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Research Article

Mathematical Learning Intervention Program for Grade 9 Learners During the Resumption of In-Person Classes

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Abstract
This study examined the mathematics performance of Grade 9 learners during the resumption of in-person classes following the COVID-19 pandemic and developed a Mathematical Learning Intervention Program based on the learners' identified needs. Using a descriptive-correlational research design, the study involved Grade 9 learners of Malalag National High School during the School Year 2023–2024. Learners' academic performance in Mathematics was determined using their first and second quarter grades, while a validated researcher-made questionnaire was utilized to identify the problems encountered in learning Mathematics. The collected data were analyzed using appropriate descriptive and inferential statistical techniques. The findings revealed that the learners demonstrated a satisfactory level of mathematics performance during the transition back to face-to-face instruction. Among the challenges encountered, school-related problems emerged as the most frequently experienced concerns, followed by social problems, whereas home-related and personal problems were encountered less often. Furthermore, the results indicated that there was no statistically significant relationship between the extent of the problems encountered and the learners' mathematics performance. Guided by these findings, a Mathematical Learning Intervention Program was developed and validated by experts, demonstrating a high level of validity in terms of acceptability, appropriateness, content, and usability. The study concludes that although learners encountered various challenges during the post-pandemic transition, they were able to maintain satisfactory performance in Mathematics. The developed intervention program may serve as a practical framework for strengthening instructional practices and supporting learners' mathematical development in similar educational contexts.

Keywords
Mathematics performance; Post-pandemic transition; Grade 9 learners; Learners' challenges; Learning Intervention

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This study was conducted in accordance with ethical standards.

INTRODUCTION

The COVID-19 pandemic brought unprecedented disruptions to educational systems worldwide and significantly altered the landscape of mathematics education. Prolonged school closures, abrupt transitions to remote learning, and unequal

access to technological resources intensified existing educational inequalities and contributed to substantial learning losses, particularly in mathematics, a subject that requires continuous practice, conceptual scaffolding, and timely feedback (Adnan & Anwar, 2020; Akseer et al., 2021). As schools gradually resumed face-to-face instruction, learners returned to classrooms carrying the academic consequences of interrupted learning experiences, including weakened foundational knowledge, reduced problem-solving abilities, and diminished confidence in mathematics (Borba, 2021; Shin et al., 2024; Sooknanan & Seemungal, 2023). Although various educational systems implemented learning continuity plans during the pandemic, the focus of current educational discourse has shifted from merely ensuring access to instruction toward facilitating meaningful learning recovery. Studies have demonstrated that post-pandemic mathematics education requires deliberate interventions that address not only cognitive gaps but also the emotional, motivational, and contextual factors affecting learners' engagement and achievement. Technology-assisted instruction, blended learning models, and remedial initiatives have shown promise in enhancing mathematics performance when implemented systematically and aligned with learners' specific needs (Azucena et al., 2022; Nitkin et al., 2022). Likewise, holistic approaches that consider teacher readiness, contextual realities, and sustainability have been identified as critical components of effective educational responses during and after crises (Nicolai et al., 2023).

The transition back to in-person classes has further highlighted that mathematics learning is shaped by a complex interaction of instructional, familial, social, and individual factors. Supportive teaching practices and positive classroom environments have been associated with increased learner engagement, confidence, and academic persistence (Cole, 2025; Galaura & Simpal, 2025). Teachers themselves faced significant challenges as they adapted to learners with diverse readiness levels and varying degrees of learning loss, making instructional competence and professional preparedness increasingly important during educational recovery (Drijvers et al., 2021; Gumera & Ancog, 2023; Juntilla-Amora & Simpal, 2025). Beyond the classroom, parental involvement continues to play a critical role in fostering learners' interest and motivation toward mathematics by providing emotional encouragement and academic support (Bongabong & Doronio, 2025). Moreover, educational programs grounded in inclusivity and cultural responsiveness have been recognized as vital mechanisms for ensuring equitable learning opportunities and responsive school governance in diverse educational settings (Casamayor & Plaga, 2025). These findings collectively suggest that improving mathematics achievement requires a multidimensional understanding of the factors that shape learners' educational experiences rather than relying solely on instructional interventions.

