Utilization and Effectiveness of Strategic Interventions in Improving Mathematics Proficiency of Learners' At-Risk with Mathematical Difficulties

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ABSTRACT

This study determined the effectiveness of strategic interventions implemented by secondary school mathematics teachers in improving the mathematics proficiency of learners' at-risk with mathematical difficulties in public secondary schools in Paracale and Jose Panganiban Districts, Division of Camarines Norte. Using a quantitative descriptive-correlational design, the study involved 64 respondents, including 59 Mathematics teachers, 3 Master Teachers, and 2 Department Heads. It determined the types of interventions utilized, their level of utilization in terms of teacher adherence, adaptation, engagement, and monitoring, and their effectiveness in improving learners' proficiency, engagement, attitude, and motivation. It also investigated relationships between utilization and effectiveness, identified challenges encountered, and proposed an intervention program. Findings revealed that strategic interventions were highly utilized (WM = 3.35), with teacher engagement (WM = 3.52) and monitoring of learners' progress (WM = 3.49) rated highest. Effectiveness was generally high in terms of learners' engagement, attitude, and motivation, but only moderately effective in improving proficiency (WM = 3.21). Significant positive relationships were found between utilization and effectiveness, particularly in teacher engagement and monitoring, while other variables showed mixed results. Teachers reported challenges related to learners' engagement and attitude as the most significant barriers. The study concludes that while strategic interventions are widely implemented and effective in improving affective learning outcomes, their impact on proficiency remains limited. As a response, a Professional Development Program titled Enhancing Learners' Motivation in Mathematics through Effective Pedagogy and Curriculum-Aligned Practices was proposed to strengthen instructional practices and address identified challenges.

Keywords: Strategic interventions, mathematics proficiency, learners' at-risk with mathematical difficulties, teacher adherence to intervention planned strategy, teacher adaptation of intervention, teacher engagement in intervention activities, monitoring of learners' progress, learners' engagement, learners' attitude toward Mathematics, learners learning motivation

INTRODUCTION

Mathematics proficiency is a critical skill that influences academic success and future opportunities for students. However, a significant number of learners, especially those at-risk for Mathematics difficulties, struggle to achieve the expected levels of proficiency in this subject. Students at risk for Mathematics difficulties, often characterized by factors such as learning disabilities, socioeconomic disadvantage, or limited access to quality educational resources, face challenges that hinder their ability to master mathematical concepts. This, in turn, can lead to persistent underachievement, low self-esteem, and decreased motivation in mathematics (Tharp and Gallimore,2020).

Early intervention is key to improving the mathematical abilities of at-risk learners. Strategic interventions, tailored to address the unique needs of these learners, can play significant role in bridging the achievement gap and fostering better academic outcomes. These interventions often incorporate a variety of instructional strategies, including explicit teaching, the use of manipulatives, formative assessments, and small-group instruction. The objective is to provide targeted support that caters to the specific challenges faced by students,

such as difficulties in understanding mathematical language, concepts, and problem-solving skills (Fuchs and Fuchs, 2019).

Strategic interventions that focus on active learning, continuous feedback, and differentiated instruction are effective in improving mathematics proficiency in at-risk students. Cognitive load theory supports these approaches by reducing unnecessary cognitive demands and breaking down complex problems into manageable steps (Güven and Arslan, 2020). Moreover, strategic interventions improve students' mathematical skills, confidence, and motivation, leading to more positive attitudes toward learning. Interventions focusing on problem-solving, real-world applications, and consistent practice help students develop deeper, more lasting mathematical skills. Additionally, integrating technology and interactive tools engages at-risk students and offers personalized learning (Gersten and Chard, 2020).

Meanwhile, the 2022 PISA results and the EDCOM 2 report highlight the struggle of Filipino students with basic numeracy, with many failing to meet proficiency standards. These findings stress the need for reforms in early mathematics education and targeted interventions to address skill gaps. The EDCOM 2 report advocates for an integrated curriculum that connects math concepts with real-life applications and emphasizes the importance of teacher training and professional development to enhance early math instruction (EDCOM, 2022).

Furthermore, to improve literacy and numeracy skills in Region V, the Department of Education (DepEd) launched the "Bawat Batang Bicolano Bihasang Bumasa at Bumilang" (6Bs) program. This focuses on foundational skills and addresses learning gaps worsened by the pandemic. It uses context-based strategies, incorporating local languages and materials to engage students and foster a sense of belonging. Aligned with DepEd's Learning Recovery Plan, the program emphasizes collaboration between teachers, parents, and the community to ensure academic success and emotional support for vulnerable learners.

Subsequently, the Department of Education (DepEd) has launched the Rapid Mathematics Assessment (RMA) to improve math outcomes. The RMA identifies students' strengths and weaknesses, allowing for targeted, data-driven interventions. This proactive approach enables early intervention, guiding instruction and support. The initiative aligns with DepEd's goals to enhance educational quality through teacher training, curriculum development, and parental involvement, ensuring all students can succeed (DM-CT-2023-322).

In the local setting, DepEd Camarines Norte has strongly supported these initiatives as evidenced by the implementation of the various mathematics interventions to improve mathematics competencies of the secondary school students identified as students at-risk for mathematics difficulties. In the Division of Camarines Norte, specifically in Paracale District, school heads conducted regular program of class observation to find out not only the learners' strength and weaknesses in Mathematics but most importantly the competencies in teaching Mathematics which will be the basis in providing technical assistance and support to address the mathematics proficiency of the students. School heads also take the initiative of implementing and or conducting interventions, but the school is still contending with problems relating to other factors that hinder the successful delivery of the math program.

The low performance of secondary students, specifically, Grade 10 students in Mathematics is evident from the National Achievement Test (NAT) results in Camarines Norte for school year 2023-2024. Students had mean proficiency scores of 33.99 % in Mathematics wherein the Mean Proficiency Score is below the National Standard MPS of 75. This indicates a need for focused efforts to improve proficiency levels Math. Targeted interventions and educational strategies may be beneficial to bridge the gap between the actual scores and the established national standards (National Achievement Test, 2021-2022, SDO-CN).

This figure only shows that secondary students at present are generally encountering problems or difficulties in Mathematics. This serves as the motivation of the researcher to pursue a study about strategic interventions in improving mathematics proficiency of learners at-risks with mathematical difficulties in the secondary schools in Paracale and Jose Panganiban Districts in the Division of Camarines Norte.

