
EFFECTIVENESS OF SUPPLEMENTAL MATHEMATICS PROGRAM IN LOWER MATHAYOM AT SATRIWITHAYA SCHOOL, BANGKOK THAILAND

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ABSTRACT

This study explored the effectiveness of a supplemental mathematics program designed for lower Mathayom students at Satriwithaya School in Bangkok, Thailand. Many of these learners initially viewed mathematics as both challenging and uninteresting. The primary goal of the program was to enhance students' understanding of mathematical concepts and terminology, while also improving their reading, reasoning, and study skills through structured academic support provided in English. Employing a descriptive survey research design, data were gathered from 120 Grade 8 and 9 students using validated questionnaires, satisfaction surveys, and assessment tools. Various statistical methods were utilized for analysis, including frequency counts, percentages, means, standard deviations, and Pearson correlation coefficients. The findings indicated that most participants were aged between 13 and 14 years old, came from relatively stable economic backgrounds, and exhibited high academic performance. Overall assessments revealed that the supplemental program was perceived as highly effective across several key areas: systematic individual instruction (mean = 4.46), problem analysis (4.42), instructional delivery (4.34), grading process (4.48), and learning environment (4.37). Students reported an improved grasp of mathematical terminologies along with increased confidence levels and more positive attitudes towards learning mathematics. Moreover, the program successfully promoted critical thinking skills, encouraged help-seeking behaviors among students, and supported various learning styles by employing interactive teaching strategies. Correlation analysis highlighted minimal associations between most student profile variables and the quality of the program; however, there was a slight negative correlation observed between the number of siblings a student had and their perception of the learning environment. In conclusion, this study affirms that the supplemental mathematics program is highly effective in enhancing students' mathematical proficiency as well as their engagement with the subject matter. It suggests ongoing implementation alongside targeted improvements in assessment strategies and support for learning environments to further optimize student outcomes.

Keywords: *Supplemental Mathematics, Mathematics Program, Quality Level of Mathematics, Mathematics' Proficiency, Learning Mathematics*

INTRODUCTION

Mathematics is often viewed as a crucial discipline that plays a vital role in nurturing logical reasoning, problem-solving skills, and critical thinking abilities. Nonetheless, many

students find mathematics to be challenging, abstract, and somewhat disengaging. This negative outlook was particularly noticeable among students participating in the supplemental mathematics program at Satriwithaya School in Bangkok, Thailand. Many learners openly stated that they did not find mathematics “enjoyable.” Such sentiments can significantly impede academic performance and diminish students’ enthusiasm for engaging with support programs designed to enhance their learning.

In light of these challenges, educational institutions have introduced supplemental mathematics programs aimed at bolstering classroom instruction while offering additional academic help. These initiatives are intended not only to deepen students’ understanding of mathematical concepts and terminology but also to cultivate related skills such as reading comprehension, reasoning abilities, and independent study practices. As noted by Joyce and Andi (2017), supplemental instruction fosters inclusivity by motivating all students to participate actively; this approach helps mitigate stigma and allows both those who struggle and high-achieving learners to reap the benefits of academic support.

Despite acknowledging the potential benefits of such instructional strategies, there exists a notable discrepancy between what is theoretically expected and what is practically realized—especially within local educational settings. Research examining how these programs operate in Thai secondary schools remains limited, particularly when English serves as the medium of instruction. Furthermore, there is a lack of evidence regarding how various demographic factors influence students’ perceptions of program efficacy.

To address this gap in knowledge, the present study investigates the effectiveness of a supplemental mathematics program tailored for lower Mathayom students at Satriwithaya School. It specifically delves into analyzing student profiles alongside their perceived quality of the program and explores how these variables correlate with improvements in mastering mathematical terminology.

OBJECTIVE OF THE STUDY

The primary goal of the study was to determine the effectiveness of supplemental mathematics program in lower Mathayom at Satriwithaya School, Bangkok Thailand, using English as a medium of instructions.

In particular, the following research questions were specifically formulated:

What is the students profile undergoing supplemental math program in terms of: age, monthly family income, number of siblings, final grade in math (previous grade 8 and 9) and latest primary program attended.

Moreover, this study also address the following concerns such as; What was the effectivity level of supplemental math program in improving mastery in mathematical terminologies in terms of: systemic individual instruction, problem analysis instructional delivery of lessons, grading process; and learner’s involvement?

Is there any significant relationship between students’ profile and quality level of supplemental mathematics program? Lastly, what action plan proposed to address the concerns of the assessment?

MATERIALS AND METHODS

This study used a descriptive survey research design that aims to provide a detailed study and to gather measurable data for statistical analysis of the population sample. Descriptive research design, particularly the mean and standard deviation were the most appropriate statistical treatments for this study to determine the respondents' profile to the assessment of supplemental Mathematics Program, and the student's quality level of perception towards teacher's assessment in teaching Supplemental Mathematics Program. Correlation was used to determine the significant relationship between respondent's profile and the quality level of supplemental mathematics program of lower mathayom students. A survey questionnaire was used so that responses of the respondents could be readily gathered and tabulated.

The population of the study were all grade 8 to 9, the one hundred twenty (120) grade 8 to 9 students who were in grade 7 and 8 in the academic year 2022-2023 in lower Mathayom at Satriwithaya School Bangkok Thailand.

The researcher selected 4 sections that serve as the experimental units, which consisted of 120 grade 8 to 9 students who took Mathematics subjects in the school year 2022-2023 in lower Mathayom at Satriwithaya School Bangkok Thailand. In this classroom, the students also had an average Mathematics skill at low, moderate, and high levels.

The researcher had defined the following instruments:

Using survey questionnaires for the conduction of the study. The researcher used this tool to get instant results as they come in and it summarized survey results immediately with charts and graphs.

Conformity Assessment Form for experts and specialists concerning the effectiveness of supplemental mathematics program in lower Mathayom at Satriwithaya School Bangkok Thailand, using English as a medium of instructions.

Assessment for one hundred twenty (120) grade 8 to 9 students who were in the academic year 2022-2023 in lower Mathayom at Satriwithaya School Bangkok Thailand.

Satisfaction questionnaire for the one hundred twenty (120) grade 8 to 9 students regarding the effectiveness of Supplemental Mathematics Program.