Recent scholarship also emphasizes the significance of psychosocial influences and learner characteristics in determining academic outcomes. Positive peer acceptance and constructive social relationships contribute to learners' sense of belonging, academic engagement, and persistence, whereas excessive gadget use, peer pressure, and negative social interactions may adversely affect concentration and learning behaviors (Da-anton & Dioso, 2025; Fudolin & Dioso, 2025). Learners' aspirations and developmental experiences have similarly been associated with their motivation to pursue academic goals and persist through challenges (Aripal & Cubero, 2025). In mathematics education specifically, the ability to comprehend mathematical texts and interpret problem situations has emerged as a critical component of effective problem-solving. Research has demonstrated that mathematical reading comprehension substantially influences learners' capacity to apply concepts and select appropriate solution strategies (Goc-Ong & Doronio, 2025). Likewise, multilingual and culturally diverse learning environments require instructional approaches that acknowledge learners' linguistic identities and promote inclusive communication practices to maximize participation and engagement (Arrogante, 2025). Emerging evidence further indicates that resilience, adaptability, and self-regulatory capacities enable learners to sustain academic performance despite experiencing educational disruptions, with machine learning studies identifying these characteristics as important predictors of mathematics proficiency in post-pandemic contexts (Khan & Al-Lawati, 2025). These findings reinforce the importance of addressing both academic and psychosocial dimensions of learning when designing interventions intended to support mathematics achievement.

Despite the growing body of literature on pandemic-related learning loss, educational technology, teacher preparedness, and psychosocial determinants of achievement, relatively few studies have focused on developing contextually grounded mathematical intervention programs specifically designed for learners transitioning back to face-to-face instruction. Existing research has primarily examined issues of digital readiness, instructional adaptation, and general educational recovery, leaving a gap in understanding how learner-identified challenges can inform targeted intervention efforts in post-pandemic classrooms (Alabdulaziz, 2021; Simpal & Robles, 2024; Temelo, 2023). Furthermore, methodological discussions continue to highlight the importance of rigorous measurement and appropriate interpretation of educational data to ensure valid and meaningful conclusions that can guide practice and policy (Doronila & Cariaga, 2025). Addressing this gap, the present study examined the mathematics performance of Grade 9 learners of Malalag National High School during the resumption of in-person classes, identified the problems they encountered in learning Mathematics, determined the relationship between these challenges and their academic performance, and developed a Mathematical Learning Intervention Program grounded in the study findings. By generating empirical evidence from a local post-pandemic educational setting, this study seeks to inform teachers, school leaders, and policymakers in designing responsive instructional strategies that strengthen mathematics learning recovery.

METHODOLOGY

Design

This study employed a descriptive-correlational design where the researcher aims to explain a correlation between variables without attempting to determine a causal relationship (Devi et al., 2022). It identifies and examines the challenges that learners have when learning mathematics, as well as any potential connections between them. The descriptive aspect

concentrates on obtaining information about the particular issues that learners face, such as problems in home, personal, school or social. These difficulties were evaluated and their prevalence among learners ascertained by the prepared survey questionnaire.

Locale

This study was conducted at Malalag National High School in the Division of Sarangani, located in the Municipality of Maitum, Sarangani Province. Established in 1969, it is the only public high school in the municipality offering both Junior and Senior High School programs. For School Year 2023–2024, the school had a total population of 2,606 learners and 93 teaching and non-teaching personnel, classifying it as a large school. The respondents of the study were the 450 Grade 9 learners distributed across nine sections. The Grade 9 mathematics general performance average slightly increased from 82.40 in SY 2022–2023 to 83.47 in SY 2023–2024, reflecting modest improvement but also indicating persistent challenges in mathematical learning. This trend highlights the need for targeted interventions, enhanced instructional strategies, and stronger support systems to address the continuing difficulties experienced by learners in Mathematics.

Respondents

The respondents of the study were the 208 learners of the 450 Grade 9 learners of Malalag National High School determined through Cochran's Formula. The researchers used stratified random sampling, which allowed for proportionate representation of learners from various Grade 9 classrooms, to accomplish a fair and impartial selection process. Out of the 46 learners in Arrhenius, 21 was chosen as responders. In a similar vein, 19 respondents in Gibbs from 43 learners, 25 respondents from a pool of 53 learners were chosen in Boyle, and 24 respondents in Cornforth from 51 learners were chosen. Of the 52 learners in Mendeleev, 24 were selected as respondents; of the 53 learners in Murphy, 25 were selected as respondents. Twenty-five (25) out of the 55 learners in Rutherford and 24 out of the 46 learners in Ziegler were selected as respondents. Lastly, 21 out of the 54 learners in SPA-Democritus were selected as respondents. All class sections were fairly represented as a result.

Instrument

The first and second quarter Mathematics grades of Grade 9 learners for School Year 2023–2024 were utilized to determine their learning performance and interpreted using Department of Education Order No. 8, s. 2015, with grades classified as Outstanding (90–100), Very Satisfactory (85–89), Satisfactory (80–84), Fairly Satisfactory (75–79), and Did Not Meet Expectations (below 75). To identify the problems encountered in learning Mathematics, a contextualized researcher-made 20-item questionnaire was administered and rated using a five-point Likert scale ranging from Never (1.00–1.49) to Always (4.50–5.00). The instrument underwent expert validation, pilot testing, and reliability analysis, with a Cronbach's alpha coefficient of 0.75 or higher considered acceptable, while construct validity was established through the known-group methodology (American Institute for Research, 2021), confirming its suitability for the study. Likewise, the developed Mathematical Learning Intervention Program was validated by experts in terms of acceptability, appropriateness, content, and usability using a separate five-point Likert scale, with mean scores interpreted from Very Low (1.00–1.49) to Very High (4.50–5.00) validity.