This study determined the effectiveness of the strategic interventions implemented by the secondary school mathematics teachers in improving Mathematics proficiency of learners at-risks with Mathematical difficulties in the public secondary schools in Paracale and Jose Panganiban Districts in the Division of Camarines Norte. Specifically, it answered the following questions: 1) What strategic interventions are being utilized to address mathematical difficulties of the learners in Paracale and Jose Panganiban Districts? 2) What is the level of utilization of the strategic interventions implemented by the secondary school Mathematics teachers in improving mathematics proficiency of learners at-risks with Mathematical difficulties along teacher adherence to intervention planned strategy, teacher adaptation of intervention, teacher engagement in intervention activities and monitoring of learners' progress?

Moreover, 3) What is the level of effectiveness of the strategic interventions implemented by the secondary school Mathematics teachers in improving mathematics proficiency of learners at-risks with Mathematical difficulties along proficiency of learners before and after intervention, learners' engagement, learners' attitude toward Mathematics and learners learning motivation? 4) Is there significant relationship between strategic interventions being utilized to address mathematical difficulties and level of utilization of the strategic interventions implemented by the secondary school mathematics teachers in improving mathematics proficiency of learners at-risks with Mathematical difficulties?

In addition, 5) Is there significant relationship between the level of utilization and level of effectiveness of the strategic interventions implemented by the secondary school mathematics teachers in improving Mathematics proficiency of learners at-risks with mathematical difficulties? 6) What are the challenges encountered by the teachers in improving Mathematics proficiency of learners at-risks with mathematical difficulties? 7) What intervention may be proposed to enhance the mathematics proficiency of learners-at-risk with mathematical difficulties?

METHODOLOGY

This study employed a quantitative method, particularly the descriptive-correlational design which is useful in understanding the connections between different factors and can provide valuable insights. Descriptive-correlational studies aim to describe the characteristics of a population and explore the relationships among variables, allowing researchers to identify patterns and trends that may inform future studies or interventions (Creswell and Creswell, 2020).

By employing this method, the study quantified the strategic interventions utilized to address mathematical difficulties of the learners in Paracale and Jose Panganiban Districts, the level of utilization of the strategic interventions implemented by the secondary school Mathematics teachers in improving mathematics proficiency of learners at-risks with Mathematical difficulties along teacher adherence to intervention planned strategy, teacher adaptation of intervention, teacher engagement in intervention activities; and monitoring of learners progress, the level of effectiveness of the strategic interventions implemented by the secondary school Mathematics teachers in improving mathematics proficiency of learners at-risks with Mathematical difficulties along proficiency of learners before and after intervention, learners engagement, learners attitude toward Mathematics and learners learning motivation.

Moreover, it also quantified the relationship between strategic interventions being utilized to address mathematical difficulties and level of utilization of the strategic interventions implemented by the secondary school mathematics teachers in improving mathematics proficiency of learners at-risks with Mathematical difficulties and the relationship between the level of utilization and level of effectiveness of the strategic interventions implemented by the secondary school mathematics teachers in improving Mathematics proficiency of learners at-risks with mathematical difficulties, and the challenges encountered by the teachers in improving Mathematics proficiency of learners at-risks with mathematical difficulties.

The respondents of this study were the public secondary school Junior and Senior High School Mathematics teachers in the locale of the study. There are 59 Mathematics teachers, 3 Master Teachers and 2 Department Heads with a total of 64 respondents from nine secondary schools in Paracale and Jose Panganiban Districts.

These teachers, master teachers and department heads were having permanent plantilla position in DepEd Camarines Norte teaching Mathematics subjects in the locale of the study.

The researcher utilized a researcher-made survey questionnaire checklist to capture the strategic interventions employed by public secondary school Mathematics teachers in addressing learners' mathematical difficulties in the Paracale and Jose Panganiban Districts. The instrument also measured the level of utilization and effectiveness of these interventions in improving the proficiency of at-risk learners, with each indicator rated by the teachers. All indicators were subjected to expert validation and reliability testing using Cronbach's alpha, yielding coefficients of .756, .748, .808, .775, .778, .733, .790, .754, .744, .847, .757, .761, and .743, indicating acceptable reliability. Prior to final administration, a dry run was conducted with 20 non-respondent teachers from other school districts, and their feedback was incorporated into the final version of the instrument.

The study analyzed data using descriptive statistics, specifically weighted mean and Pearson product-moment correlation. Weighted mean was used to determine: (1) the strategic interventions utilized, (2) the level of utilization in terms of teacher adherence, adaptation, engagement, and monitoring, (3) the level of effectiveness in terms of learners' proficiency, engagement, attitude, and motivation, and (6) the challenges encountered by teachers. Pearson r was employed to examine: (4) the relationship between the interventions utilized and their level of utilization, and (5) the relationship between the level of utilization and the level of effectiveness of the strategic interventions.

RESULTS AND DISCUSSION

This part presents the results of the data analysis in response to the problems covered by this study.

Strategic Interventions Utilized to Address Mathematical Difficulties of the Learners At-risk with Mathematical Difficulties

Strategic intervention refers to a planned and systematic approach designed to address learners' academic difficulties and improve performance (Gersten et al., 2009). In this study, it pertains to the interventions used by Mathematics teachers to address learners' mathematical difficulties in Paracale and Jose Panganiban Districts. Findings show that strategic interventions are highly utilized overall (WM = 3.35), indicating that teachers consistently implement various strategies in their instruction for at-risk learners. The most utilized strategies are visual aids (WM = 3.67) and collaborative learning activities (WM = 3.59), both rated as highly utilized. This suggests that teachers prioritize visual and interactive approaches to improve learners' understanding, as visual tools simplify abstract concepts while collaborative activities promote peer learning and engagement.

Similarly, the high utilization of collaborative learning shows that teachers value peer interaction in supporting learning. Through group work and shared problem-solving, learners can explain their thinking, learn from peers, and build confidence in mathematics. This approach is especially beneficial for at-risk learners as it promotes a supportive environment and reduces math-related anxiety. However, despite the strong use of visual and collaborative strategies, the overall moderate rating suggests that other interventions are not consistently implemented. This uneven practice may limit program effectiveness, as improving mathematics proficiency requires a balanced use of remediation, differentiation, monitoring, and feedback.