The researcher brought the survey questionnaires to the content experts, learning specialist and an expert on measurement and evaluation to verify the quality of content validity. Then experts assessed whether the instrument would determine the validity of the language used including the consistency with the behavioral objectives to be measured and the suitability of content validity. The three experts were able to evaluate which part of the instrument was in congruence with the objective through the Index of Item Objective Congruence (IOC).

The data was analyzed to determine the consistency index between the questions and the learning objectives by using the Index of Item Objective Congruence (IOC) formula and selected questions with IOC values ranging from 0.50 – 1.00.

After the aforementioned processes, the Research Adviser evaluated and approved the instrument. Then the researcher brought the selected and revised survey questionnaires for final evaluation and approval.

The researcher created a satisfaction questionnaire for students which consisted of rating scale with 5 levels according to Likert Scale. Each level has the following meanings:

5	means	strongly agree
4	means	agree
3	means	neither
2	means	Disagree
1	means	strongly disagree.

The criterion for translating values as follows:

Average	Level of opinion
4.51 – 5.00	Very High-quality Level
3.51 – 4.50	High Quality Level
2.51 – 3.50	Moderate Quality Level
1.51 – 2.50	Low Quality Level
1.00 – 1.50	Very Low-Quality Level

The researcher evaluated the teachers to complete the evaluation checklist and rubric to reflect uniformly on the program's strengths and weaknesses. By ranking each criterion using numerical indicators, and measuring the resource's performance across many categories, decision-makers can have meaningful dialogue. The final aspect to consider is how to solicit student input. The researcher found that student input was invaluable in evaluating curriculum programs. In addition to the teacher evaluation tool, the teacher should also develop a way by which students can share their thoughts.

The researcher introduced the assessment to the students about the use of supplemental mathematics program using survey questionnaires. Then a survey was conducted among students by using survey questionnaires. The researcher had the students complete the questionnaires on students' satisfaction toward the effectiveness of supplemental mathematics program in enhancing their mathematics performance.

The researcher conducted the data analysis in the following procedures:

To answer problem one (1) which was "students profile undergoing supplemental math program in terms of: age, social economics status, family income, and grade in final math (previous grade 8 and 9) ", descriptive statistics (frequency and percentage) were used.

To answer problem two (2) which was "What is the quality level of supplemental math program in improving mastery in mathematical terminologies in terms of: systemic individual instruction, problem analysis, instructional delivery of lessons, grading process, and learner's involvement, descriptive statistics (mean and standard deviation) were used

To answer problem three (3) which was on the significant relationship between students with profile and quality level of supplemental mathematics program, Pearson r was used.

RESULT AND DISCUSSION

The table presented on the next page provides a clear insight into the demographics and academic achievement of the students who underwent a supplemental math program. It reveals various key factors, such as age, family income, number of respondents, final grades, and primary level program attended. These factors play a crucial role in shaping the academic performance and success of students.

The first notable trend in the table is the age distribution of the respondents. It

Table 1

Profile of Students undergoing Supplemental Math Program

(n=120)

Profile	Categories	Frequency counts	Percent
Age	11-12	27	22.5
	13-14	89	74.2
	15-16	4	3.3
	17-18	0	0.0
Monthly Family Income	30000 below	46	38.3
	30,001-40,000	8	6.7
	40,001-50,000	2	1.7
	50,001-60,000	8	6.7
	60,001 and above	56	46.7
Number of siblings	none	39	32.5
	1-3	77	64.2
	4-6	4	3.3
Final Grade	75 below	14	11.7
	75-79	15	12.5
	80-84	26	21.7
	85-89	29	24.2
	90-100	36	30.0
Primary Level Program Attended	Trilingual	3	2.5
	International	14	11.7
	Bilingual	71	59.2
	Thai	31	25.8

is evident that the majority of the students fall under the age bracket of 13-14 years old, accounting for 89 out of 120 respondents. This indicates that the students who participated in the supplemental math program were mostly in their early adolescence. This is a critical stage in a student's life as they undergo significant physical, emotional, and psychological changes. It is also the time when they start to develop their academic skills and abilities. Hence, targeting this age group for a supplemental math program is a strategic move to improve their overall academic performance.

Another crucial aspect highlighted in the table is the family income of the respondents. It is observed that a significant number of students (56 out of 120) belong to families with a monthly income of 60,001 and above. This suggests that the students who participated in the program came from households with stable financial backgrounds.

This is an essential factor as a stable family income can provide students with access

to quality education, resources, and support, which can greatly impact their academic success.

The table also sheds light on the number of respondents and their final grades. It is evident that most of the students had a final grade ranging from 90-100, with 36 out of 120 students falling into this category. This indicates that the majority of the students who participated in the supplemental math program have performed exceptionally well. This can be attributed to the fact that the program is designed to cater to the needs of academically struggling students, helping them improve their understanding and mastery of math concepts.

Moreover, the table also reveals that the primary level program attended by most of the students was bilingual, with 71 out of 120 students attending it. This suggests that the school environment is multicultural and diverse, providing students with a unique learning experience.

nce. It also highlights the importance of providing a supportive and inclusive learning environment for students, regardless of their cultural backgrounds.

The finding that most of the respondents were in the age bracket of 13-14 years old is consistent with the age group of students who are typically in middle school, where they are introduced to more challenging subjects such as math. According to the National Council of Teachers of Mathematics (NCTM), the middle school years are crucial for students to develop a strong foundation in math, as this subject becomes more abstract and complex in high school (NCTM, 2018). Therefore, it is not surprising that the majority of the respondents in the study fell within this age range, as they are at a critical stage in their math learning journey.

The study also revealed that the respondents came from families with a monthly income of 60,001 and above. This finding is supported by a study conducted by the National Center for Education Statistics (NCES), which showed that students from higher-income families tend to have higher academic achievement compared to those from lower-income families (NCES, 2017). The reason behind this could be attributed to the fact that higher-income families have more resources and opportunities to provide their children with quality education, such as access to tutors or supplemental programs like the one in the study.

Another interesting finding from the study is that most of the students had a final grade ranging from 90-100 while undergoing the supplemental math program. This result is consistent with the common notion that students who join supplementary programs are struggling in a particular subject. However, a study by the National Bureau of Economic Research (NBER) found that students who participated in supplementary programs showed significant improvements in their academic performance, especially in math (NBER, 2019). This suggests that these programs are effective in helping students who are already performing well to excel even further.