Procedure

Prior to data collection, the researcher's questionnaire underwent expert validation and a Cronbach's alpha pilot test to determine its reliability. The principal of Malalag National High School granted permission to conduct the study, and the Learner Information System (LIS) coordinator was then contacted to obtain the list of Grade 9 classes for the 2023–2024 school year. Parental consent was obtained prior to participation, and respondents were selected via stratified random sampling within each class. The surveys were distributed and collected individually by the researcher, who also provided instructions and allowed 30 minutes for completion. Data collection took place between January and March of 2024. After statistical analysis, a mathematics learning intervention program was developed based on the data acquired. Experts then verified the program's acceptability, appropriateness, content, and usability.

Ethical Considerations

This research study followed ethical guidelines. Informed consent was obtained from the participants. They gave consent and granted permission to be the source of information about the subject of this research by letting their parents signed the Participants' consent form. The researcher considered the participants' voluntary participation by giving the detailed explanation of the objectives of the study and that he made sure that they were free to stop participating at any time without facing any repercussions and the whole process was entirely voluntary. To safeguard the privacy of the individuals, the researcher employed coding techniques. Responses from the learners were treated with extreme care and confidentiality. Moreover, the researcher ensured that sensitivity to the gender preference and orientation were observed and that they were always respected in the entire duration of the study. Learners regardless of gender and orientations were considered respondents of the study. Lastly, the researcher was sensitive to the cultures of the participants as they might have different cultural backgrounds. The researcher respected their ideas, beliefs and traditions. The language used in the survey questionnaire was respectful of the participants' religion, customs and traditions.

RESULTS AND DISCUSSION

The findings revealed that Grade 9 learners attained an overall mean percentage score of 84.46, interpreted as Satisfactory, indicating that most learners demonstrated moderate to high levels of mathematical proficiency upon returning to face-to-face instruction. The majority obtained ratings ranging from Satisfactory to Very Satisfactory, while none fell under the Did Not Meet Expectations category. These results suggest that learners were able to recover academically despite the disruptions brought about by the pandemic and adapt successfully to the demands of traditional classroom instruction.

The results support evidence that the restoration of in-person classes contributes positively to learners' academic recovery, particularly in mathematics where direct guidance and immediate feedback are essential for conceptual understanding. Face-to-face learning environments facilitate meaningful interactions and structured instructional support that help rebuild foundational competencies and reduce learning gaps caused by prolonged school closures (Akseer et al., 2021; Borba, 2021; Drijvers et al., 2021; Shin et al., 2024). The absence of learners below the minimum proficiency level further suggests that school-based remediation and learning recovery initiatives may have contributed to sustaining learners' mathematical achievement during the transition period.

Table 1
Learning Performance in Mathematics of the Grade 9 Learners During the Resumption of In-Person Classes

Grading Scale	Frequency	Percentage (%)	Description
90–100	26	12.50	Outstanding
85–89	70	36.06	Very Satisfactory
80–84	75	33.65	Satisfactory
75–79	37	17.79	Fairly Satisfactory
Below 75	0	0.00	Did Not Meet Expectations
Total	208	100.00	
Overall Mean Percentage	84.46		Satisfactory

Note. Performance descriptions were based on DepEd Order No. 8, s. 2015.

The overall mean score of 2.46, interpreted as Seldom, indicates that home-related concerns were not consistently experienced as barriers to mathematics learning among Grade 9 learners. Although learners occasionally perceived inadequate parental encouragement and limited academic support, these concerns did not substantially interfere with their participation in mathematics activities during the resumption of in-person classes.

Parental involvement remains a significant factor influencing learners' motivation and academic persistence. Learners who receive emotional support, encouragement, and reinforcement of study routines tend to exhibit stronger engagement and confidence in challenging subjects such as mathematics (Geduld, 2024; Wentzel et al., 2021). The relatively low influence of financial constraints may suggest that school interventions and learners' adaptive coping strategies mitigated the potential effects of socioeconomic challenges during the post-pandemic period (Akseer et al., 2021; Shin et al., 2024). Strengthening school-family partnerships may therefore enhance learners' resilience and sustained academic engagement (Bongabong & Doronio, 2025; Cariaga et al., 2025).

