

Effectiveness of classroom strategies to facilitate learning mathematics

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Abstract

This study analyzes the effectiveness of different ways of learning in mathematics for Grade 4 learners at Sta. Maria East Central School during the Academic Year 2024-2025. It intends to study the association between students' profiles—such as sex, parents' educational level, monthly income, availability of reading materials, and gadget use—and their performance in mathematics. The research adopts a correlational methodology, utilizing a validated questionnaire to obtain data from 72 Grade 4 students across two sections. The study examines the learners' performance based on four classroom strategies: Manipulative-Based Strategy, Game-Based Strategy, Cooperative Learning Strategy, and Explicit Instruction. Statistical analysis, including frequency counts, percentages, averages, and point biserial correlation, are utilized to examine the data. Findings demonstrate that students' profiles greatly influence their mathematical performance, with notable variances among the instructional modalities. The study concludes with the development of a Strategic Intervention Material (SIM) aiming at strengthening learners' arithmetic skills. The study recommends that teachers should continue to recognize and address varied backgrounds and learners' needs; teaching practices should be balanced, inclusive and responsive; teachers are encouraged to utilize cooperative learning and explicit instruction more frequently and SIM should be introduced into courses to benefit learners. The consequences of this research extend to teachers, school administrators, and educational policymakers, providing insights for better pedagogical techniques and curriculum design. Ultimately, the study contributes to the current discourse on effective mathematics instruction and the significance of personalized classroom strategies to accommodate varied learner requirements.

Keywords: classroom strategies, mathematics education, grade 4 learners, performance assessment, strategic intervention material

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1. Introduction

Teaching strategy is a plan to help students learn the desired competencies in the course contents. It should be applied accordingly and tailored to the needs and learning styles of young learners in which the students participate actively and intelligently during class interaction. This can be observed if the learners respond in strategic manner or based from their prior knowledge related to their personal experience and observation in environment. As personally observed by the researcher, majority of the students nowadays still struggle in understanding mathematics concepts. Emanuel et al. (2021), showed that learners have difficulties when translating words into mathematical expressions or equations, that is identifying known and unknown variables, and have difficulties with transformation. It was also observed by the teachers that students' lack of effort and prerequisites are the major reasons for mathematics being a difficult subject for students. Reluctance to seek help from others, inattention in the classroom and students' lack of motivation were also perceived to contribute toward difficulty in learning mathematics. The researcher also noticed that lack of relevant prerequisites, difficulty in speedy grasping of the concepts and a greater number of students in a classroom are causing difficulty in teaching mathematics.

In the present scenario mathematics is absolutely necessary subject for living. This importance is evident in school curriculum and in the importance given to mathematics education. Courtney and Caniglia's (2021) study, recommended the importance of training mathematics teachers before and during service on effective teaching practices in practical, applied ways to improve their students' mathematical concepts, skills, and thinking habits. The quality of education in the Philippines was questioned in 2019 due to Filipino students' poor performance in national and international assessments of student success (EDCOM II, 2024). Even if the outcomes were unsatisfactory, the Department of Education (DepEd) saw a bright spot: this will serve as a wake-up call for all parties involved in education to work together in order to reach one common goal: quality education for every student.

In addition, DepEd also released the most recent PISA results from the Organization for Economic Co-operation and Development (OECD), in which Filipino students scored at the bottom in Science and Mathematics and last overall among the 79 participating nations (EDCOM II, 2024). The country's participants performed the worst among the 58 nations taking part in the Trends in International Mathematics and Science Study (TIMSS) 2019 report, which was another international test. The decline from 2013 to 2019 was evident. Even though the PISA 2018 findings were disappointing, DepEd views them as a beginning point for determining where Filipino students are at the moment. By taking part in PISA, DepEd "takes advantage of an exam designed and continuously updated by education professionals around the world to supplement its own national assessment.

In this, the researcher is faced with the multiple competencies that need to be taught to students to enhance their mathematical skills to become proficient and independent learners. That prompted the researcher to focus her study on improving intervention activity that can meliorate the mathematical skills of the learners through various classroom strategies used by the teacher in achieving the desired learning competency.

Statement of the Problem - This study aimed to explore the effectiveness of classroom strategies to facilitate learning Mathematics in Sta. Maria East Central School during the Academic Year 2024-2025. Specifically, this sought to answer the following research questions:

- What is the profile of the respondents in terms of gender, parents' educational attainment, parents' monthly salary income, availability of reading materials at home, and gadgets use?

- What is the level of performance of the learners in the different classroom to facilitate learning Mathematics in terms of manipulative based strategy, game-based strategy, cooperative learning strategy, and explicit instruction?
- Is there a significant relationship between profile and performance of the learners in learning mathematics?
- Is there a significant difference among the strategies used to facilitate learning mathematics?
- Based on the findings of the study, what strategic intervention material (SIM) may be proposed?