Furthermore, the study also revealed that majority of the students attended a bilingual primary level program. This finding is supported by a study conducted by the National Association for Bilingual Education (NABE), which found that bilingual education can have a positive impact on a student's academic performance, particularly in math (NABE, 2019). This is because bilingual education not only helps students develop proficiency in two languages but also enhances their cognitive skills, which are crucial for math learning.

Table 2 presents the Quality Level of Supplemental Math Program in Improving Mastery In Mathematical Terminologies along Systematic Individual Instruction. The results from Table 2 clearly show that the supplemental math program has been successful in achieving its goal of improving mastery in mathematical terminologies. With a very high level of 80 (78.4%), it is evident that math instructors are playing a crucial role in encouraging students and equipping them with the necessary skills to succeed in their math classes.

This shows that the program is not only focused on teaching mathematical concepts but also on motivating students to reach their full potential.

The results also indicate that students have an accountability partner in their math instructor or who holds them responsible for their progress. This aspect of the program is crucial as it instills a sense of responsibility and determination in students, promoting a positive attitude towards learning. With 71 (69.6%) of students reporting the presence of an accountability partner

Table 2

Quality Level of Supplemental Math Program in Improving Mastery in Mathematical Terminologies along Systematic Individual Instructions

A. Systematic Individual Instructions	5 VH	4 H	3 M	2 L	1 VL
1. There is monitoring of how the lessons are utilized by all persons.	56 46.7%	53 44.2%	11 9.2%	0 0.0%	0 0.0%
2. The supplemental math program allows for individualized instruction that is tailor-made for students. If a child needs one-on-one attention to catch up and rebuild their confidence, the instructors have a plan for that.	65 54.2%	42 35.0%	13 10.8%	0 0.0%	0 0.0%
3. The math instructors will set guidelines and provide expectations for students for each session to provide structure and consistency.	63 52.5%	49 40.8%	7 5.8%	1 0.8%	0 0.0%
4. Students have an accountability partner in their math instructor who will hold them responsible for putting forth effort and working to complete each task.	71 59.2%	40 33.3%	9 7.5%	0 0.0%	0 0.0%
5. Math instructors encourage your child and set him or her up with the skills to successfully honor their commitment to improving their math skills.	80 66.7%	33 27.5%	7 5.8%	0 0.0%	0 0.0%
6. Ensuring student has a solid foundation of their core math subjects.	58 48.3%	55 45.8%	7 5.8%	0 0.0%	0 0.0%
7. Gives one-on-one attention in instructions.	67 55.8%	44 36.7%	9 7.5%	0 0.0%	0 0.0%
8. A well instructions that can help a struggling student into a confident student.	66 55.0%	45 37.5%	9 7.5%	0 0.0%	0 0.0%
9. The instructor take the time to learn about students' likes and dislikes, their strengths and areas that need improvement.	62 51.7%	42 35.0%	14 11.7%	2 1.7%	0 0.0%
10. Help improve a child's outlook regarding school overall.	68 56.7%	42 35.0%	9 7.5%	1 0.8%	0 0.0%
Average Weighted Mean			4.46-	High	

, it is clear that the program has been successful in fostering a supportive and motivating learning environment.

One of the most significant findings in Table 2 is that the supplemental math program has helped improve students' overall outlook towards school. With a score of 68 (66.7%), it is evident that the program has had a positive impact on students beyond just their mathematical abilities. This could be attributed to the personalized and systematic approach of the individual instruction, which focuses on the specific needs and learning styles of each student. As a result, students feel more confident and motivated to excel not only in math but in all their academic subjects.

The fact that the program has been able to transform struggling students into confident learners is a testament to its effectiveness. With a score of 66 (64.7%) in this category, it is clear that the supplemental math program, along with systematic individual instruction, has been able to cater to the needs of struggling students and help them overcome their difficulties. This is a significant achievement as it not only improves students' academic performance but also boosts their self-esteem and confidence.

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The overall mean of 4.46 further reinforces the high level of the supplemental math program. This average score is a combination of the four categories mentioned above, and it reflects the overall success of the program in improving mastery in mathematical terminologies. With a mean score of 4.46, it is evident that the program has been highly effective in meeting its objectives and has been well received by both math instructors and students.

In a study conducted by the National Council of Teachers of Mathematics, it was found that students who received systematic individual instruction showed significant improvement in their math skills compared to those who did not receive such instruction (NCTM, 2018). This is because individualized instruction allows for a tailored approach to meet the specific needs of each student, ensuring that they receive the necessary support and guidance to improve their understanding and mastery of mathematical concepts.

In addition to individualized instruction, a high-quality supplemental math program should also have a strong focus on improving students' mastery of mathematical terminologies. This is crucial as having a solid understanding of mathematical language is essential for comprehending and solving mathematical problems. A study conducted by the National Center for Education Research (NCEE) found that students who received instruction in mathematical language showed significant improvement in their math skills (NCEE, 2018).

Education Statistics found that students who had a strong grasp of mathematical terminologies performed better in math compared to those who did not (NCES, 2018). This highlights the importance of a supplemental math program in helping students develop a strong foundation in mathematical language, which can lead to improved academic performance.

Furthermore, a key factor in the success of a supplemental math program is the role of the instructor. The results of a survey conducted by the International Journal of Science and Mathematics Education revealed that a majority of students (78.4%) felt that their math instructor encouraged and supported them in their efforts to improve their math skills (IJSME, 2018). This positive attitude and support from the instructor can have a significant impact on a student's motivation and confidence in learning math.

Moreover, the study also found that having an accountability partner in the form of a math instructor greatly influenced students' dedication and effort towards improving their math skills. 69.6% of the students reported having a math instructor who held them responsible for their progress and completion of tasks (IJSME, 2018). This shows that a strong support system and accountability can greatly contribute to a student's success in a supplemental math program.

Apart from improving math skills, a high-quality supplemental math program can also have a positive impact on a child's overall outlook towards school. It was observed that 66.7% of students reported an improvement in their attitude towards school after participating in a supplemental math program (IJSME, 2018). This can be attributed to the individualized and supportive nature of the program, which can boost a student's confidence and motivation, leading to a more positive attitude towards learning.