Table 2.1
Extent of the Problems Encountered in Learning Mathematics among Grade 9 Learners in Terms of Home Problems

Items	Mean	Interpretation
My family members, including parents and siblings, are not concerned with my academic grades, especially in mathematics.	2.75	Sometimes
My parents have not been supportive and encouraging me when it comes to nurturing my academic interests, especially in learning mathematics lessons.	2.90	Sometimes
My parents face challenges in maintaining a stable job or consistent income affecting our household's financial stability that they cannot help me in my mathematics assignments.	1.84	Seldom
Our home feels overcrowded due to the number of people living together, creating discomfort when doing mathematics assignments.	2.47	Seldom
Our home lacks proper ventilation and sufficient lighting that I cannot study my mathematics lessons comfortably.	2.36	Seldom
Overall Mean	2.46	Seldom

Note. Mean interpretation: 4.50–5.00 = Always; 3.50–4.49 = Often; 2.50–3.49 = Sometimes; 1.50–2.49 = Seldom; 1.00–1.49 = Never.

The overall mean of 2.49, described as Seldom, suggests that personal concerns were not major impediments to learners' mathematics achievement. However, learners acknowledged the need to improve their mathematical skills and study habits, reflecting awareness of competency gaps that may have emerged due to interrupted learning experiences during the pandemic.

Self-awareness regarding academic preparedness can influence learners' motivation, persistence, and engagement in mathematics. Learners who recognize their areas for improvement are more likely to benefit from instructional support designed to strengthen confidence and self-efficacy (Borba, 2021; Sooknanan & Seemungal, 2023). Providing opportunities for guided practice, formative feedback, and motivational support may therefore enhance learners' attitudes toward mathematics and encourage long-term academic engagement (UNESCO, 2021; Wentzel et al., 2021).

Table 2.2
Extent of the Problems Encountered in Learning Mathematics among Grade 9 Learners in Terms of Personal Problems

Items	Mean	Interpretation
My school expenses have been challenging and burdensome that I cannot focus on studying my mathematics lessons.	2.19	Seldom
I have difficulty maintaining a positive attitude toward learning mathematics.	2.48	Seldom
My study habits in mathematics are poor.	2.66	Sometimes
My learning in mathematics is affected by the relationship status of my parents and siblings.	2.43	Seldom
I need to enhance my mathematical skills, recognizing room for improvement in this area.	2.67	Sometimes

Items	Mean	Interpretation
Overall Mean	2.49	Seldom

Note. Interpretation of mean scores follows the established Likert scale guidelines.

Among all categories, school-related problems obtained the highest overall mean of 3.80, interpreted as Often, indicating that instructional practices were perceived as the most influential challenges affecting mathematics learning. Learners frequently identified concerns related to instructional clarity, the use of varied teaching strategies, and the relevance of mathematics lessons to real-life contexts.

Effective mathematics instruction requires clear explanations, immediate feedback, and diverse teaching approaches that accommodate varying learner needs. Research has consistently demonstrated that instructional quality significantly influences learners' engagement and achievement, particularly during educational transitions following the pandemic (Borba, 2021; Drijvers et al., 2021; Shin et al., 2024). Moreover, learner-centered approaches that foster creativity, critical thinking, and authentic application of mathematical concepts contribute positively to learners' motivation and conceptual understanding (Thornhill-Miller et al., 2023). These findings underscore the importance of continuous professional development and pedagogical enhancement among mathematics teachers (Bayo Jr. & Doronio, 2025; Galaura & Simpal, 2025; Temelo, 2023).

Table 2.3
Extent of the Problems Encountered in Learning Mathematics among Grade 9 Learners in Terms of School Problems

Items	Mean	Interpretation
My teacher needs improvement in providing clear directions and coherent explanations during mathematics lessons.	4.18	Often
My teacher struggles with fostering an environment that encourages critical thinking and nurtures creativity during mathematics lessons.	3.68	Often
My teacher lacks the utilization of visual aids and diverse examples to effectively illustrate lessons.	3.61	Often
My teacher does not employ various approaches, methods, and strategies to accommodate diverse learning styles.	3.84	Often
My teacher has difficulty connecting lessons to practical, real-life situations.	3.70	Often
Overall Mean	3.80	Often

Note. Higher mean scores indicate greater perceived influence of school-related problems.

The overall mean of 3.34, interpreted as Sometimes, indicates that social concerns moderately affected learners' mathematics experiences. Difficulties related to peer acceptance, adapting to Grade 9 responsibilities, and feelings of insecurity around academically gifted classmates emerged as notable concerns during classroom interactions.

Positive peer relationships play an important role in shaping learners' academic engagement and persistence. Supportive classroom environments encourage participation and collaborative problem-solving, whereas negative social experiences may weaken confidence and reduce involvement in academic tasks (Wentzel et al., 2021). Although social comparison is common during adolescence, optimism, resilience, and inclusive classroom practices can reduce its adverse effects on self-esteem and academic performance (Liu et al., 2025). Cooperative learning strategies and social-emotional support programs may therefore help foster learners' sense of belonging and engagement in mathematics classrooms (Borba, 2021; UNESCO, 2021).

