interrelated, particularly within underserved and rural contexts. Such an examination is critical not only for classroom-level improvement but also for informing educational leadership decisions related to instructional supervision, teacher professional development, and school-based interventions. This study, therefore, seeks to generate empirical evidence that can guide leadership-driven strategies aimed at strengthening mathematics instruction and improving learner outcomes in Kabugao District.

2. Related Literature and Studies

Mathematics is widely recognized as a fundamental subject that serves as the foundation for numerous academic disciplines, technological advancements, and real-world applications (Andamon and Tan, 2018; Genç et al., 2025). Mastery of mathematics not only enables learners to perform calculations but also develops critical cognitive skills, such as logical reasoning and analytical thinking (Carey et al., 2017; F. Chen and Cui, 2019). The National Council of Teachers of Mathematics (NCTM, 2014) posits that mathematical success for all students requires equitable access to high-quality instruction. Despite its importance, mathematics remains a highly challenging subject. Successful learning requires a balance of procedural fluency, conceptual understanding, and persistence (Boaler, 2016; Decristan et al., 2015). Creating effective, equitable learning environments demands that educators assess students' initial knowledge and provide differentiated, scaffolded support to gradually build mastery and confidence (Chamberlin and Powers, 2010; Irwanto et al., 2024).

2.1. Learners' Attitudes toward Mathematics

Research consistently demonstrates that learners' attitudes toward mathematics significantly impact their academic engagement. Foundational frameworks suggest that positive attitudes encourage resilience when facing challenging tasks, whereas negative attitudes hinder learning and motivation (Aiken, 1970; Hannula, 2002). Recent studies echo this, emphasizing that emotions, perceived utility, and self-confidence shape learning outcomes in modern classrooms (Mutodi and Ngirande, 2014; Uslan et al., 2024).

Math anxiety is a particularly prevalent factor in shaping negative attitudes. High levels of anxiety cognitively disrupt problem-solving abilities and negatively impact overall performance (Ashcraft, 2002; Dowker et al., 2016). Ramirez et al. (2018) highlighted that targeted interventions are required to alleviate math anxiety and rebuild positive emotional connections to the subject. In the Philippine context, sociodemographic variables, family background, and peer influence are strong determinants of academic dispositions (Poon, 2020; Tan et al., 2019). Andamon and Tan (2018) emphasized that cultivating a supportive classroom environment significantly enhances a learner's disposition toward math.

The existing literature largely associates challenging academic environments with high math anxiety and negative attitudes. However, the present study contrasts with these generalized findings. Despite being in rural, geographically isolated schools with limited resources, the Grade 6 learners in this study demonstrated a predominantly positive attitude toward mathematics. This indicates that geographical isolation and socioeconomic disadvantages do not inherently dictate a negative academic disposition, suggesting that these rural learners possess high resilience and intrinsic motivation.

2.2. Teachers' Pedagogical Practices

Research on pedagogical practices underscores the importance of teacher self-efficacy, pedagogical content knowledge (PCK), and the ability to adapt to diverse classroom structures. Shulman (1986) established PCK as the vital intersection of subject mastery and instructional skill, a concept further validated by Hill et al. (2005), who linked mathematical knowledge for teaching directly to student achievement. Recently, Berg et al. (2024) found that teachers with higher self-efficacy deploy significantly more effective, learner-centered pedagogical practices.

In complex educational settings, such as multi-grade or rural classrooms, responsive pedagogy is critical. Brown (2010) and Taole (2020) highlighted that teaching mathematics in multi-grade classrooms requires distinct strategies, such as peer tutoring, differentiated instruction, and highly contextualized materials, to overcome resource limitations. To transition away from rote memorization, action research by Bohara (2024) demonstrated the effectiveness of project-based learning (PBL) in deepening mathematical engagement. Furthermore, modern policy frameworks, such as the MATATAG curriculum in the Philippines and DepEd Order No. 24, s. 2020, mandate culturally responsive and inclusive pedagogies tailored to local realities (Xenofontos et al., 2024).

The literature affirms that teaching in non-traditional or resource-scarce environments requires high pedagogical awareness and adaptability. This perfectly aligns with the present study, which found that rural educators frequently practice contextualized instruction, error analysis, and diagnostic assessment. The teachers' high utilization of these practices confirms the literature's assertion that localized, responsive pedagogies are essential for managing the distinct challenges of GIDA (Geographically Isolated and Disadvantaged Areas) schools.