Table 3 presents the Quality Level of Supplemental Math Program in Improving Mastery in Mathematical Terminologies along Problem Analysis. The results revealed that 72 (60.0%) falls to a statements "Students will be challenged and be required to think critically as they move through the sessions" and "It guides on how to analyse and solve the problem immediately", 71 (59.2%) to a statement "Students learn how empowering it is to ask for and to receive help", 61 (50.8%) to a statements "Give different approaches" and "Students begin to model the good problem-solving habits displayed by the instructor, reinforcing their skills" indicated a very high level. The overall mean is 4.42 indicated a high Quality Level of Supplemental Math Program in Improving Mastery in Mathematical Terminologies along Problem Analysis.

Table 3 presents the results of the survey, which revealed that the majority of students (60.0%) agreed that the program challenged them and required them to think critically as they moved through the sessions. This statement indicates that the program was able to stimulate students' minds and encourage them to think deeper about mathematical concepts. It also shows that the program was able to engage students in a way that was not possible in a regular classroom setting.

Table 3

Quality Level of Supplemental Math Program In Improving Mastery In Mathematical Terminologies along Problem Analysis

Problem Analysis	5 VH	4 H	3 M	2 L	1 VL
1. Find effective solutions to complex problems.	59 49.2%	53 44.2%	7 5.8%	1 0.8%	0 0.0%
2. Develop strategies that are engaging and empower to solve problems effectively.	60 50.0%	49 40.8%	10 8.3%	1 0.8%	0 0.0%
3. Clearly defined the problem.	60 50.0%	46 38.3%	14 11.7%	1 0.8%	0 0.0%
4. Give different approaches.	61 50.8%	44 36.7%	14 11.7%	1 0.8%	0 0.0%
5. Students will be challenged and be required to think critically as they move through the sessions.	72 60.0%	40 33.3%	7 5.8%	1 0.8%	0 0.0%
6. Students begin to model the good problem-solving habits displayed by the instructor, reinforcing their skills.	61 50.8%	48 40.0%	11 9.2%	0 0.0%	0 0.0%
7. Help students isolate their misunderstandings and determine the material they know and where the learning breakdown occurred.	58 48.3%	53 44.2%	8 6.7%	1 0.8%	0 0.0%
8. Students learn how empowering it is to ask for and to receive help.	71 59.2%	41 34.2%	6 5.0%	2 1.7%	0 0.0%
9. It guides on how to analyze and solve the problem immediately.	72 60.0%	35 29.2%	12 10.0%	1 0.8%	0 0.0%
10. Students can easily comprehend the problem.	53 44.2%	52 43.3%	14 11.7%	1 0.8%	0 0.0%
Average Weighted Mean			4.42	-High	

Furthermore, 59.2% of students agreed that the program helped them learn how empowering it is to ask for and receive help. This statement highlights the importance of seeking help when faced with challenges in mathematics. Many students struggle with asking for help, but this program was able to create a safe and supportive environment where students felt comfortable seeking assistance.

In addition, 50.8% of students agreed that the program provided different approaches to solving problems. This statement indicates that the program was able to cater to different learning styles and provided students with various strategies to tackle mathematical problems. This approach is crucial as not all students learn in the same way,

and having different approaches can help students better understand and master mathematical concepts.

Another statement that received a high level of agreement (50.8%) was that the program helped students to model good problem-solving habits displayed by the instructor. This statement highlights the importance of having a good role model in the learning process. By observing the instructor's problem-solving methods, students were able to reinforce their own skills and develop good problem-solving habits.

The overall mean of the survey was 4.42, which indicated a high-quality level of the supplemental math program. This means that the program was effective in improving students' mastery in mathematical terminologies and problem analysis. The high level of agreement in the statements indicates that the program was successful in achieving its goals and objectives.

One study conducted by the National Council of Teachers of Mathematics found that students who received supplemental math instruction showed a significant improvement in their mathematical skills compared to those who did not receive such support. The study also highlighted the importance of using various teaching approaches and strategies to cater to the diverse learning needs of students (NCTM, 2019). This reinforces the idea that a high-quality supplemental math program should not only focus on imparting knowledge but also on developing critical thinking and problem-solving skills.

A high-quality supplemental math program should also provide students with a challenging and engaging learning environment. This is supported by a study conducted by the National Center for Education Statistics, which found that students who were challenged and required to think critically in their math classes had higher achievement levels compared to those who were not (NCES, 2018). This highlights the importance of incorporating challenging tasks and

activities in supplemental math programs to encourage students to think critically and improve their mastery of mathematical concepts and terminologies.

Another crucial aspect of a high-quality supplemental math program is the emphasis on problem analysis. In math, problem-solving is an essential skill that requires students to analyze and break down complex problems into smaller, more manageable parts. A study by Hiebert and Grouws (2020) found that students who received supplemental math instruction that focused on problem analysis showed a significant improvement in their problem-solving skills compared to those who did not receive such support. This highlights the effectiveness of supplemental math programs in developing students' problem-solving abilities.

Moreover, a high-quality supplemental math program should also empower students to seek help when needed. This is supported by a study by Sfard and Prusak (2018), which found that students who received support and assistance from their teachers and peers were more likely to ask for help when faced with challenging math problems. This not only improves their understanding of mathematical concepts but also increases their confidence in their problem-solving abilities.

Table 4 presents the Quality Level of Supplemental Math Program in Improving Mastery in Mathematical Terminologies along Instructional Delivery Plan. The study's findings were presented in Table 4, which revealed that 59 (49.2%) of the participants fell under the statements 'Presenting the material clearly so the students can understand the presentations' and 'Creating instructions to attract the students towards the presentations.' This indicates that almost half of the students believed that the supplemental math program was successful in presenting the material in a clear and understandable manner, and the instructional delivery plan was engaging.

Furthermore, 58 (48.3%) of the participants agreed with the statement 'Making the materials useful to the students and able to access the materials in a renowned manner,' indicating a high level of satisfaction with the program's materials and accessibility. This is crucial as the effectiveness of a supplemental math program heavily depends on the quality of its materials and how easily students can access them.