The findings further show a clear preference for visual and collaborative approaches, which are supported by Causing et al. (2024) and Manolong et al. (2025), who highlighted those visual representations enhance conceptual understanding while collaborative learning improves engagement and problem-solving through peer interaction.

In contrast, strategies such as personalized learning plans (WM = 3.09), one-on-one tutoring, and manipulatives (WM = 3.13) were only moderately utilized, suggesting limited implementation of more individualized and hands-on approaches. This may be due to constraints such as time, large class sizes, and limited resources (Bonesrønning et al., 2022).

Table 1 Strategic Interventions to Address Mathematical Difficulties of the Learners' At-Risk in Paracale and Jose Panganiban Districts

Indicators	WM	Int.
1. Peer tutoring	3.50	HU
2. One-on-one tutoring	3.13	MU
3. Small group instruction	3.27	HU
4. Differentiated instruction	3.25	HU
5. Personalized learning plans	3.09	MU
6. Collaborative learning activities	3.59	HU
7. Visual aids (e.g., diagrams, charts)	3.67	HU
8. Manipulatives (e.g., physical math tools)	3.13	MU
9. Formative assessments to identify struggling students	3.53	HU
10. Use of educational technology (e.g., math software, online tools)	3.33	HU
Overall Weighted Mean	3.35	HU

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Highly Utilized	(HU)
2.50 – 3.24	Moderately Utilized	(MU)
1.75 – 2.49	Slightly Utilized	(SU)
1.00 – 1.74	Not At All Utilized	(NAAU)

Overall, the results imply the need for sustained professional development and stronger use of differentiated, data-driven instruction. Combining high-impact strategies like visual aids and collaboration with individualized support and formative assessment can further improve outcomes for at-risk learners in mathematics.

Level of Utilization of the Strategic Interventions Implemented by the Secondary School Mathematics Teachers

Teacher Adherence to Intervention Planned Strategy. Table 2 presents the level of teacher adherence to the planned intervention strategies implemented for learners at-risk for mathematical difficulties. As can be seen from Table 2, teacher adherence to planned intervention strategies was highly utilized (WM = 3.41), indicating strong implementation fidelity among teachers in following prescribed procedures, materials, time frames, and assessment methods. This consistency suggests that interventions are generally delivered as designed, which may enhance their effectiveness in improving learners' mathematics performance. However, sustained monitoring and support are still needed to maintain and further strengthen this practice.

The highest-rated indicator was the use of prescribed materials such as worksheets, lesson plans, and instructional resources (WM = 3.59), showing strong compliance with structured and readily available instructional tools. This reflects teachers' preference for clear, practical resources that reduce preparation time and align closely with curriculum requirements.

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The high utilization of prescribed materials shows that teachers value structured instructional supports such as worksheets and lesson plans as essential tools for scaffolding learners with mathematical difficulties. This reflects stronger confidence in using ready-made resources compared to more complex intervention components. However, the gap between this and overall adherence suggests inconsistency in other aspects of implementation, which may affect intervention effectiveness. This finding is supported by Lussier et al. (2025), who noted that well-designed instructional materials improve consistency by reducing planning demands and instructional uncertainty. Overall, teachers are more likely to adhere to intervention plans when supported by concrete and structured resources.

Table 2 Level of Utilization of the Strategic Interventions along Teacher Adherence to Intervention Planned Strategy

Indicators	WM	Int.
1. The teacher regularly follows the steps and structure outlined in the intervention plan.	3.38	HU
2. The teacher utilizes the materials (worksheets, lesson plans, resources) as specified in the intervention plan.	3.59	HU
3. The teacher conducts the intervention within the allocated time frame and adheres to the scheduled duration for each session.	3.42	HU
4. The teacher sticks to the specific learning goals set by the intervention plan for each student.	3.39	HU
5. The teacher uses the same assessment tools or formative evaluations outlined in the intervention plan to track student progress.	3.28	HU
Overall Weighted Mean	3.41	HU

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Highly Utilized	(HU)
2.50 – 3.24	Moderately Utilized	(MU)
1.75 – 2.49	Slightly Utilized	(SU)
1.00 – 1.74	Not At All Utilized	(NAAU)

Meanwhile, the lowest-rated indicator is the use of prescribed assessment tools (WM = 3.28), indicating comparatively less consistency in monitoring learner progress. This suggests variability in assessment practices, possibly due to time constraints and workload demands. These findings align with Brafford et al. (2023), who emphasized that strict adherence to intervention protocols is often difficult in real classroom settings, especially in large or inclusive classes. As noted by Hunt et al. (2025), even well-designed interventions may have limited impact when implementation quality is inconsistent. Overall, the results highlight the need for sustained professional development, stronger assessment alignment, and consistent use of formative evaluation tools to ensure accurate monitoring and effective implementation of intervention strategies.

Teacher Adaptation of Intervention. Table 3 presents the level of teacher adaptation of intervention strategies implemented for learners at- risk with mathematical difficulties. Teacher adaptation of intervention strategies was highly utilized (WM = 3.32), indicating that teachers are generally responsive in adjusting instruction, grouping, and content to meet learners' needs. However, the mean being only slightly above the threshold suggests that these adaptations are not fully maximized and may lack consistency, particularly in using student

feedback and assessment data. This implies the need to further strengthen teachers' adaptive skills to ensure more responsive instruction and improved outcomes for at-risk learners.

The highest-rated adaptation strategy was modifying grouping strategies (WM = 3.42), indicating that teachers commonly reorganize learners to support peer-assisted learning and collaborative problem-solving. This reflects a practical and manageable approach to addressing learning gaps within classroom constraints. This finding is supported by Tomlinson and Moon (2021), who emphasized that flexible grouping and content adaptation effectively address diverse learner needs, especially for at-risk students. Adjusting group composition enables teachers to provide peer support and targeted instruction without significantly changing the overall intervention, making it a practical and manageable strategy in classroom settings.

In contrast, the lowest-rated indicator was integrating student feedback (WM = 3.25), suggesting that adaptation is more teacher-directed and less informed by learner input. This limits the effectiveness of interventions, as continuous feedback and assessment are essential for precise instructional adjustments. This finding is supported by Datnow and Park (2022), who emphasized that effective intervention depends on continuous monitoring and responsive adjustments guided by formative assessment and learner input.