2.3. Learners' Mathematics Proficiency

Mathematical proficiency is multifaceted, encompassing conceptual understanding, procedural fluency, and the capacity for adaptive reasoning (Mutawah et al., 2019; Thompson and Carlson, 2017). However, extensive global and local data indicate persistent struggles in achieving this proficiency. The OECD (2023) PISA 2022 results revealed that Filipino learners continue to score significantly below the global average in mathematics. This corroborates earlier TIMSS data showing systemic gaps in curriculum implementation and conceptual mastery (Mullis et al., 2016).

Proficiency is not purely cognitive; it is heavily influenced by instructional experiences. Hattie's (2008) extensive meta-analyses revealed that visible learning strategies and quality feedback are among the highest predictors of student achievement. Recent studies by Bascones et al. (2024) and Yusof et al. (2020) further argue that proficiency is deeply intertwined with non-cognitive factors, including the student's learning environment and systemic educational support.

National assessments paint a picture of widespread low mathematical proficiency in the Philippines. In stark contrast, the learners in the present study exhibited a "Transition (Proficient)" level of achievement. This significant finding demonstrates that specific localized contexts—despite facing the typical challenges of rural education—can foster functional academic proficiency that outperforms broader national trends, highlighting the effectiveness of localized resilience.

2.4. Relationship Between Learners’ Attitudes and Teachers’ Pedagogies

Educational psychology heavily connects teacher behavior to student emotional responses. Lazarides and Rubach (2020) found that inquiry-based, student-centered pedagogies positively influence students' achievement goal orientations. Furthermore, Fauth et al. (2019) demonstrated that teacher enthusiasm, cognitive activation, and a supportive classroom climate significantly boost students' enjoyment of mathematics. When teachers establish a safe space for errors and utilize formative assessments constructively, students' math anxiety decreases, and their perceived utility of the subject increases (Kyaruzi et al., 2019; Zembylas, 2005).

Mainstream literature strongly argues that specific teaching pedagogies directly shape how students feel about a subject. However, the present study refutes this assumption in its specific context. The findings revealed no significant relationship between the teachers' self-assessed pedagogical practices and the learners' attitudes. This contradiction suggests that for these particular rural learners, positive attitudes are likely driven by external factors—such as community values, family encouragement, or intrinsic resilience—rather than the specific mechanical pedagogies employed by their teachers.

2.5. Relationship Between Learners’ Attitudes and Learners’ Proficiency

The reciprocal relationship between attitude and academic achievement is one of the most widely accepted paradigms in mathematics education. Ma and Kishor’s (1997) seminal meta-analysis established a reliable correlation between positive attitudes and high achievement. Contemporary studies support this, indicating that high self-efficacy and low anxiety yield better test scores and deeper conceptual understanding (Peixoto et al., 2017; Andamon and Tan, 2018). Essentially, students who value mathematics and feel confident in their abilities perform significantly better than those plagued by math anxiety (Ramirez et al., 2018).

Similar to the previous theme, the present study challenges this established academic norm. While extensive literature dictates a strong, positive correlation between attitude and achievement, this study found no significant relationship between the two variables among the Grade 6 learners. This implies that in this rural demographic, students are maintaining functional mathematical proficiency independent of their emotional disposition toward the subject, pointing to compliance, structured study habits, or alternative motivational drivers as the root of their academic success.

2.6. Gaps in the Literature

Despite the extensive body of research concerning mathematics education, several critical gaps remain that this study seeks to address. First, a significant grade-level gap exists in the application of diagnostic tools; while the Rapid Mathematics Assessment (RMA) is widely researched in the early grades to establish foundational numeracy (Department of Education [DepEd], 2023), there is a dearth of empirical literature exploring its efficacy for Grade 6 learners. This is a crucial omission, as this level serves as the terminal year of elementary education and a vital transition toward complex concepts like algebra and geometry (Bite and Tan, 2024). Second, there is a notable contextual and geographic gap in the literature. Performance data often overlook the unique instructional challenges in rural settings like SDO-Apayao, where geographical dispersion and resource limitations significantly impact teaching delivery (Adarlo and Jackson, 2022).