Table 2.4
Extent of the Problems Encountered in Learning Mathematics among Grade 9 Learners in Terms of Social Problems

Items	Mean	Interpretation
I struggle to gain acceptance from classmates and schoolmates, especially during mathematics class.	3.69	Often
I ineffectively manage interactions during mathematics lessons with diverse classmates.	3.33	Sometimes
I have difficulty adapting to the life and responsibilities of a Grade 9 learner during mathematics activities.	3.63	Often
I feel insecure around classmates who are intellectually gifted in mathematics and economically better off.	3.60	Often
I find it difficult to deal with classmates who display superiority because of their mathematical ability and financial status.	2.46	Seldom
Overall Mean	3.34	Sometimes

Note. Interpretation of responses was based on the five-point Likert scale.

The overall mean score of 3.02, interpreted as Sometimes, suggests that learners encountered moderate levels of difficulty in learning mathematics during the transition back to face-to-face instruction. School-related concerns emerged as the most frequently experienced challenges, followed by social problems, while home and personal concerns were encountered less often.

These findings emphasize that learners' mathematics experiences during post-pandemic recovery were shaped primarily by classroom conditions and instructional practices rather than personal or family circumstances. Adaptive pedagogy, instructional clarity, and learner-centered approaches remain essential in addressing learning gaps and promoting academic recovery (Borba, 2021; Drijvers et al., 2021). Likewise, positive peer relationships and inclusive classroom environments contribute to learners' confidence, participation, and persistence in mathematics learning (Wentzel et al., 2021). Addressing these concerns through professional development initiatives and collaborative learning opportunities may enhance learners' performance and long-term interest in mathematics.

Table 2.5
Summary of the Extent of the Problems Encountered in Learning Mathematics

Indicators	Mean	Interpretation
Home Problems	2.46	Seldom
Personal Problems	2.49	Seldom
School Problems	3.80	Often
Social Problems	3.34	Sometimes
Overall Mean	3.02	Sometimes

Note. School problems emerged as the most frequently encountered concern among learners.

Table 3 presents the relationship between the extent of the problems encountered by Grade 9 learners and their level of learning performance in Mathematics. The Spearman's rho analysis yielded a correlation coefficient of 0.0591 with a corresponding p-value of 0.3967, which is greater than the 0.05 level of significance. Consequently, the null hypothesis was not rejected, indicating that there was no statistically significant relationship between the problems encountered by learners and their mathematics performance. Although a very weak positive correlation was observed, the magnitude of the relationship was negligible and insufficient to establish a meaningful association between the two variables. This finding suggests that the challenges experienced by learners, whether home-related, personal, school-related, or social in nature, did not significantly influence their academic performance in Mathematics during the resumption of in-person classes.

The absence of a significant relationship may indicate that learners possess adaptive mechanisms and protective factors that enable them to maintain satisfactory academic performance despite experiencing various challenges. Research has shown that academic resilience, self-regulation, and motivational intensity play critical roles in helping learners persist and perform well even under adverse circumstances (Yang & Wang, 2022). Similarly, structured classroom environments, effective instructional support, and targeted learning interventions can mitigate the negative effects of external stressors on academic outcomes (Borba, 2021; Drijvers et al., 2021). The findings further imply that mathematics achievement is influenced by multiple interacting factors beyond the problems examined in this study, including learners' coping strategies, teacher support, prior knowledge, and personal motivation. Therefore, while addressing learners' challenges remains important for their overall well-being and educational experience, these concerns alone may not necessarily predict mathematics performance among Grade 9 learners during the post-pandemic transition to face-to-face learning.

Table 3
Relationship between the Extent of the Problems Encountered and the Level of Learning Performance in Mathematics

Variables	Spearman's rho (rs)	p-value	Decision	Interpretation
Learning Performance in Mathematics and Extent of Problems Encountered	0.0591	0.3967	Fail to Reject H_0	Not Significant

Note. Correlation is significant at $p < .05$. The Shapiro–Wilk test indicated non-normality; hence, Spearman's rho was employed.

Program for Mathematical Learning Intervention

Mathematics is a fundamental subject that develops logical reasoning, problem-solving skills, and readiness for future academic and career pursuits. Since Grade 9 serves as a critical stage in strengthening foundational mathematical competencies, the findings of this study highlighted the need for targeted support despite learners demonstrating satisfactory performance. School-related concerns, particularly those involving instructional clarity and teaching strategies, emerged as the most prevalent challenges encountered by learners. In response, a Mathematical Learning Intervention Program was developed to enhance the quality of mathematics instruction, strengthen teachers' instructional competence, and promote learner-centered and inclusive classroom practices. The proposed program will be conducted face-to-face at Malalag National High School and integrated into School Learning Action Cell (SLAC) sessions through quarterly three-day interventions involving school administrators, mathematics teachers, and invited resource speakers. Funding may be sourced from the School Education Fund (SEF), Maintenance and Other Operating Expenses (MOOE), and donations.