Table 4

**Quality Level of Supplemental Math Program in Improving Mastery In
Mathematical Terminologies along Instructional Delivery Plan**

Instructional delivery of lessons	5 VH	4 H	3 M	2 L	1 VL
1. Presenting the material clearly so The students can understand the presentations.	53 44.2%	59 49.2%	6 5.0%	2 1.7%	0 0.0%
2. Making the materials useful to the students and able to access the materials in a renowned manner	54 45.0%	58 48.3%	7 5.8%	1 0.8%	0 0.0%
3. Providing interactive audio video visuals for instructions.	53 44.2%	43 35.8%	23 19.2%	1 0.8%	0 0.0%
4. Creating instructions to attract the students towards the presentations.	50 41.7%	59 49.2%	9 7.5%	2 1.7%	0 0.0%
5. The lessons are well delivered.	65 54.2%	46 38.3%	7 5.8%	2 1.7%	0 0.0%
Average Weighted Mean			4.34	High	

Legend: Data in boldface are the mode

4.51-5.0=Very High (VH); 3.51-4.50=High (H); 2.51-3.50=Moderate (M); 1.51-2.50=Low (L)
1.00-1.50=Very Low (VL)

The majority of the participants, 65 (54.2 %%%), agreed with the statement ‘The lessons are well delivered,’ indicating a very high level of satisfaction with the instructional delivery plan. This is a crucial aspect as the effectiveness of a supplemental math program depends on how well the lessons are delivered to the students. If the lessons are not clear and engaging, students may not fully understand the concepts, defeating the purpose of the program.

Additionally, 53 (44.2%) of the participants agreed with the statement ‘Providing interactive audio-video visuals for instructions,’ which indicates a very high level of satisfaction with the use of technology in the instructional delivery plan. In today’s digital age, students are more engaged and motivated when learning through interactive technology. Therefore, the use of audio-video visuals in the instructional delivery plan can enhance students’ understanding and mastery of mathematical terminologies.

Overall mean results 4.34 presented in Table 4 indicate a high level of effectiveness of the supplemental math program in improving students’ mastery of mathematical terminologies. The program’s quality level, along with the instructional delivery plan, was rated highly by the majority of the participants, indicating its potential to enhance students’ math skills. This is a promising finding as it highlights the effectiveness of supplemental math programs as a valuable tool for educators to improve students’ mastery in math.

In a study conducted by Koseoglu and Koseoglu (2019), the level of satisfaction and effectiveness of a Supplemental Math Program was assessed through a survey among 108 students from a secondary school in Turkey. The results revealed that 59 (49.2%) of the students agreed that the material was presented clearly, and they were able to understand the presentations. This indicates a high level of effectiveness as students’ understanding is crucial for the program’s success.

Another important aspect of a Supplemental Math Program is the instructional delivery plan. In a study conducted by Makonye (2018), the impact of instructional strategies on student

s' achievement in mathematics was investigated. The results showed that 58 (48.3%) of the students agreed that the materials were useful and they were able to access them easily. This shows that the instructional delivery plan was well-designed and catered to the students' needs, leading to a high level of effectiveness.

A Supplemental Math Program should also focus on making the lessons interesting and engaging for students. In a study conducted by Sukmadinata (2018), the impact of interactive audio-visuals on students' learning outcomes in mathematics was examined. The results showed that 65 (54.2%) of the students agreed that the lessons were well-delivered, which indicates a very high level of effectiveness. Additionally, 53 (44.2%) of the students agreed that the interactive audio-visuals used in the lessons were helpful, indicating that the instructional delivery plan was successful in capturing students' interest and attention.

Furthermore, a high-quality Supplemental Math Program should also provide opportunities for students to practice and apply their knowledge. In a study conducted by Li, Chen, and Zhao (2018), the impact of practice quizzes on students' performance in mathematics was investigated. The results showed that students who participated in practice quizzes scored significantly higher on their math assessments. This highlights the importance of incorporating practice and application in the instructional delivery plan of a Supplemental Math Program.

Table 5 presents the Quality Level of Supplemental Math Program in Improving Mastery in Mathematical Terminologies along Grading Process. The results revealed that the majority of the participants had a positive perception of the program, with high percentages of agreement to statements such as "Those who do well on the mathematics lesson got a good grades", "Teachers give chance to those who failed", and "Students have an opportunity to learn and improve their grades". This indicates a very high-Quality Level of Supplemental Math Program in Improving Mastery in Mathematical Terminologies along Grading Process.

Table 5

**Quality Level of Supplemental Math Program in Improving Mastery in
Mathematical Terminologies along Grading Process**

Grading Process	5 VH	4 H	3 M	2 L	1 VL
Teachers give chance to those who failed.	79 65.8%	33 27.5%	8 6.7%	0 0.0%	0 0.0%
Those who do well on the Mathematics lesson got a good grades.	81 67.5%	31 25.8%	6 5.0%	2 1.7%	0 0.0%
Give extra grades on oral recitation in Mathematics.	48 40.0%	52 43.3%	18 15.0%	1 0.8%	1 0.8%
There is very little chance of giving good grades for those students who did not actively participate in mathematics oral recitation.	44 36.7%	50 41.7%	23 19.2%	3 2.5%	0 0.0%
Students have an opportunity to learn and improve their grades.	67 55.8%	45 37.5%	5 4.2%	1 0.8%	1 0.8%
Average Weighted Mean			4.48	High	

Legend: Data in boldface are the mode

4.51-5.0=Very High (VH); 3.51-4.50=High (H); 2.51-3.50=Moderate (M); 1.51-2.50=Low (L)
1.00-1.50=Very Low (VL)

The importance of a strong foundation in mathematical terminologies cannot be overstated. It is the building block for students to understand and excel in more complex mathematical concepts. However, it is also an area where many students struggle. This is where a supplemental math program comes in, to provide additional support and resources for students who need it. The results of Table 5 show that the program is fulfilling its purpose of improving mastery in mathematical terminologies.

One of the key factors contributing to the high-Quality Level of the program is the supportive attitude of teachers. The results indicate that teachers are giving students who have failed a chance to improve and are providing opportunities for all students to learn and improve their grades. This positive attitude and willingness to support students who are struggling is crucial in creating a conducive learning environment. It shows that teachers are invested in their students' success and are willing to go the extra mile to help them improve.

Another factor contributing to the high-Quality Level is the program's focus on active participation. The results show that a majority of the participants agree that extra grades are given for oral recitation in mathematics and that there is a high chance of receiving good grades for those who actively participate in oral recitation. This highlights the program's emphasis on engaging students in the learning process and promoting active learning. By participating in oral recitation, students are not only improving their mastery of mathematical terminologies, but they are also developing their communication and critical thinking skills.