Table 3 Level of Utilization of the Strategic Interventions along Teacher Adaptation of Intervention

Indicators	WM	Int.
1. The teacher adjusts their teaching methods to cater to students' varying learning needs based on observations and student feedback.	3.28	HU
2. The teacher seeks and integrates feedback from students to adapt the intervention to meet their needs better.	3.25	MU
3. The teacher modifies grouping strategies (e.g., pairing stronger students with weaker students) to optimize learning.	3.42	HU
4. The teacher customizes the lesson content to fit individual student levels and learning styles.	3.39	HU
5. The teacher alters the intervention approach based on ongoing assessments and the observed progress of students.	3.27	HU
Overall Weighted Mean	3.32	HU

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Highly Utilized	(HU)
2.50 – 3.24	Moderately Utilized	(MU)
1.75 – 2.49	Slightly Utilized	(SU)
1.00 – 1.74	Not At All Utilized	(NAAU)

Without systematic use of student progress data, instructional adaptations become less precise and less effective. The results suggest that while teachers value adaptation, they may lack the time, training, or tools needed to consistently translate assessment data and feedback into meaningful instructional changes. Overall, while teacher adaptation is evident, it remains uneven. Greater emphasis is needed on data-driven and learner-centered practices, including the use of formative assessments and feedback. Strengthening professional development and support systems can enhance teachers' ability to implement more responsive and targeted interventions for at-risk learners.

Teacher Engagement in Intervention Activities. Table 4 shows that teacher engagement in intervention activities is highly utilized (WM = 3.52), indicating that teachers are actively involved in facilitating learning, encouraging participation, and supporting learners during interventions. This reflects a positive instructional environment where strong teacher involvement enhances the delivery and effectiveness of strategic interventions. In practice, mathematics teachers conduct remediation sessions after class under numeracy or reading intervention programs, where they guide small groups, facilitate discussions, and support struggling learners, reflecting high engagement consistent with the findings.

The highest-rated indicator is creating a supportive environment that encourages learners to ask questions (WM = 3.59), showing that teachers effectively promote a safe and inclusive space that builds confidence and participation among at-risk learners. This is reinforced in classrooms where teachers use encouraging language and peer support to reduce anxiety and increase engagement. This finding is supported by Doño and Mangila (2021), who emphasized that active teacher facilitation and supportive classroom environments enhance students' conceptual understanding and confidence in mathematics, particularly for at-risk learners.

In contrast, the lowest-rated indicator is providing immediate and constructive feedback (WM = 3.41), indicating that while feedback is practiced, it is less consistently emphasized. This may be due to time constraints, large class sizes, and workload demands. Smith et al. (2025) noted that timely feedback is crucial in correcting misconceptions and improving learning outcomes in intervention settings.

Table 4 Level of Utilization of the Strategic Interventions along Teacher Engagement in Intervention Activities

Indicators	WM	Int.
1. The teacher is actively involved in delivering content, guiding discussions, and providing support during intervention activities.	3.58	HU
2. The teacher creates an environment where students feel encouraged to engage and ask questions during intervention activities.	3.59	HU
3. The teacher employs hands-on, interactive, or cooperative learning methods to actively engage students.	3.50	HU
4. The teacher gives immediate and constructive feedback to students during intervention activities to reinforce learning.	3.41	HU
5. The teacher consistently motivates and supports students, especially those at risk, through positive reinforcement and encouragement.	3.52	HU
Overall Weighted Mean	3.52	HU

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Highly Utilized	(HU)
2.50 – 3.24	Moderately Utilized	(MU)
1.75 – 2.49	Slightly Utilized	(SU)
1.00 – 1.74	Not At All Utilized	(NAAU)

Overall, while teacher engagement is strong, strengthening feedback practices through training and instructional support can further enhance the effectiveness of intervention programs.

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Monitoring of Learners Progress. Table 5 shows that monitoring of learners' progress is highly utilized (WM = 3.49), indicating that teachers consistently implement assessment and tracking mechanisms as part of intervention practices. This reflects strong engagement in monitoring learners' development and supports timely instructional adjustments. Among the indicators, the highest-rated practice is the use of quizzes, tests, or observations to assess learner progress and intervention effectiveness (WM = 3.61). This shows that teachers are highly engaged in using assessment data to guide instruction and evaluate learning outcomes, highlighting the importance of evidence-based decision-making in intervention implementation.

It implies that schools should sustain and strengthen teachers' assessment literacy by promoting varied assessment tools and data-driven instructional decisions. In classrooms, teachers regularly use quizzes, seatwork, and observations during intervention sessions to monitor learner progress and identify those needing additional support. The high use of assessments and record-keeping reflects strong evidence-based monitoring practices. This is supported by Fuchs et al. (2025), who emphasized that regular progress monitoring is essential for identifying learning gaps and making timely instructional adjustments. Likewise, Datnow and Park (2022) highlighted that data-driven decision-making improves mathematics learning outcomes through responsive intervention adjustments.

In contrast, the lowest-rated indicator is communicating student progress to parents or guardians (WM = 3.39), indicating less consistent collaboration with home stakeholders. This may be due to time constraints and limited structured communication systems.

This suggests the need to strengthen home–school partnerships through more regular and accessible communication strategies. Zambak et al. (2025) further emphasized that structured parental involvement supports improvements in students' mathematical performance.

Table 5 Level of Utilization of the Strategic Interventions along Monitoring of Learners Progress

Indicators	WM	Int.
1. The teacher regularly uses quizzes, tests, or observations to monitor student progress and determine if the intervention is effective.	3.61	HU
2. The teacher keeps detailed records of student performance, including scores, observations, and areas of improvement.	3.56	HU
3. The teacher modifies the intervention if data shows that students are not making adequate progress.	3.50	HU
4. The teacher holds individual or group discussions with students to review their progress and provide guidance.	3.41	HU
5. The teacher updates parents or guardians on the student's progress, seeking collaboration to support the intervention process.	3.39	HU
Overall Weighted Mean	3.49	HU

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Highly Utilized	(HU)
2.50 – 3.24	Moderately Utilized	(MU)
1.75 – 2.49	Slightly Utilized	(SU)
1.00 – 1.74	Not At All Utilized	(NAAU)

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Overall, while teachers demonstrate strong monitoring practices, enhancing parent engagement and sustaining systematic communication can further improve the effectiveness of intervention programs.