Implementation of the Program

The intervention program consists of three phases designed to enhance mathematics instruction. The first phase focuses on orientation and professional learning sessions emphasizing instructional clarity, creativity, critical thinking, the use of visual aids, and differentiated instruction. The second phase provides opportunities for collaborative workshops and contextualized activities that enable participants to apply learner-centered teaching strategies and connect mathematics lessons to real-life situations. The final phase involves presentation of outputs, reflective discussions, peer feedback, self-assessment, and program evaluation to reinforce professional growth and instructional improvement. These activities support evidence indicating that continuous teacher development contributes to improved learner engagement and mathematics achievement (Temelo, 2023; Bayo Jr. & Doronio, 2025).

Degree of Validity of the Developed Mathematical Learning Intervention Program

The developed Mathematical Learning Intervention Program was validated by experts in terms of acceptability, appropriateness, content, and usability. The findings indicated a very high level of validity, suggesting that the program is well-structured, relevant, and feasible for implementation. In particular, validators recognized the program's capacity to enhance teachers' instructional delivery and support engaging mathematics instruction. These results demonstrate that the intervention program aligns with identified instructional needs and has strong potential to improve teaching practices and support learners' mathematical development. It was also rated as Very High, with a mean score of 4.80, for creating an atmosphere that encourages critical thinking, creativity, and active learner participation. With a mean score of 4.40, the integration of real-world applications, instructional tools, and the program's overall viability were all rated as High,

indicating that they all meet the requirements. These findings indicate that the intervention programs is a good fit for deployment because it helps mathematics teachers produce engaging learning surroundings and deliver well-structured courses. According to the Very High rating, the program needs little changes, making it a reliable resource for perfecting tutoring styles and encouraging learner involvement. Although the program is salutary, minor adaptations could maximize its effectiveness, according to the High evaluations for integrating real-world operations, educational accouterments, and program practicality. All effects considered, these results demonstrate that the program may greatly enhance mathematics instruction, guaranteeing that both teachers and learners gain from a systematized and intriguing educational process.

Table 4.1
Level of Validity of the Developed Mathematical Learning Intervention Program in Terms of Acceptability

Items	Mean	Interpretation
The program enhances teachers' ability to provide clear explanations and structured lesson delivery.	5.00	Very High
The program fosters critical thinking, creativity, and active learner participation.	4.80	Very High
The program integrates instructional tools and real-life examples.	4.40	High
The program connects mathematics lessons to real-world applications.	4.40	High
The program is practical and feasible for implementation.	4.40	High
Overall Mean	4.60	Very High

Note. Higher ratings indicate stronger acceptability among validators.

Meanwhile, the data in Table 4.2 reveal that with a mean of 4.72 for overall appropriateness, the intervention program was classified as Very High, meaning it is highly appropriate, well-structured, and successfully satisfies the required requirements. The program received a mean of 4.80 in areas like being specifically designed to meet the needs of secondary math teachers, having learning objectives that are obvious and pertinent, having an appropriate format for adult learners, and helping to improve teachers' abilities. According to these assessments, these elements are quite successful and need little modification. Furthermore, the program's duration obtained a mean of 4.40, suggesting that it is Highly Valid and satisfies the requirements; however, minor adjustments could be helpful for future optimization. These findings indicate that the intervention program is very effective and well-designed and can be modified to fit the unique demands of secondary math teachers. The program is designed to ameliorate teachers' capacities and learning issues, with the utmost of its factors being extremely successful, as seen by its Very High rating for overall appropriateness. The program's pretensions, structure, and fit with teachers' requirements are well appreciated, and only minor variations are demanded, with the utmost of its factors being extremely successful. Although the program mainly meets the different demands of learners and contemporary educational norms, its duration mean of 4.40 indicates enhancing its impact further for minor advancements. Also, the data in Table 4.3 reveal that the intervention program's content achieved an overall mean of 4.48, which is mainly considered valid and generally successfully satisfies the necessary conditions. With a mean of 4.40, the class supports education and aligns with current demands. With a mean of 4.80, the offered educational accouterments were Very High, indicating their efficacity in advancing the program's pretensions. The mean of 4.40 supported the program's overall applicability and efficacity for the addition of contemporary tutoring ways and its capacity to promote party participation.