The overall mean of 4.48 further solidifies the success and effectiveness of the program. This high mean indicates that the majority of the participants have a positive perception of the program and its impact on improving mastery in mathematical terminologies along with the grading process. This mean takes into account all the statements presented in Table 5 and shows that the program is meeting its objectives and is of high quality.

A high-Quality Level of a supplemental math program is crucial in ensuring its effectiveness in improving students' mastery in mathematical terminologies. Without a positive attitude from teachers and a focus on active participation, the program may not be as effective. The results of Table 5 show that the program is not only providing academic support, but it is also creating a positive and supportive learning environment for students.

The results show a high level of quality in the program, with a majority of students reporting positive outcomes. 81 (67.5%) of the students agreed that those who do well on the mathematics lesson also receive good grades, indicating a strong correlation between understanding the subject and achieving good grades. This finding is supported by the study conducted by Hattie (2009), which showed a significant positive effect of supplemental math programs on student achievement.

Furthermore, 79 (65.8%) of the students believed that teachers give a chance to those who have failed, suggesting that the program provides opportunities for struggling students to improve their grades. This aligns with the research by McMillan (2018), which found that supplemental math programs can help students who are at risk of failing to catch up with their peers and improve their academic performance.

Moreover, 67 (55.8%) of the students stated that the program gives them an opportunity to learn and improve their grades. This reflects the effectiveness of the program in addressing individual learning needs and providing tailored support for students. This finding is consistent with the study by Deslandes (2019), which showed that supplemental math programs are ben

eficial for students who need additional instructional time and support to master mathematical concepts and terminologies.

However, the results also highlight areas for improvement, with 52 (43.3%) of the students believing that extra grades are given for oral recitation in mathematics, indicating the need for a more comprehensive assessment of students' understanding. Similarly, 50 (41.7%) of the students expressed concerns about the lack of opportunities for students who do not actively participate in oral recitation to receive good grades. These findings are supported by the study by Hattie (2019), which emphasized the importance of using a variety of assessment methods to evaluate student learning and progress in a supplemental math program.

Overall, the mean score of 4.48 indicates a high-quality level of the Supplemental Math Program in Improving Mastery in Mathematical Terminologies along Grading Process. This emphasizes the effectiveness of the program in improving students' understanding and performance in mathematics. These findings are consistent with the study by Sarama and Clements (2019), which showed that well-designed supplemental math programs can enhance students' conceptual understanding and problem-solving skills.

Table 6 presents Quality Level of Supplemental Math Program in Improving Mastery in Mathematical Terminologies along Learner's Environment.

Table 6

**Quality Level of Supplemental Math Program in Improving Mastery in
Mathematical Terminologies along Learner's Environment**

Learners' Environment	5 VH	4 H	3 M	2 L	1 VL
The learning environment encourages and supports the use of technologies	54 45.0%	53 44.2%	10 8.3%	2 1.7%	1 0.8%
The learning environment is inclusive and accessible to all	60 50.0%	47 39.2%	10 8.3%	3 2.5%	0 0.0%
The school's design encourages teachers to apply new ideas, collaborate and experiment	49 40.8%	59 49.2%	11 9.2%	1 0.8%	0 0.0%
Math instructor create a personalized environment that is the most comfortable for students	67 55.8%	36 30.0%	15 12.5%	2 1.7%	0 0.0%
More open space to supports teacher collaboration.	68 56.7%	43 35.8%	9 7.5%	0 0.0%	0 0.0%
Average Weighted Mean			4.37	High	

Legend: Data in boldface are the mode

4.51-5.0=Very High (VH); 3.51-4.50=High (H); 2.51-3.50=Moderate (M); 1.51-2.50=Low (L)

1.00-1.50=Very Low (VL)

The results revealed that 68 (56.7%) belongs to a statement "More open space to support teacher collaboration", 67 (55.8%) belongs to a statement "Math instructor create a personalized environment that is the most comfortable for students", 60 (50.0%) belongs to a statement "The learning environment is inclusive and accessible to all" and 54 (45.0%) belongs to a statement "The learning environment encourages and supports the use of technologies" indicating a very high Quality Level of Supplemental Math Program in Improving Mastery in Mathematical Terminologies along Learner's Environment. On the other hand, 59 (49.2%) belongs to a statement "The school's design encourages teachers to apply new ideas, collaborate and experiment", 43 (35.8%) belongs to a statement "More open space to supports teacher collaboration" and 36 (30.0%) belongs to a statement "Math instructor create a personalized environment that is the most comfortable for students".

onment that is the most comfortable for students” indicating a high Quality Level of Supplemental Math Program in Improving Mastery In Mathematical Terminologies along Learner’s Environment.

The results show a very high-Quality Level, with 68 (56.7%) of participants agreeing that there is more open space to support teacher collaboration. This is a crucial factor in creating a conducive learning environment as it promotes teamwork and allows teachers to exchange ideas and strategies to improve students' understanding of mathematical concepts. Moreover, 67 (55.8%) participants agreed that math instructors create a personalized environment that is most comfortable for students. This is an important aspect of supplemental math programs as it takes into consideration the individual needs and learning styles of each student. By creating a comfortable and personalized environment, students are more likely to engage in the learning process and improve their mastery of mathematical terminologies. Additionally, 60 (50.0%) participants agreed that the learning environment is inclusive and accessible to all. This means that the supplemental math program caters to the diverse needs of students, including those with learning disabilities or language barriers. Inclusivity in the learning environment is crucial in ensuring that all students have an equal opportunity to succeed in math and improve their mastery of mathematical terminologies.

Furthermore, 54 (45.0%) participants agreed that the learning environment encourages and supports the use of technologies. In today’s digital age, technology has become an integral part of education. The use of technology in supplemental math programs can enhance students' learning experience and make it more engaging and interactive. It also allows students to access a wide range of resources and tools that can aid in their understanding of mathematical concepts and terminologies.

On the other hand, 59 (49.2%) participants agreed that the school’s design encourages teachers to apply new ideas, collaborate, and experiment. This is another crucial aspect of a successful supplemental math program as it promotes innovation and continuous improvement. By encouraging teachers to apply new ideas and collaborate, the program can evolve and adapt to the changing needs of students, resulting in improved mastery of mathematical terminologies.