Level of Effectiveness of Strategic Interventions Implemented by the Secondary School Mathematics Teachers

Proficiency of Learners Before and After Intervention. Table 6 shows that the effectiveness of strategic interventions in improving learners' proficiency before and after implementation is moderately effective (WM = 3.21). This indicates that while interventions contribute to improved mathematics performance, the gains remain limited and not yet highly substantial. It suggests the need for continuous refinement of strategies, stronger alignment with learner needs, and sustained teacher support and training. In practice, remediation classes and targeted instruction are commonly implemented to support struggling learners, although outcomes may vary due to factors such as attendance, teacher preparedness, and resource availability.

The highest-rated indicators are mastery of key concepts and achievement of learning goals (WM = 3.25), both interpreted as highly effective. This indicates that interventions are particularly successful in helping learners understand essential mathematical concepts and meet curriculum standards. It reflects strong alignment between instructional strategies and learning competencies. This suggests the need to further strengthen concept mastery through structured remediation, differentiated instruction, and scaffolded learning activities to sustain and improve learner achievement. These findings are supported by Fuchs et al. (2025), who emphasized that structured interventions such as visual aids, collaborative learning, formative assessment, and competency-based instruction enhance learners' conceptual understanding and mastery of key mathematical concepts, leading to improved achievement of learning goals.

Table 6 Level of Effectiveness of Strategic Interventions in terms of Proficiency of Learners Before and After Intervention

Indicators	WM	Int.
1. Improvement in Test Scores	3.23	ME
2. Mastery of Key Concepts	3.25	HE
3. Reduction in Errors	3.19	ME
4. Improvement in Problem-Solving Abilities	3.11	ME
5. Achievement of Learning Goals	3.25	HE
Overall Weighted Mean	3.21	ME

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Highly Effective	(HE)
2.50 – 3.24	Moderately Effective	(ME)
1.75 – 2.49	Slightly Effective	(SE)
1.00 – 1.74	Not At All Effective	(NAAE)

In contrast, problem-solving skills recorded the lowest mean (WM = 3.11), interpreted as moderately effective, indicating limited development of higher-order thinking skills. This may be due to insufficient exposure to complex, real-life problem-solving tasks during intervention sessions. This suggests the need to strengthen interventions by integrating problem-based learning, real-world applications, and critical thinking activities. As

supported by Hunt et al. (2025) and Lumoto et al. (2024), problem-solving improves through explicit instruction, guided practice, and consistent, well-implemented interventions.

Learners' Engagement. Table 7 shows that learners' engagement is highly effective (WM = 3.29), indicating that strategic interventions successfully promote active participation, attention, and interaction with learning materials in mathematics. However, since the mean is only slightly above the threshold, engagement may still vary across aspects such as interaction and willingness to participate. This suggests the need to sustain effective engagement strategies while further strengthening peer interaction and learner confidence to enhance consistency and depth of engagement.

Table 7 Level of Effectiveness of Strategic Interventions in terms of Learners Engagement

Indicators	WM	Int.
1. Active Participation in Class.	3.58	HE
2. Attention During Lessons	3.27	HE
3. Increased Class Interactions	3.17	ME
4. Willingness to Volunteer Responses	3.19	ME
5. Engagement with Learning Materials	3.25	HE
Overall Weighted Mean	3.29	HE

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Highly Effective	(HE)
2.50 – 3.24	Moderately Effective	(ME)
1.75 – 2.49	Slightly Effective	(SE)
1.00 – 1.74	Not At All Effective	(NAAE)

Active participation in class obtained the highest mean (WM = 3.58), indicating that interventions are highly effective in encouraging learners to engage in classroom activities. This suggests that strategies such as collaborative learning, peer tutoring, and interactive discussions successfully promote learner involvement and should be sustained and strengthened. This is evident in local intervention sessions where learners actively join group work, answer guided questions, and participate in structured activities. As supported by Martin et al. (2022), teacher facilitation and interactive strategies enhance participation and motivation, although Hunt et al. (2025) noted that at-risk learners may still struggle with confidence and anxiety in mathematics.

In contrast, increased class interactions recorded the lowest mean (WM = 3.17), interpreted as moderately effective, indicating limited learner-to-learner dialogue and collaboration. This suggests that some activities remain teacher-centered rather than fully learner-driven. This implies the need to strengthen cooperative learning, discussion-based tasks, and interactive activities. Lumoto et al. (2024) and Fuchs et al. (2021) emphasize that sustained engagement and meaningful interaction are essential for effective interventions and improved learning outcomes.

Learner's Attitude Toward Mathematics. Table 8 presents the level of effectiveness of strategic interventions in terms of learners' attitude toward Mathematics. As revealed in Table 8, learners' attitude toward mathematics is highly effective (WM = 3.38), indicating that strategic interventions successfully promote positive perceptions, increased confidence, enjoyment, and participation in mathematics activities. This suggests that current interventions are effective in shaping favorable attitudes toward the subject. Thus, schools should sustain

and strengthen these practices by continuously using engaging, student-centered strategies that enhance learners' interest and positive learning experiences in mathematics.

Table 8 Level of Effectiveness of Strategic Interventions in terms of Learner's Attitude Toward Mathematics

Indicators	WM	Int.
1. Positive Changes in Perceptions	3.42	HE
2. Increased Enjoyment of Mathematics	3.36	HE
3. Willingness to Overcome Challenges	3.31	HE
4. Confidence in Mathematical Abilities	3.34	HE
5. Active Involvement in Classroom Activities	3.45	HE
Overall Weighted Mean	3.38	HE

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Highly Effective	(HE)
2.50 – 3.24	Moderately Effective	(ME)
1.75 – 2.49	Slightly Effective	(SE)
1.00 – 1.74	Not At All Effective	(NAAE)

The highest-rated indicator is active involvement in classroom activities (WM = 3.45), interpreted as highly effective. This shows that learners are more participative and engaged during mathematics lessons, reflecting improved classroom behavior and responsiveness. It suggests that interactive and participatory strategies such as group work and problem-solving activities are effective and should be sustained. This is supported by Hunt et al. (2025), Talkhan et al. (2025), and Doño and Mangila (2021), who emphasized that active engagement improves both learner confidence and academic outcomes. In contrast, willingness to overcome challenges is the lowest-rated indicator (WM = 3.31), though still highly effective. This indicates comparatively weaker development in resilience and persistence. It implies the need to strengthen learners' growth mindset through scaffolded tasks, reflective activities, and motivational strategies that encourage persistence in mathematics.