Furthermore, a procedural gap is evident in how diagnostic data is utilized for professional development. Most initiatives follow a "top-down" approach, whereas there is a lack of research linking RMA-driven error analysis to specific "bottom-up" interventions like a Pedagogical Retooling Program (UNESCO, 2023). Finally, there is a correlational gap regarding the triangulation of teacher practices, learner attitudes, and actual proficiency. While global studies such as the Programme for International Student Assessment (PISA) emphasize the role of mathematics anxiety, localized research has yet to map how specific pedagogical strategies influence the psychological disposition and RMA-based proficiency of Filipino Grade 6 learners (Capuno et al., 2019; Organisation for Economic Co-operation and Development [OECD], 2023).

2.7. Synthesis

The synthesis of current literature suggests that mathematical excellence is determined by the synergy between instructional quality and learner psychology. Research underscores that a positive attitude toward Mathematics is a primary predictor of success, serving as a buffer against anxiety and a catalyst for persistence (Mazana et al., 2019). These dispositions are shaped by Pedagogical Practices, particularly those aligned with the MATATAG Curriculum, which emphasizes student-centered approaches and the Concrete-Pictorial-Abstract (CPA) model (DepEd, 2023). International frameworks support this, noting that contextualizing lessons within the learners' local environment makes abstract concepts more tangible (NCTM, 2020).

In the Philippine context, the implementation of the National Learning Recovery Program (NLRP) identifies the Rapid Mathematics Assessment (RMA) as a cornerstone for intervention. Literature characterizes the RMA as a "diagnostic engine" designed to identify conceptual gaps before they become permanent deficits (Gomez and Dela Cruz, 2024). State-of-the-art perspectives now argue that teacher development must evolve into "pedagogical retooling"—a targeted response to documented student errors (Ball et al., 2008; Hill et al., 2005). By combining diagnostic evidence from the RMA with an analysis of teacher practices and attitudes, this study synthesizes global pedagogical theories with localized needs to create an evidence-based professional development framework.

Additionally, the reviewed literature highlights that mathematics education is a complex interplay of cognitive proficiency, affective attitudes, and pedagogical quality. International frameworks and local studies agree that responsive teaching practices and positive learning environments are fundamental to student success (Boaler, 2016; NCTM, 2014).

The literature significantly affirms the present study regarding the crucial role of localized pedagogy. The teaching strategies utilized by the Grade 6 educators, such as error analysis, contextualization, and flexible assessment—are heavily supported by modern research as the most effective ways to manage rural and multi-grade environments (Taole, 2020; Berg et al., 2024).

Conversely, the present study significantly refutes several core assumptions found in broader educational literature. While global assessments (OECD, 2023) suggest widespread low proficiency and high anxiety among Filipino learners, this study found that rural GIDA learners maintain a positive attitude and a functional, proficient level of achievement. Most notably, while extensive literature claims that pedagogy dictates attitude, and attitude dictates proficiency (Andamon and Tan, 2018; Lazarides and Rubach, 2020), the present study found no significant relationships among these variables.

Ultimately, this synthesis reveals that geographically isolated and disadvantaged areas (GIDA) operate under unique educational and social dynamics. These distinct environments can foster student resilience and proficiency that defy conventional academic expectations, necessitating highly localized, rather than generalized, educational interventions.

3. Methodology

3.1. Research Design

This study employed a quantitative research framework integrating descriptive, correlational, explanatory, and comparative designs to systematically examine the interplay between teacher profiles, pedagogical practices, and learner outcomes. The descriptive component utilized weighted means and standard deviations to document institutional classifications and the frequency of pedagogical dimensions practiced by Grade 6 Mathematics teachers. To address the explanatory objective, multiple regression analysis was executed to determine the predictive influence of school classification and educational attainment on instructional behavior. Furthermore, a correlational design using the Pearson Product-Moment Correlation coefficient evaluated the association between self-reported teaching practices and learners' affective dispositions and cognitive achievement as measured by the Rapid Mathematics Assessment (RMA). Complementing these analyses, a comparative design via independent samples t-tests was implemented to discern potential performance disparities between mono-grade and multi-grade structural arrangements. By synthesizing these inferential approaches, the study systematically tested the null hypotheses, identifying that structural and professional profiles do not significantly dictate pedagogical frequency, nor do these frequencies inherently correlate with student achievement. This comprehensive methodological approach provided the robust empirical foundation necessary for proposing the Contextualized and Affective Mathematics Pedagogy (CAMP) Training Matrix, a targeted professional development program designed to transition educators from quantitative frequency to high-impact instructional execution.