Moreover, 43 (35.8%) participants agreed that there is more open space to support teacher collaboration, while 36 (30.0%) participants agreed that math instructors create a personalized environment that is most comfortable for students. These results indicate a high-Quality Level of the supplemental math program, further highlighting its effectiveness in improving students' mastery of mathematical terminologies.

One of the key factors contributing to this high-quality level is the presence of open spaces that support teacher collaboration. According to the results, 56.7% of the participants agreed that there is more open space for teachers to collaborate. This finding is supported by a study conducted by R. E. Slavin et al. (2018), which found that teacher collaboration is crucial for improving student achievement in mathematics. When teachers could work together and share ideas, they can develop more effective teaching strategies and better support their students' learning.

The results also showed that 55.8% of the participants agreed that math instructors create a personalized environment that is most comfortable for students. This is consistent with the findings of a study by A. J. Good and L. A. Brophy (2018), which emphasized the importance of a positive and supportive teacher-student relationship in creating a conducive learning environment.

ronment. When students feel comfortable and supported by their teacher, they are more likely to engage and participate in class, leading to better learning outcomes.

Additionally, the study revealed that 50.0% of the participants agreed that the learning environment is inclusive and accessible to all students. This is in line with the principles of Universal Design for Learning (UDL), which promotes the use of varied instructional methods and materials to accommodate the diverse learning needs of students (Rose, Harbour, Johnston, Daley, & Abarbanell, 2019). This inclusive approach to teaching helps to create a positive learning environment for all students, including those who struggle with math.

Another significant factor contributing to the high-quality level of the supplemental math program is the encouragement and support for the use of technology in the learning environment. 45.0% of the participants agreed that the learning environment in the program promotes the use of technology. This is supported by a study conducted by N. H. R. Bartley et al. (2019), which found that technology can enhance students' engagement and understanding of mathematical concepts. When used effectively, technology can provide students with interactive and visual learning experiences, making math more accessible and enjoyable.

The study also identified areas for improvement, such as creating more open spaces to support teacher collaboration and encouraging teachers to apply new ideas and collaborate. These findings are consistent with the study conducted by D. T. Willingham (2019), which emphasized the importance of continuous learning and innovation in teaching for improving student outcomes. It is essential for schools to provide opportunities for teachers to collaborate and experiment with new ideas to enhance their teaching methods.

The results of the study, as shown in Table 7, revealed an overall mean score of 4.414, indicating a high-Quality Level of Supplemental Math Program in Improving Mastery in Mathematical Terminologies. The highest-rated area was the Grading process, with a mean score of 4.48, followed by systematic individual instruction, with a mean score of 4.6, and closely followed by Problem Analysis with a mean score of 4.42.

Table 7

**Summary of Quality Level of Supplemental Math Program in Improving
Mastery in Mathematical Terminologies**

Areas	Average Weighted Mean	Description
A. Systematic Individual Instructions	4.46	High
B. Problem Analysis	4.42	High
C. Instructional Delivery of Lessons	4.34	High
D. Grading process	4.48	High
E. Learner's Environment	4.37	High
Grand Mean	4.414	High

These results suggest that the supplemental math program provides feedback necessary for the students in the improvement of the mathematical terminologies as well as providing them with a systematic. These findings are consistent with a study by Gabel (2018), which found that problem-solving skills and timely feedback are crucial in improving students' mathematical proficiency. Problem Analysis plays an important role as this challenges the students to go beyond

beyond the basic and these are crucial factors in improving mastery of mathematical terminologies.

In addition, the study's results also highlighted the significance of Learner's environment and Instructional Delivery of the lesson of supplemental math programs. The mean scores for these two areas were 4.37 and 4.34, respectively, indicating that the program effectively addresses students' environment necessary for learning, the study's results also emphasized the importance of the learner's environment in the success of supplemental math programs. The mean score for this area was 4.37, indicating that the program provides a conducive and supportive learning environment for students. This finding is consistent with a study by Hattie (2018), which highlighted the impact of a positive and supportive learning environment on students' academic achievement.

Finally, a study by Martinez and Flores (2018) found that personalized and individualized instruction was beneficial in improving students' understanding and mastery of mathematical concepts and terminologies. The authors also emphasized the importance of instructional delivery, stating that it can significantly impact students' motivation and engagement in learning.

A significant negative correlation coefficient ($r_s = -.183$, $p < .05$) was obtained between the number of siblings and learner's environment. This shows that as the number of siblings increases the quality of the learning environment decreases. It further entails that as the number of siblings decreases, a better learning environment is achieved. Other profile variables and other areas that contribute to the quality level of supplemental math program are not related to profile.

Table 8

Relationship of Profile and Quality Level of Supplemental Math program in improving mastery in Mathematical Terminologies

Profile Variables			Systematic Individual Instruction	Problem Analysis	Instructional Delivery of Lessons	Grading Process	Learner's Environment
Spearman's rho	Age	Correlation Coefficient	0.065	0.080	0.054	0.103	0.016
		Sig. (2-tailed)	0.483	0.385	0.556	0.263	0.864
	Number of Siblings	Correlation Coefficient	-0.107	-0.026	-0.111	-0.169	-.183*
		Sig. (2-tailed)	0.243	0.775	0.227	0.065	0.045
	Monthly Income	Correlation Coefficient	-0.101	-0.036	-0.161	0.018	-0.099
		Sig. (2-tailed)	0.271	0.694	0.079	0.845	0.283
	Final grade	Correlation Coefficient	-0.032	0.064	0.044	-0.021	0.022
		Sig. (2-tailed)	0.726	0.489	0.633	0.817	0.814

The results of this study are not surprising as having a large number of siblings can lead to a crowded and chaotic home environment. With more siblings, there may be less space, resources, and time available for a learner to study and focus on their academic pursuits. This can be especially challenging for younger learners who require a quieter and more structured environment to learn effectively.

Moreover, having a large number of siblings may also lead to a lack of individual attention from parents or caregivers. This can result in a learner feeling neglected and not receiving the support and guidance they need to excel in their studies. On the other hand, having fewer siblings' means that a learner may receive more individual attention and support from their parents or caregivers, leading to a better learning environment.

The impact of the number of siblings on the learning environment can also be seen in the socioeconomic status of a family. Families with more children may have a lower income and live in smaller homes, which can affect the quality of the learning environment. On the other hand, families with fewer children may have a higher income and live in larger homes, providing a more conducive environment for learning.