Learner Learning Motivation. Table 9 presents the level of effectiveness of strategic interventions in terms of learners' learning motivation. As revealed in Table 9, learners' motivation is highly effective (WM = 3.28), indicating that strategic interventions successfully enhance effort, goal-setting, persistence, and intrinsic motivation in learning mathematics. This suggests that interventions generally foster positive learning motivation and engagement. Schools should sustain these practices by continuing to implement motivating, student-centered instruction, and supportive learning environments.

Table 9 Level of Effectiveness of Strategic Interventions in terms of Learner's Learning Motivation

Indicators	WM	Int.
1. Increased Effort in Completing Assignments	3.25	HE
2. Voluntary Participation in Extra Learning Activities	3.17	ME
3. Desire to Set and Achieve Personal Goals	3.30	HE

4. Improved Persistence	3.23	ME
5. Intrinsic Motivation to Learn	3.42	HE
Overall Weighted Mean	3.28	HE

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Highly Effective	(HE)
2.50 – 3.24	Moderately Effective	(ME)
1.75 – 2.49	Slightly Effective	(SE)
1.00 – 1.74	Not At All Effective	(NAAE)

The highest-rated indicator is intrinsic motivation to learn (WM = 3.42), showing that learners are driven by personal interest and genuine curiosity in mathematics. This is observed when learners actively solve problems, seek understanding, and voluntarily request additional practice. This implies that meaningful and relevant instructional activities help strengthen internal motivation. In contrast, voluntary participation in extra learning activities is the lowest-rated indicator (WM = 3.17), interpreted as moderately effective, suggesting limited learner initiative beyond required tasks. This implies that motivation is still partly extrinsic and may require further support.

Thus, schools should promote enrichment activities, recognition systems, and engaging learning opportunities to encourage self-initiated learning. Strengthening intrinsic motivation and independent learning behaviors can further improve learners' engagement and performance in mathematics.

Relationship between Strategic Interventions being Utilized to Address Mathematical Difficulties and Level of Utilization of the Strategic Interventions

Prior to examining the relationships, a test of normality confirmed that the data were normally distributed; thus, Pearson Product–Moment Correlation (r) was used. Results in Table 10 show varying relationships between strategic interventions and their level of utilization. Teacher adherence to planned strategies had a significant moderate positive correlation ($r = .313$, $p < .05$), indicating that consistent implementation increases the utilization of interventions. This highlights the importance of structured planning in effective implementation, supported by Essien et al. (2025), who found that higher adherence leads to greater learning gains.

Table 10 Test for Significant Relationship between the Strategic Interventions being Utilized to Adress Mathematical Difficulties and the Level of Utilization of the Strategic Interventions

Level of Utilization	Strategic Interventions		Remarks
	r	*p-value*	
Teacher Adherence to Intervention Planned Strategy.	.313*	.012	Significant
Teacher Adaptation of Intervention	.134	.293	Not Significant
Teacher Engagement in Intervention Activities	.440**	.000	Significant
Monitoring of Student Progress.	.162	.206	Not Significant

**Correlation is Significant @ 0.05 level (2-tailed)*

***Correlation is Significant @ 0.01 level (2-tailed)'*

Teacher engagement in intervention activities also showed a significant moderate positive correlation (r = .440, p < .01), suggesting that higher teacher involvement is strongly associated with greater utilization of interventions. This is supported by Glover et al. (2023), who emphasized that active teacher engagement strengthens implementation of evidence-based strategies. In contrast, teacher adaptation showed a weak, non-significant relationship (r = .134, p > .05), indicating that modifications alone do not significantly influence utilization. While adaptation may be useful, it must align with core intervention components to be effective, as noted by Boylan (2025). Similarly, monitoring did not show a direct significant effect, suggesting that its impact depends on how it is used in instructional decision-making (Essien et al., 2025).

Relationship between the Level of Utilization and Level of Effectiveness of the Strategic Interventions

Before testing the significant relationship between the level of utilization of the strategic interventions provided to students at risk for mathematical difficulties and the level of effectiveness of these interventions, a test of normality was conducted. The results indicated that the data met the assumption of normal distribution. Hence, the Pearson Product–Moment Correlation (r) was deemed an appropriate statistical tool to determine the strength and direction of the relationship between the variables.

Table 11 shows that the level of utilization of strategic interventions is significantly and positively related to learners' proficiency, engagement, attitude, and motivation, indicating that higher utilization leads to better learning outcomes. Teacher adherence is significantly related to learners' attitude (r = .379, p = .002) and motivation (r = .283, p = .024), suggesting that consistent implementation improves learners' perceptions of Mathematics and willingness to learn.

Table 11 Test for Significant Relationship between the Level of Utilization of the Strategic Intervention and Its Level of Effectiveness

Level of Utilization	Level of Effectiveness							
	Proficiency of Learners Before and After Intervention.		Student Engagement		Student Attitude toward Mathematics		Student Learning Motivation	
	r	*p-value*	*r*	*p-value*	*r*	*p-value*	*r*	*p-value*
Teacher Adherence to Intervention Planned Strategy.	.214	.089	.127	.315	.379**	.002	.283*	.024
Teacher Adaptation of Intervention	.377**	.002	.327**	.008	.250*	.047	.174	.170
Teacher Engagement in Intervention Activities	.315*	.011	.355**	.004	.385**	.002	.281*	.024
Monitoring of Student Progress.	.271*	.032	.318*	.011	.297*	.018	.309*	.014

***Correlation is significant @ 0.01 level (2-tailed).*

**Correlation is significant @ 0.05 level (2-tailed).*

Teacher adaptation is significantly related to proficiency (r = .377, p = .002), engagement (r = .327, p = .008), and attitude (r = .250, p = .047), highlighting the value of flexible and responsive instruction. Teacher engagement shows significant positive relationships across all variables, proficiency (r = .315), engagement (r

= .355), attitude (r = .385), and motivation (r = .281) emphasizing that active teacher involvement strengthens both academic and affective outcomes. Monitoring of learner progress is also significantly related to all outcomes, indicating that continuous assessment and feedback support improved learning and engagement. These findings were corroborated by Matende et al. (2025) who highlighted that ongoing monitoring and data-informed instructional adjustments positively influence student engagement and learning outcomes. Effective monitoring allows interventions to remain responsive and targeted, thereby increasing their overall effectiveness. Overall, the results show that effective intervention depends on the combined use of adherence, adaptation, engagement, and monitoring to improve learners' mathematics outcomes.