3.2. Participants of the Study

The participants of the study comprised two groups: Grade 6 Mathematics teachers and their respective learners from public elementary schools in Kabugao District I, Division of Apayao. The primary respondents were teachers from both mono-grade and multi-grade rural schools, whose demographic profiles, particularly educational attainment, provided context to their self-reported pedagogical practices. The secondary respondents were Grade 6 learners enrolled in these teachers' classes, whose mathematical proficiency and academic attitudes were assessed. These groups were purposively selected to represent the unique educational dynamics, structural challenges, and teaching-learning conditions in a Geographically Isolated and Disadvantaged Area (GIDA)

3.3. Sampling Procedure

The study utilized purposive sampling to select participants based on specific demographic and contextual characteristics aligned with the research problem. Grade 6 Mathematics teachers were chosen according to inclusion criteria: they had to be officially teaching mathematics under the K to 12 or MATATAG curriculum and assigned to either mono-grade or multi-grade public elementary schools in Kabugao District I, a strictly rural locale. This ensured that the data reflected pedagogical realities and resource limitations within a Geographically Isolated and Disadvantaged Area (GIDA). Consequently, the intact classes of these teachers were also purposively included, with Grade 6 learners selected so their mathematics achievement scores and academic attitudes could be directly paired with their teachers' pedagogical practices for correlational analysis. This non-probability sampling approach was appropriate as it guaranteed that the selected samples represented the structural challenges and teaching-learning conditions necessary for the descriptive-correlational and comparative phases of the research.

3.4. Locale of the Study

The study was conducted in Kabugao District I, Division of Apayao, a recognized Geographically Isolated and Disadvantaged Area (GIDA) comprising fifteen public elementary schools located in strictly rural settings. The locale included eight mono-grade schools and seven multi-grade schools, namely Apadi ES, Cabetayan ES, Dagara ES, Dibagat ES, Iyapan ES, Kabugao CS, Kadikitan ES, Lucab ES, Madatag ES, Madduang ES, Malabanig ES, Maragat ES, Musimut ES, Nagbabalayan ES, and Tuyangan ES. These schools were characterized by limited instructional resources, multi-grade arrangements, and contextual challenges related to geography, language, and socio-economic conditions, making Kabugao District I am appropriate setting for examining mathematics teaching practices and learner achievement in underserved educational environments.

3.5. Research Instrument

The study utilized three standardized research instruments to comprehensively gather data. Learners' mathematical proficiency was measured using the official post-test results of the Rapid Mathematics Assessment (RMA) for Grade 6, a DepEd-recognized tool aligned with K to 12 and MATATAG curriculum competencies, covering number sense, geometry, measurement, patterns, and problem-solving. Learners' academic disposition was assessed through the Attitude Toward Mathematics Inventory (ATMI), which employed a 5-point Likert scale to evaluate self-confidence, interest, perceived usefulness, and mathematics anxiety, with negative items reverse-scored for accuracy. Teachers' pedagogical practices were evaluated using the P-MATHEX survey, aligned with the Philippine Professional Standards for Teachers (PPST) Domains 1, 4, and 5, measuring instructional strategies, curriculum planning, assessment practices, feedback and learner support, and learning environment. To reduce social desirability bias, teacher responses were collected anonymously. Both ATMI and P-MATHEX were pilot-tested for reliability in the GIDA context, with internal consistency confirmed using Cronbach's alpha.

3.6. Statistical Treatment of Data

Data were tallied, tabulated, and analyzed using appropriate statistical treatments at the 0.05 level of significance. Frequency counts and percentages described the demographic profiles of schools and teachers, while weighted means and standard deviations assessed pedagogical practices and learners' attitudes, with responses evaluated through 5-point Likert scales and negative items reverse-scored. Mathematics achievement was measured via the Rapid Mathematics Assessment (RMA), categorized into four proficiency levels: Highly Proficient (45–50), Nearly Proficient (29–44), Low Proficient (15–28), and Not Proficient (0–14). Inferential statistics were utilized to test relationships, differences, and predictors: Pearson correlation measured the associations between teachers' practices, learners' attitudes, and achievement, while an independent samples t-test compared achievement between mono-grade and multi-grade settings. Finally, Multiple Regression Analysis was employed to determine the extent to which school classification and teachers' educational attainment significantly influenced the pedagogical practices employed in Grade 6 Mathematics.