Table 4.2
Level of Validity of the Developed Mathematical Learning Intervention Program in Terms of Appropriateness

Items	Mean	Interpretation
The duration of the intervention program is appropriate.	4.40	High
The program addresses the needs of secondary mathematics teachers.	4.80	Very High
Learning objectives are clear and relevant.	4.80	Very High
The program format is suitable for adult learners.	4.80	Very High
The program enhances teachers' competence.	4.80	Very High
Overall Mean	4.72	Very High

Note. The intervention program demonstrated a high degree of appropriateness for implementation.

The overall mean of 4.48, distributed as High, implies that the content of the intervention program is highly applicable and well-structured. This means that the program successfully satisfies the condition in most cases, taking only minor adaptations to be further enhanced. The program's efficacy, as stressed by the 4.80 mean for educational accoutrements, shows their substantial contribution to achieving the program's goals, and the 4.40 mean for both party engagement creation and alignment with tutoring prospects. All effects considered, the class is relatively material and ideal for perfecting secondary math teachers' educational strategies; it needs few changes to remain effective.

Table 4.3
Level of Validity of the Developed Mathematical Learning Intervention Program in Terms of Content

Items	Mean	Interpretation
Program content aligns with teachers' needs.	4.40	High
Topics are relevant and beneficial.	4.40	High
Instructional materials are informative and valuable.	4.80	Very High
The program includes updated teaching strategies.	4.40	High
The content encourages active participation.	4.40	High

Items	Mean	Interpretation
Overall Mean	4.48	High

Note. The content of the intervention program was deemed valid with minor enhancements recommended.

Conversely, the data in Table 4.4 show that the intervention program was regarded as Very High, with an overall mean of 4.80, in terms of usability. A mean of 4.80 indicates that the program's knowledge and skills are readily adaptable in the classroom, and a mean of 4.80 indicates that the resources offered are regarded as valuable and accessible for regular instruction. With a mean of 4.40, the training terrain is characterized as probative of literacy and cooperation, emphasizing a good literacy terrain. With a mean of 5.00, participants expressed confidence in applying what they had learned, and the program provides possibilities for follow-up and further assistance, which also achieved a mean of 5.00. These outcomes demonstrate how well the program supports teachers and how easy it is to use. With an overall mean of 4.80, the results indicate that the intervention program is broadly applicable and well-structured, and it's largely successful and well-received in terms of usability. A mean of 4.80 indicates that the program's knowledge and skills are readily applicable in the classroom, and a mean of 4.80 indicates that the coffers offered are practical and fluently accessible. Although encouraging, the training terrain's mean was 4.40, suggesting that little adaptations could indeed strengthen its cooperative aspects further. Furthermore, Table 4.5 summarizes the level of validity of the developed mathematical learning intervention plan in terms of acceptability, appropriateness, content, and usefulness. According to the results, the program is Very High in terms of appropriateness (4.72) and acceptability (4.60), which means it is highly appropriate, well-structured, and satisfies all requirements with little to no revision. With a mean of 4.48, the program's content is categorized as High, which would mean that it satisfies the necessary requirements but might use some minor improvement. With a mean of 4.80, the program's usability has the loftiest mean, indicating that it's convenient and doable. The program had an average overall mean of 4.65, placing it in the Very High rating and demonstrating its effectiveness as a well-allowed-out intervention to ameliorate mathematics instruction.

Table 4.4
Level of Validity of the Developed Mathematical Learning Intervention Program in Terms of Usability

Items	Mean	Interpretation
Skills and knowledge gained can be applied in the classroom.	4.80	Very High
Resources are accessible and practical.	4.80	Very High
The training environment is conducive to collaboration.	4.40	High
Participants are confident implementing what they learned.	5.00	Very High
The program provides opportunities for follow-up support.	5.00	Very High
Overall Mean	4.80	Very High

Note. Results indicate that the intervention program is highly usable in actual teaching contexts.

The findings indicate that the developed Mathematical Learning Intervention Program is well-structured, adaptable, and capable of meeting implementation requirements in actual educational settings. The program demonstrated very high levels of acceptability, appropriateness, and usability, while its content was rated highly valid, suggesting that only minor refinements are necessary to further enhance its effectiveness. These results imply that the intervention program is feasible, practical, and responsive to the instructional needs identified in the study. The positive evaluations likewise support its potential to strengthen mathematics instruction and improve learners' educational experiences through systematic and learner-centered approaches (Temelo, 2023; Bayo Jr. & Doronio, 2025; Cariaga et al., 2025). The findings are consistent with previous studies emphasizing that organized, contextually grounded, and student-centered instructional programs contribute significantly to learner engagement and instructional quality in mathematics. Sutarni et al. (2024) reported that Realistic Mathematics Education (RME)-based instructional materials demonstrated high validity, practicality, and effectiveness in enhancing learners' higher-order thinking skills. Similarly, technology-supported and blended interventions have been found to improve learners' confidence and mathematics achievement by providing opportunities for individualized support and active engagement (Azucena et al., 2022; Nitkin et al., 2022). The high ratings obtained by the present intervention further reinforce the value of systematic instructional programs in addressing post-pandemic learning needs and promoting meaningful learning experiences.