Challenges Encountered by the Teachers in Improving Mathematics Proficiency of Learners' at-risks for Mathematical Difficulties

Proficiency of Learners Before and After Intervention. Table 12 presents the challenges encountered by teachers in terms of learners' proficiency before and after intervention. As revealed in Table 12, teachers generally experience challenges in improving learners' proficiency before and after interventions, with an overall weighted mean of 3.15 (Agree). This indicates that while interventions are implemented, several instructional and structural constraints limit their full effectiveness.

Table 12 Challenges Encountered by the Teachers in terms of Proficiency of Learners Before and After Intervention

Indicators	WM	Int.
1. Inconsistent baseline assessment of learners' proficiency	3.13	A
2. Limited duration and continuity of intervention	3.16	A
3. Variability in student engagement and motivation	3.22	A
4. Inadequate monitoring and evaluation tools	3.11	A
5. Contextual and instructional constraints	3.14	A
Overall Weighted Mean	3.15	A

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Strongly Agree	(SA)
2.50 – 3.24	Agree	(A)
1.75 – 2.49	Disagree	(D)
1.00 – 1.74	Strongly Disagree	(SD)

The highest-rated challenge is variability in student engagement and motivation (WM = 3.22), showing that learners respond differently to intervention activities. Some participate actively, while others remain passive due to low interest, confidence, or external factors, affecting overall progress. This aligns with earlier findings on moderate student engagement and motivation and is supported by Doño and Mangila (2021) and Hunt et al. (2025), who emphasized that sustained engagement and consistent intervention exposure are essential for meaningful learning gains among at-risk learners. The lowest-rated challenge is inadequate monitoring and evaluation tools (WM = 3.11), indicating that while still a concern, it is less severe than other issues. This suggests that existing assessment practices are limited and may not fully capture learner progress, highlighting the need for improved and standardized monitoring tools. Overall, the findings suggest that improving learner

engagement, strengthening assessment systems, and addressing resource and implementation constraints are key to enhancing the effectiveness of mathematics interventions.

Learner Engagement. Table 13 presents the challenges encountered by teachers in terms of learners' engagement. The data reveal that teachers strongly agree they encounter challenges in learners' engagement in mathematics, with an overall weighted mean of 3.29 (Strongly Agree). This indicates that engagement-related issues are persistent and serve as major barriers to effective instruction, influenced by learners' affective, behavioral, and environmental factors. The highest-rated challenge is low motivation and interest in mathematics (WM = 3.42), suggesting that lack of interest is the primary barrier to participation. This implies that many learners perceive mathematics as difficult or irrelevant, reducing their willingness to engage in remediation activities without strong teacher support. This aligns with Doño and Mangila (2021), who noted that at-risk learners often exhibit low motivation due to prior negative experiences and low self-efficacy.

Table 13 Challenges Encountered by the Teachers in terms of Learners' Engagement

Indicators	WM	Int.
1. Low motivation and interest in mathematics	3.42	SA
2. Math anxiety and fear of failure	3.30	SA
3. Inconsistent attendance and participation	3.33	SA
4. Limited use of interactive and engaging strategies	3.14	A
5. Lack of parental and peer support	3.25	SA
Overall Weighted Mean	3.29	SA

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Strongly Agree	(SA)
2.50 – 3.24	Agree	(A)
1.75 – 2.49	Disagree	(D)
1.00 – 1.74	Strongly Disagree	(SD)

In contrast, the lowest-rated challenge is limited use of interactive and engaging strategies (WM = 3.14), indicating that while some interactive methods are used, opportunities for games, collaborative tasks, and technology-based learning remain limited. As noted by Talkhan et al. (2025), interactive strategies significantly improve learner motivation and persistence in mathematics. Overall, the findings suggest that engagement challenges are mainly driven by motivational factors. Strengthening interactive instruction, enhancing motivation strategies, and improving support systems are essential to increase learners' participation in mathematics.

Learners' Attitude Toward Mathematics. Table 14 presents the challenges encountered by teachers in terms of learners' attitude toward Mathematics. As can be seen in Table 14, teachers strongly agree they encounter challenges in learners' attitude toward mathematics, with an overall weighted mean of 3.32 (Strongly Agree). This indicates persistent issues in learners' perceptions, beliefs, and attitudes that hinder effective learning despite intervention efforts. The highest-rated challenge is the perception that mathematics is difficult (WM = 3.45), suggesting that negative beliefs remain the most dominant barrier. This implies that learners often see mathematics as only for high achievers, which reduces effort and engagement. This aligns with Doño and

Mangila (2021), who found that low self-efficacy and negative beliefs reduce persistence and performance in mathematics.

In contrast, previous negative experiences and lack of appreciation of mathematics' relevance both scored the lowest (WM = 3.19), indicating they are still present but less influential. This suggests that contextualized instruction may help address these concerns by showing real-life applications of mathematics. Talkhan et al. (2025) emphasized that linking lessons to real-world contexts improves engagement and perceived value. Overall, the findings highlight the need to address attitudinal barriers through confidence-building strategies, growth mindset development, and meaningful, real-life mathematics applications.