4. Results and Discussion

Table 1. Profile of Schools in Terms of Classification

Classification	Frequency (f)	Percentage (%)
Mono-grade	8	53.33%
Multi-grade	7	46.66%
Total	**N =15**	**100%**

Table 1 shows the classification of the participating schools. Out of the 15 schools, 8 (53.33%) are mono-grade, while 7 (46.66%) are multi-grade. This distribution indicates that multi-grade classes are commonly used in the district as a practical way to meet the needs of learners.

Table 2. Profile of Grade 6 mathematics teachers in terms of educational degree

Educational Degree	Frequency (f)	Percentage (%)
Bachelor's Degree	1	6.66%
With MA Units	6	40%
Master's Degree Holder	6	40%
With Doctoral Units	2	13.33%
Doctorate Degree Holder	0	0%
Total	**N = 15**	**100%**

Table 2 illustrates the educational attainment of the Grade 6 Mathematics teachers. A significant majority of the teachers have pursued advanced studies, with 6 (40%) having earned Master's units and another 6 (40%) being full Master's Degree holders. Additionally, 2 teachers (13.33%) have advanced to take Doctoral units, while only 1 teacher (6.66%) holds a Bachelor's degree. This indicates a highly qualified teaching force dedicated to professional growth despite the geographical challenges of their assignment.

Table 3. Pedagogical practices in terms of instructional strategies

Survey Question	Mean	Interpretation
1. I use concrete objects (manipulatives) to help students understand numbers.	4.47	Agree
2. I encourage students to draw pictures or diagrams to represent math problems.	4.27	Agree
3. I use digital technology to demonstrate mathematical transformations.	4.07	Agree
4. I implement group work to encourage mathematical discussion among students.	4.33	Agree
5. I relate math lessons to the students' cultural or local environment.	4.60	Strongly Agree
6. I use storytelling or real-life scenarios to introduce new math topics.	4.27	Agree
7. I allow students to use multiple methods to solve the same problem.	4.40	Agree
8. I integrate mathematical games to reinforce computational fluency.	4.13	Agree
Overall Mean for Instructional Strategies	**4.32**	**Agree**

Table 3 details how teachers deliver lessons and utilize instructional materials. Overall, the employment of diverse instructional strategies is frequently practiced by the teachers, as shown by the overall mean of 4.32. Notably, relating math lessons to the students' cultural or local environment emerges as the highest-rated strategy (Mean = 4.60), signifying that this approach is highly practiced in their classrooms. This reflects a strong emphasis on contextualization within the district. Conversely, while the use of digital technology receives the lowest rating (Mean = 4.07), it remains a frequently practiced strategy, which logically accounts for the resource limitations typical of rural GIDA settings.

Table 4. Pedagogical practices in terms of curriculum planning

Survey Question	Mean	Interpretation
1. I can predict which parts of a new lesson will be most difficult for my students.	3.67	Agree
2. I am aware of common "traps" or errors students fall into in specific topics.	3.93	Agree
3. I can distinguish between lack of effort and genuine conceptual misunderstanding.	3.87	Agree
4. I analyze student errors to adjust my teaching for the next day.	4.07	Agree
Overall Mean for Curriculum Planning	**3.88**	**Agree**

Table 4 focuses on how teachers anticipate learning challenges and adjust their curriculum preparations. The teachers demonstrate high pedagogical awareness, yielding an overall mean of 3.88, which signifies that these responsive planning strategies are frequently practiced. Notably, analyzing student errors to adjust teaching for the following day emerges as the most prominent strategy (Mean = 4.07), demonstrating that this specific practice is frequently practiced among the educators. This highlights a commitment to data-driven instruction, where teachers actively use student performance patterns to refine their lesson delivery.

Table 5. Pedagogical practices in terms of assessment practices

Survey Question	Mean	Interpretation
1. I use diagnostic tests to pinpoint exactly where a student's knowledge gap lies.	4.13	Agree
Overall Mean for Assessment Practices	**4.13**	**Agree**

Table 5 highlights the teachers' assessment practices. The active utilization of diagnostic tests to identify specific knowledge gaps among learners yields a mean of 4.13, indicating that this assessment strategy is frequently practiced by the educators. This result suggests that the teachers prioritize identifying the root causes of student difficulties, allowing for a more targeted and effective remedial approach in their mathematics instruction.