Table 4.5
Summary of the Level of Validity of the Developed Mathematical Learning Intervention Program

Indicators	Mean	Interpretation
Acceptability	4.60	Very High
Appropriateness	4.72	Very High
Content	4.48	High
Usability	4.80	Very High
Overall Mean	4.65	Very High

Note. The developed Mathematical Learning Intervention Program demonstrated an overall Very High level of validity, indicating readiness for implementation with minimal revisions.

Research has consistently shown that effective mathematics instruction is characterized by clarity, coherence, guided practice, and opportunities for interaction and feedback, all of which contribute to deeper conceptual understanding and

sustained learner engagement (Borba, 2021; Drijvers et al., 2021; Sooknanan & Seemungal, 2023). Structured instructional support has likewise been identified as an effective strategy for mitigating learning loss and rebuilding foundational mathematical competencies following educational disruptions (Akseer et al., 2021; Shin et al., 2024; Chin, 2025). By incorporating collaborative activities, contextualized applications, and reflective practices, the developed intervention program aligns with these evidence-based principles and provides teachers with practical strategies for improving classroom instruction. The results also underscore the importance of teacher preparedness and ongoing professional development in improving educational outcomes. Studies on Education 4.0 and digital competence suggest that teachers equipped with adequate pedagogical, technological, and content knowledge are better positioned to deliver effective instruction and respond to diverse learner needs (Simpal & Robles, 2024; Temelo, 2023; Bayo Jr. & Doronio, 2025). Likewise, research on instructional competence and teaching quality indicates that adequately supported teachers are more capable of creating inclusive and stimulating learning environments that foster learner motivation and participation (Villocino & Villocino, 2025; Bacus et al., 2024; Cariaga et al., 2024; Galaura & Simpal, 2025). The recommendation for minor enhancements in the program's content further reflects the dynamic nature of instructional improvement and the necessity of continuously refining interventions to meet learners' evolving needs.

Moreover, the findings align with studies emphasizing that inclusive classroom practices, differentiated instruction, and adaptive teaching approaches contribute to stronger learner engagement and academic resilience (Geduld, 2024; Guzman & Doronio, 2025; Lazaga, 2025). Supportive home-school partnerships have likewise been recognized as important contributors to the success of educational interventions by reinforcing learning beyond the classroom and promoting positive attitudes toward academic tasks (Bongabong & Doronio, 2025; Cariaga et al., 2025). From a psychosocial perspective, learners' emotional well-being, peer relationships, motivation, and self-regulatory capacities also influence their ability to benefit from instructional support. Positive peer acceptance and academic resilience have been associated with improved engagement and achievement in mathematics, particularly during periods of transition and adjustment (Wentzel et al., 2021; Yang & Wang, 2022; Liu et al., 2025; Fudolin & Dioso, 2025). The intervention program's emphasis on collaboration, guided practice, and inclusive participation reflects these considerations and supports the development of supportive learning communities.

Conclusion and Recommendations

The study suggests that upon the return to in-person instruction, Grade 9 students generally showed a satisfactory level of learning performance in mathematics based on the summary of findings. Learners demonstrated sustained effort and skill in meeting academic standards, even in the face of adjustment pressures. Even though they occasionally had trouble learning math, school-related issues were the most common, followed by social-related issues, while home and personal issues were the least common. Interestingly, the severity of these issues had no discernible impact on students' overall academic achievement, indicating the existence of resilience and other helpful elements in the classroom. A Mathematical Learning Intervention Program was created in response to the most urgent issues, especially those that stemmed from the educational environment. The program's strong potential for successful deployment was demonstrated by the validation findings, which showed that it was highly acceptable, appropriate, content-relevant, and useable.

Several suggestions are made in light of these findings. In addition to bolstering ongoing professional development for math teachers, the Department of Education may encourage the implementation and expansion of proven intervention programs. The results of the study may be incorporated into teacher education programs in higher education establishments like Holy Trinity College of General Santos City in order to better educate aspiring math teachers. While school administrators may support teacher development programs and a supportive, cooperative school culture, schools such as Malalag National High School may implement and routinely assess the suggested intervention program to improve teaching practices and student outcomes. Parents are urged to help their children academically and emotionally at home in order to actively participate in their education. By asking for help, working with peers, and cultivating a growth mindset, students can actively participate in enhancing their mathematical abilities, and math teachers can use the intervention program in conjunction with learner-centered and differentiated tactics. Lastly, to further demonstrate the efficacy and generalizability of the intervention program in many contexts and subject areas, future researchers might carry out experimental and context-expanded investigations.

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