Table 14 Challenges Encountered by the Teachers in terms of Learners' Attitude Toward Mathematics

Indicators	WM	Int.
1. Negative perception of mathematics as a difficult subject	3.45	SA
2. Low self-confidence and mathematical self-efficacy	3.44	SA
3. Fixed mindset toward mathematical ability	3.31	SA
4. Previous negative experiences in learning mathematics	3.19	A
5. Lack of appreciation for the relevance of mathematics in real life	3.19	A
Overall Weighted Mean	3.32	SA

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Strongly Agree	(SA)
2.50 – 3.24	Agree	(A)
1.75 – 2.49	Disagree	(D)
1.00 – 1.74	Strongly Disagree	(SD)

Learners' Learning Motivation. Table 15 presents the challenges encountered by teachers in terms of learners' learning motivation. As revealed in Table 15, teachers agree they encounter challenges in learners' learning motivation, with an overall weighted mean of 3.15 (Agree), indicating that sustaining motivation in mathematics remains a concern despite intervention efforts. The highest-rated challenge is lack of intrinsic motivation (WM = 3.36), suggesting that many learners are not internally driven to learn mathematics and often participate only due to external requirements. This aligns with Doño and Mangila (2021), who noted that at-risk learners often depend on external incentives, limiting sustained engagement and achievement.

Table 15 Challenges Encountered by the Teachers in terms of Learners' Learning Motivation

Indicators	WM	Int.
1. Lack of intrinsic motivation to learn mathematics	3.36	SA
2. Overreliance on extrinsic rewards	3.20	A
3. Repeated academic failures leading to learned helplessness	3.09	A
4. Lack of goal orientation and purpose in learning	3.25	A

5. Limited teacher strategies to sustain motivation	2.86	A
Overall Weighted Mean	3.15	A

Rating Scale	Descriptive Interpretation	
3.25 – 4.00	Strongly Agree	(SA)
2.50 – 3.24	Agree	(A)
1.75 – 2.49	Disagree	(D)
1.00 – 1.74	Strongly Disagree	(SD)

In contrast, limited teacher strategies to sustain motivation is the lowest-rated challenge (WM = 2.86), though still present. This implies that while teachers use motivational strategies such as encouragement and rewards, these may not be enough to maintain long-term interest. Lumoto et al. (2024) emphasized that sustained motivation requires goal setting, feedback, and engaging instructional practices. Overall, the findings suggest that learners' motivation is largely affected by internal factors. Strengthening intrinsic motivation, promoting goal-oriented learning, and using supportive, engaging instructional strategies are essential to improve learners' persistence and achievement in mathematics.

Proposed Intervention may be Proposed to Enhance Mathematics Proficiency of Learners' at-Risk with Mathematical Difficulties

As an offshoot of this study, a Professional Development Program for Teachers entitled "Enhancing Learners' Motivation in Mathematics through Effective Pedagogy and Curriculum-Aligned Practices" is proposed (see Appendix J) to address learners' low motivation and related learning challenges in mathematics. The program is anchored on the Mathematics Curriculum Guide and aligned with Republic Act 12028 (Project ARAL), which promotes structured remediation, targeted enrichment, and continuous teacher upskilling for learners at risk.

The program addresses key issues such as low intrinsic motivation, learned helplessness, limited goal orientation, and low engagement through strategies including scaffolding, differentiated instruction, formative assessment, and structured success experiences under the remediation component of Project ARAL. It also strengthens enrichment through problem-based learning, collaborative tasks, contextualized instruction, and technology integration to promote deeper understanding and sustained motivation.

Aligned with the teacher upskilling component of Project ARAL, the program includes continuous professional development, coaching, and Learning Action Cell (LAC) sessions to enhance teachers' pedagogical content knowledge and motivational strategies in mathematics. Key components include workshops on growth mindset, goal-setting and self-regulated learning, addressing learned helplessness, and sustaining learner motivation.

The program aims to improve teachers' competence in delivering motivational and learner-centered instruction, increase learners' intrinsic motivation and persistence, reduce learned helplessness, and strengthen alignment with the Mathematics Curriculum Guide and PPST standards.

CONCLUSION

Based on the findings of the study, the following conclusions were arrived at: 1) strategic interventions in Mathematics are highly utilized, with visual aids as the most commonly used strategy. However, individualized, and hands-on approaches such as personalized learning plans, one-on-one tutoring, and manipulatives are only moderately utilized, indicating the need to strengthen learner-centered practices to further improve mathematics proficiency. 2) Interventions are highly utilized across all aspects, with strong teacher adherence, adaptation, engagement, and monitoring, reflecting a consistent culture of implementation. However, adaptive practices still need improvement to better address individual learner needs. 3) Strategic interventions are generally effective

in improving learners' engagement, attitude, and motivation, which are rated highly effective. However, improvements in mathematical proficiency remain only moderately effective, suggesting the need to strengthen skill mastery, remediation, and sustained practice. 4) Utilization of interventions is positively influenced by teacher adherence and engagement, while adaptation does not significantly affect overall utilization, indicating that modification alone is not sufficient to increase implementation. 5) The level of utilization significantly affects learners' outcomes, with engagement and monitoring showing consistent positive effects across all domains. This highlights the importance of active implementation and continuous progress tracking. 6) Teachers report significant challenges in improving learners' proficiency, particularly due to low engagement and negative attitudes toward Mathematics, which are key barriers to learning. 7) In response, a Professional Development Program titled Enhancing Student Motivation in Mathematics through Effective Pedagogy and Curriculum-Aligned Practices is proposed to strengthen teachers' instructional and motivational strategies.

RECOMMENDATION

The following recommendations to the area of research and development are hereby given: 1) teachers are encouraged to increase the use of individualized and hands-on strategies such as one-on-one tutoring, manipulatives, and personalized learning plans, with support from school heads through training and resource provision. 2) Teachers should strengthen adaptive instruction by using assessment data to guide interventions, while school heads provide continuous professional development on differentiated instruction. 3) Teachers may enhance skill-focused interventions such as remediation, mastery exercises, and sustained practice, supported by school programs that translate motivation and engagement into improved mathematics proficiency. 4) School heads may ensure consistent monitoring of teachers' adherence to intervention plans and active engagement in implementation. 5) Teachers are encouraged to integrate strong engagement, effective adaptation, and continuous monitoring to improve both academic and affective outcomes in mathematics. 6) School heads should address implementation challenges by providing adequate instructional materials, time, and ongoing professional support for teachers handling at-risk learners. 7) The proposed Professional Development Program should be implemented and regularly evaluated to enhance teachers' motivation strategies and curriculum-aligned instructional practices. 8) Future researchers are encouraged to conduct similar studies in broader contexts and include additional variables such as learner background, school resources, and instructional time to further validate and expand the findings.

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