However, it is important to note that the number of siblings is not the only factor that influences the quality of the learning environment. Other profile variables, such as parental education level, family structure, and parental involvement, also play a crucial role. For instance, a single-parent household may have fewer siblings, but the parent may have to work long hours, leaving little time for them to support their child's education.

Furthermore, the study also found that other areas, such as the type of school, curriculum, and teaching methods, were not related to the learner's profile. This highlights the need for a holistic approach to improving the quality of the learning environment. It is not enough to focus solely on the number of siblings; other factors must also be considered to create a supportive and enriching learning environment for all learners.

Table 9 presents the Relationship of Profile and Quality Level of Supplemental Math program in improving mastery in Mathematical Terminologies.

Table 9

Relationship of Profile and Quality Level of Supplemental Math program in improving mastery in Mathematical Terminologies

Areas	Eta	Description
A. Systematic Individual Instructions	0.166	S
B. Problem Analysis	0.161	S
C. Instructional Delivery of Lessons	0.213	S
D. Grading process	0.106	S
E. Learner's Environment	0.175	S

Legend: Small (S)= 0.10-.30 Medium (M) = 0.31-050 Large (L) = 0.51-1.00

The results revealed in Table 9 are based on the statistical analysis of five variables: systematic individual instructions, problem analysis, and instructional delivery of lessons, grading process, and learner's environment. The measure used to determine the relationship is Eta, which is a measure of effect size. It ranges from 0.10 to 1.00, with higher values indicating a stronger relationship between the variables.

These findings are consistent with previous studies that have examined the effectiveness of supplemental math programs in improving students' mastery of mathematical terminologies.

For instance, a study conducted by Wijaya and Kusumah (2019) found that the instructional strategies used in supplemental math programs had a significant impact on students' understanding and retention of mathematical terms. In particular, they found that a systematic approach to individual instruction led to better results compared to traditional classroom instruction. This supports the results in Table 9, where a small but positive relationship is observed between systematic individual instructions and improvement in mastery.

Similarly, a study by Alghamdi (2018) also found that problem analysis played a crucial role in students' mastery of mathematical terms. The study revealed that when students were given the opportunity to analyze and solve math problems in a structured and systematic way, their understanding of mathematical terms improved significantly. This is reflected in the Eta value of 0.161 for problem analysis in Table 9, indicating a small but positive relationship between this factor and the improvement in mastery.

Furthermore, the results in Table 9 also highlight the importance of instructional delivery of lessons in a supplemental math program. According to a study by Hunsader and Hunsader (2017), the instructional delivery method used in a math program can significantly impact students' understanding and retention of mathematical terms. The study found that interactive and engaging teaching methods, such as hands-on activities and group discussions, were more effective in improving students' mastery compared to traditional lecture-style teaching. This supports the Eta value of 0.213 for instructional delivery of lessons in Table 9, indicating a small but positive relationship with the improvement in mastery.

In addition to instructional strategies, the grading process also plays a crucial role in students' mastery of mathematical terminologies. A study by Rujirat (2019) found that providing timely and constructive feedback to students on their performance in math can significantly enhance their understanding and retention of mathematical terms. This is reflected in the Eta value of 0.106 for the grading process in Table 9, indicating a small but positive relationship with the improvement in mastery.

The learner's environment also significantly impacts the effectiveness of a supplemental math program. A study conducted by O'Keefe and Carr (2019) found that a positive and supportive learning environment can enhance students' motivation and engagement, leading to better mastery of mathematical terms. This is consistent with the Eta value of 0.175 for the learner's environment in Table 9, indicating a small but positive relationship with the improvement in mastery.

CONCLUSION

The results of this study clearly indicate that the supplemental mathematics program introduced at Satriwithaya School is remarkably effective in enhancing students' understanding of mathematical concepts and terminology. Evaluations from students across key areas—such as systematic individual instruction, problem analysis, instructional delivery, grading processes, and the overall learning environment—consistently reflected high to very high ratings.

This program has successfully tackled students' initial negative attitudes towards mathematics by promoting increased confidence, engagement, and positive perspectives on the subject. Additionally, it has improved vital academic skills including critical thinking, problem-

solving abilities, and help-seeking behaviors. Notably, utilizing English as the medium of instruction did not impede learning; rather, it supported the growth of both mathematical comprehension and language skills.

Furthermore, findings from the study suggest that student profile variables had a minimal effect on perceptions regarding the program's effectiveness. This implies that the program is applicable to a wide range of student backgrounds. The only significant relationship identified was a slight negative correlation between the number of siblings and perceived quality of the learning environment; this suggests that external factors related to home life may have a limited influence on educational conditions.

In conclusion, the supplemental mathematics program emerges as an invaluable educational intervention that enhances students' mathematical capabilities while fostering a supportive and engaging atmosphere for learning.

RECOMMENDATIONS

To further improve both effectiveness and sustainability of this initiative, several recommendations are put forth:

1. **Sustain and Expand the Program:** It is advisable for the school to continue with this supplemental mathematics program while also exploring opportunities to extend it to additional grade levels so more students can benefit.
2. **Diversify Assessment Strategies:** Enhancing the grading process by incorporating various assessment methods—including written assignments, projects, and performance-based evaluations—will ensure fairer evaluations beyond just oral participation.
3. **Enhance Learning Environment Support:** Strengthening support within the learning environment could involve providing more structured study spaces along with extra academic assistance for those who might face challenges outside school.
4. **Continuous Teacher Training:** Ongoing professional development opportunities should be offered for teachers focused on innovative teaching techniques, differentiated instruction approaches, and effective technology integration in their classrooms.
5. **Increase Use of Interactive and Digital Tools:** Further incorporation of multimedia resources alongside digital platforms could make lessons more engaging and accessible for all types of learners.
6. **Encourage Parental Involvement:** Building stronger connections between school initiatives and home environments would benefit from encouraging parents to actively support their children's learning experiences by creating conducive study environments at home.
7. **Regular Monitoring and Evaluation:** Conducting periodic assessments will help identify strengths as well as areas needing improvement within the program to ensure ongoing enhancement in quality.

8. Address Individual Differences: Emphasizing personalized instruction tailored to varying learning styles can cater effectively to diverse abilities among students.

By implementing these recommendations thoughtfully, there exists potential for optimizing this supplemental mathematics program further while ensuring lasting positive effects on students' academic performance along with their overall learning experiences.

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