Table 6. Pedagogical practices in terms of feedback and learner support

Survey Question	Mean	Interpretation
1. I provide specific feedback that tells the student how to improve.	4.13	Agree
2. I encourage students to explain their thinking process out loud to find errors.	3.80	Agree
Overall Mean for Feedback and Learner Support	**3.97**	**Agree**

Table 6 presents the results for feedback and learner support, yielding an overall mean of 3.97. This indicates that the provision of learner support is frequently practiced in the classroom. Specifically, the teachers report that providing specific, actionable feedback to help students improve (Mean = 4.13) and encouraging students to verbalize their thinking processes (Mean = 3.80) are both frequently practiced by the educators. This suggests that the teachers prioritize active communication and constructive guidance to facilitate student growth in mathematics.

Table 7. Pedagogical practices in terms of learning environment

Survey Question	Mean	Interpretation
1. I allow students to guess the answer first before teaching the formal method.	3.33	Neutral
2. I encourage students to experiment with different tools to find a solution.	3.60	Agree
3. I give students "open-ended" problems where the solution path is not obvious.	3.53	Agree

4. I let students struggle with a problem for a while before I step in to help.	3.73	Agree
5. I value the mistakes students make as part of the learning discovery process.	4.13	Agree
Overall Mean for Learning Environment	**3.66**	**Agree**

Table 7 assesses the learning environment established by the teachers, yielding an overall mean of 3.66. This indicates that the cultivation of a supportive learning space is frequently practiced. Specifically, the data reveals that valuing student mistakes as an essential part of the discovery process (Mean = 4.13) is a frequently practiced approach. Conversely, allowing students to guess answers prior to formal instruction yields a mean of 3.33, signifying that this particular strategy is sometimes practiced in their classrooms. This suggests that while teachers are open to mistake-driven learning, they remain more cautious about using unstructured discovery or "guessing" as a primary instructional tool.

Table 8. Summary of Pedagogical Practices of Grade 6 Mathematics Teachers

Pedagogical Dimensions	Overall Mean	Qualitative Interpretation
Instructional Strategies	4.32	Frequently Practiced
Curriculum Planning	3.88	Frequently Practiced
Assessment Practices	4.13	Frequently Practiced
Feedback and Learner Support	3.97	Frequently Practiced
Learning Environment	3.66	Frequently Practiced
GRAND MEAN	**3.99**	**Frequently Practiced**

Table 8 presents the consolidated results of the various pedagogical dimensions employed by the Grade 6 Mathematics teachers. The grand mean of 3.99 indicates that, overall, the teachers' pedagogical practices are frequently practiced.

The data shows that Instructional Strategies serve as the highest area of practice (Mean = 4.32), indicating that teachers are most active in utilizing concrete objects and contextualized lessons to deliver mathematical concepts. On the other hand, the Learning Environment receives the lowest rating (Mean = 3.66). While it is still frequently practiced, this lower mean suggests that teachers are less likely to utilize strategies involving student "guessing" or unstructured discovery compared to other pedagogical areas. Overall, the findings suggest a teaching force that is highly capable in lesson delivery and assessment but more traditional in managing the classroom's discovery-based environment.

Table 9. Summary of Pedagogical Practices by School Classification and Educational Attainment

Pedagogical Domain	Mono-grade	Multi-grade	Bachelor's	Master's	Doctorate
Instructional Strategies	4.30	4.34	4.41	4.23	4.25
Curriculum Planning	3.84	3.93	3.93	3.92	3.63
Assessment Practices	4.13	4.14	4.14	4.17	4.00
Feedback & Support	4.13	3.79	4.14	3.83	3.75
Learning Environment	3.75	3.54	3.80	3.63	3.20
OVERALL PRACTICE	**4.03**	**3.95**	**4.08**	**3.96**	**3.77**

The data reveals that Bachelor's degree holders (Mean = 4.08) and Mono-grade teachers (Mean = 4.03) record slightly higher frequencies of practice compared to their counterparts. However, across all categories, the qualitative interpretation remains Frequently Practiced, suggesting a high level of pedagogical consistency regardless of the teacher's profile or school setting.

Table 10. Regression Analysis of the Influence of Profile Variables on Pedagogical Practices

Predictor Variables	Coefficient (β)	t-value	p-value	Interpretation
School Classification	0.052	0.201	0.844	Not Significant
Educational Attainment	-0.118	-0.457	0.655	Not Significant
Model Summary	(R^2 = 0.016)	(F= 0.127)	0.882	Not Significant
Level of Significance @ 0.05				

Regression analysis revealed that the model is not statistically significant (P = 0.882), with a coefficient of determination (R2 = 0.016) indicating that school classification and educational attainment explain only 1.6% of the variance in pedagogical practices. Individually, neither school classification (P = 0.844) nor educational attainment (P = 0.655) emerged as significant predictors. These results suggest that instructional frequency remains consistent across mono-grade and multi-grade settings, likely due to standardized curriculum requirements (Little, 2001).

Furthermore, the data implies that advanced graduate degrees do not inherently result in a higher frequency of pedagogical utilization compared to undergraduate credentials, aligning with findings that advanced degrees do not consistently translate into distinct instructional behaviors (Hanushek, 2011; Chingos & Peterson, 2011). Consequently, the study accepts the null hypothesis, concluding that pedagogical frequency is likely driven by experiential factors, classroom resources, or individual teaching styles rather than formal education or institutional structure (Darling-Hammond, 2017).

Table 11. Attitudes of Grade 6 learners toward mathematics

Statements	Mean	Qualitative Description
A. Enjoyment & Motivation		
1. I really like mathematics.	3.91	Agree
2. I have usually enjoyed studying mathematics in school.	3.8	Agree
3. Mathematics is dull and boring. *	3.9	Agree
4. I am happier in a math class than in any other class.	3	Uncertain
5. Mathematics is a very interesting subject.	3.6	Agree
6. I am comfortable expressing my own ideas on how to look for solutions...	3.4	Uncertain
B. Self-Confidence		
7. Mathematics is one of my most dreaded subjects.*	3.6	Agree
8. My mind goes blank and I am unable to think clearly... *	3.7	Agree
9. I feel a sense of insecurity when attempting mathematics. *	3.8	Agree
10. I am always under a terrible strain in a math class. *	3.7	Agree
11. I am able to solve mathematics problems without too much difficulty.	3.4	Uncertain
12. I expect to do fairly well in any math class I take.	3.1	Uncertain
C. Value		
13. Mathematics is a very worthwhile and necessary subject.	4.1	Agree
14. Mathematics is important in everyday life.	4	Agree
15. Mathematics is one of the most important subjects for people to study.	4	Agree
16. High school math courses would be very helpful...	3.8	Agree
17. I can think of many ways that I use math outside of school.	3.5	Agree
D. Perceived Ability		
18. I am confident that I could learn advanced mathematics.	3.7	Agree
19. I believe I am good at solving math problems.	3.4	Uncertain
20. I want to develop my mathematical skills.	4.2	Agree
Overall	**3.7**	**Agree**

Table 11 presents the Grade 6 learners' attitudes toward mathematics across four key dimensions: Enjoyment & Motivation, Self-Confidence, Value, and Perceived Ability. Based on the established scoring scale, the overall mean of 3.7 falls under the "Agree" rating, which translates to a "Positive" qualitative description. This indicates that, in general, the learners possess a favorable and constructive academic disposition toward the subject. This positive outlook is most notably highlighted by their strong agreement regarding their desire to develop their mathematical skills, which generated the highest item mean (Mean = 4.2, Positive). Ultimately, the findings reveal that despite the challenges of their geographical and structural learning environments, the learners are generally motivated, recognize the value of the subject, and hold a positive mathematical attitude that educators can further leverage for academic improvement.

Table 12. Level of mathematics achievement of Grade 6 learners

Indicator	Mean Score	Interpretation
Mathematics Achievement of Grade 6	39.85	Transition (Proficient)

Table 12 presents the level of mathematics achievement of the Grade 6 learners. The data reveals an overall mean score of 39.85 with a standard deviation of 6.83, which is qualitatively interpreted as "Transition (Proficient)." This finding indicates that despite the structural and geographical challenges inherent in their rural learning environments, the learners successfully maintain a functional and proficient level of mathematical competence.

Table 13. Relationship between teachers' pedagogical practices and learners' attitudes toward mathematics

Variables Correlated	N	Pearson r	p-value	Decision on H0	Interpretation
Pedagogical Practices vs. Attitudes toward Mathematics	11	0.240	0.478	Accepted	Not Significant (Weak, Positive Correlation)

Correlation analysis between teachers' pedagogical practices and learners' attitudes toward mathematics reveals a weak, positive association that is not statistically significant ($r = 0.240$, $P = 0.478$). Consequently, the null hypothesis is accepted, indicating that variations in instructional strategies do not significantly dictate students' overarching attitudes toward the subject. This finding aligns with Ma and Kishor (1997), who concluded that the link between instruction and student attitude is often weak and resistant to short-term change. Furthermore, the results support the assertions of McLeod (1992) and Pintrich (2003), suggesting that affective traits such as math interest or anxiety are predominantly shaped by long-term internal beliefs and parental influences rather than immediate classroom methodologies. Ultimately, while teachers in the district frequently employ diverse pedagogy, learner attitudes remain complex constructs influenced by a broader constellation of factors beyond the scope of direct instruction.

Table 14. Relationship between teachers' pedagogical practices and learners' mathematics achievement

Variables Correlated	N	Pearson r	p-value	Decision on H0	Interpretation
Pedagogical Practices vs. Mathematics Achievement	15	-0.368	0.178	Accepted	Not Significant (Weak, Negative Correlation)

Correlation analysis between pedagogical practices and mathematics achievement reveals a weak, negative, and non-significant relationship ($r = -0.368$, $P = 0.178$). Consequently, the null hypothesis is accepted, indicating that teachers' self-assessed instructional frequencies do not significantly translate into higher achievement scores in this locale. This finding aligns with Feldman (1989), who noted that teacher self-reports often measure the intent and frequency of a practice rather than the qualitative effectiveness of its execution. Furthermore, the results support Hanushek's (2011) "black box" theory, suggesting that student achievement is frequently driven by complex interactions of socioeconomic status and prior academic preparation, which may overshadow the influence of specific teaching methodologies within a single academic year.

Table 15. Descriptive statistics of learners' mathematics achievement by school type

School Classification	N	Mean
Multi-grade	7	38.33
Mono-grade	8	40.79

The data shows that learners from mono-grade schools obtain a slightly higher mean score (40.79) compared to those from multi-grade schools (M = 38.33). According to the RMA proficiency scale, both groups fall within the "Developing" level, which indicates that the learners are nearly proficient in their grade-level mathematics competencies. This suggests that regardless of the school classification, learners in the district maintain a relatively similar level of mathematical understanding.

Table 16. Independent samples t-test for differences in mathematics achievement

Variables Compared	Mean Difference	df	Computed t-value	p-value	Decision on H0	Interpretation
Multi-grade vs. Mono-grade Math Achievement	-2.46	13	-1.053	0.312	Accepted	Not Significant

Table 16 displays the inferential results comparing the mathematics achievement of learners in multi-grade and mono-grade settings. The test yields a computed t-value of -1.053 and a p-value of 0.312. Since the p-value is greater than the 0.05 level of significance, the null hypothesis is accepted.

This indicates that there is no significant difference in the mathematics achievement of Grade 6 learners between multi-grade and mono-grade schools in Kabugao District. The result implies that the structural arrangement of the classroom—whether students are grouped with multiple grade levels or a single grade level—does not fundamentally determine their academic success in mathematics. This suggests that the quality of pedagogical practices and learner support systems are likely more influential factors in student outcomes than the specific school classification.

5. Conclusion

The study concludes that despite geographical isolation, rural schools are staffed by highly qualified educators who consistently employ responsive, contextualized pedagogy. While learners exhibit functional proficiency and a resilient academic disposition, these outcomes appear to be influenced by intrinsic or external factors rather than specific instructional frequencies or classroom structures. Ultimately, the findings establish that the organizational arrangement—whether mono-grade or multi-grade—does not serve as a determinant or a barrier to a student's capacity for mathematical proficiency.

Compliance with ethical standards

Acknowledgments

I acknowledge that I have not used ChatGPT or Copilot for refining some of the sections in the document.

Disclosure of conflict of interest

I affirm that the respondents voluntarily agreed to participate after being fully informed about the purpose, nature, and potential implications of the study. Their responses have been collected with utmost respect for their privacy and confidentiality, in accordance with ethical research guidelines.

Statement of ethical approval

The study was conducted with approval and in accordance with the standards of the college. No ethical approval was required, as the research followed all applicable ethical guidelines, ensuring respect for the respondents' privacy and confidentiality

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

Statement of funding

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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