2. Methodology

Research Design - This study employed descriptive and correlational research designs to determine the effectiveness of classroom strategies in to facilitate learning mathematics. To ensure that the results are valid and reliable, the descriptive research design should be carefully developed as stated by McCombes, (2019). This is necessary to observe and systematically describe the subject under observation and supervision to monitor their responses. This research design allows the researcher to describe the profile of Grade 4 pupils as well as the level of their performance along Manipulative based Strategy, Game- based Strategy, Cooperative Learning Strategy and Explicit Instruction. On the other hand, correlational research design utilized the correlational statistic to describe and measure the strength and type of association or relationship between two or more variables or sets of scores (Creswell, 2012). With this research design, the researcher will be able to correlate the profile of the respondents and their level of performance along with the classroom strategies to facilitate learning Mathematics.

Population and Locale of the Study - This study involved the participation of two heterogenous sections of Grade 4 pupils of Sta. Maria East Central School for the School Year 2024-2025. The respondents of this study are the 72 Grade 4 pupils, 36 pupils from Grade IV- Vanessa and 36 pupils from Grade IV- Rusele. This research used the total enumeration sampling technique. According to Sugiyono (2014:68), total enumeration sampling is a sampling technique where the whole members of population are treated as sample. Total enumeration sampling involves studying an entire population rather than a sample. It aimed to gather data from every individual in the population of interest to eliminate sampling bias.

Research Instrument - The instrument used to collect the data was validated questionnaire that is anchored on a primary and secondary source. The researcher first read a lot of resources, and formulate a question that are literature based, afterwards underwent validation through experts in the field. The questionnaire was validated by her research adviser and research experts for the improvement of its content. The first part of the questionnaire focuses on the profile of the respondents along sex, parents' educational attainment, parents' income, availability of reading materials at home, gadgets use. The second part of the questionnaire is a teacher made learning activity sheets to measure the level of performance of the pupils along Manipulative- based Strategy, Game-based Strategy, Cooperative Learning Strategy and Explicit Instruction as classroom strategies in teaching Mathematics 4. The teacher made learning activity sheets are composed of 80 questions: 20 items Manipulative-based Strategy, 20 items Game- based Strategy, 20 items Cooperative Learning Strategy and 20 items Explicit Instructions.

The learning activity sheets were validated by five experts in the field of mathematics and educational expert. According to the validation, the calculated validity rating was 5.0 categorized as very high validity. This indicates that the instrument used in this study is suitable for the goal of the research. Thus, the instrument evaluated what it claimed to measure. Furthermore, it was also pilot tested by the 20 pupils of Sta. Maria, Ilocos Sur to measure its internal consistency. The reliability coefficient of calculated with Cronbach's alpha is 0.72, which is considered acceptable. This indicated that data collection tool employed in this study can produced consistent and dependable outcomes.

Data Gathering Procedure - Before initiating data collection, this research study obtained ethical approval from the Research Ethics Committee of Ilocos Sur Polytechnic State College- Main Campus. This approval guaranteed compliance with all applicable ethical protocols, such as informed consent processes, confidentiality and data protection of participants. Informed written consent was provided from all participants before they took part of the study, and their anonymity was preserved during the data collection and analysis process. The REC approval process and subsequent compliance with its provisions form the cornerstone of the validity and ethical integrity of the research. Prior to the administration of the teacher made learning activity sheets among the respondents, the researcher secured an approved letter from the Schools Division Superintendent of Ilocos Sur. After the approval, the researcher also requested permission from the School Head particularly in Santa Maria East Central School to use the classroom strategies in teaching mathematics and administer the test among the Grade 4 pupils. The researcher also asked permission and assistance from the teacher- adviser to administer the instrument among the respondents after all the necessary letters and requests have been approved and secured. The results of the retrieved questionnaire were tabulated. Then the data was analyzed and interpreted through the use of the most appropriate statistical procedures.

Ethical Considerations - This research study investigated the effectiveness of various classroom strategies in teaching mathematics, focusing on ethical consideration throughout the research process. The primary reason for conducting this research was to improve mathematics education while upholding the rights and well- being of the participants. It aimed to explore the effectiveness of classroom strategies to facilitate learning and improve intervention activity that can meliorate the mathematical skills of the learners through various classroom strategies used in achieving the desired learning competency. The target participants for this study were selected to ensure a sample that reflects the diversity of a typical student population and enable general findings including the gender, age, grade level, socioeconomic background, mathematical achievement level, and the presence of any learning differences. All participants were fully informed about the study's purpose, procedures, risks, and benefits before providing their consent to participate. Consent were voluntary and can be withdrawn at any time without penalty. All data were kept confidential and anonymized to protect the privacy of participants. Data were restored securely and only accessible to authorized researchers. After conducting the study, the data were deleted or discarded.

This study offered a lot of benefits to various stakeholders. The participants were directly benefited from exposure to possibly enhanced teaching practices resulting in better learning outcomes. School administrations were received valuable information to guide curriculum planning which can result in enhanced overall student performance. The community was served by an increasingly mathematically capable population, better prepared for future academic and professional achievement. The research arena were enriched with new information and evidenced- based practices, furthering to the development of mathematics education pedagogy. Lastly, other researchers can use the results to guide their own research, continuing to develop the field and eventually making mathematics education better around the world.

During the research, participants were required to give their time and answer a series of questions intended to collect information on how effective classroom strategies are in math instruction. Knowing that some of the questions could be sensitive, participants are allowed to refuse to answer any question or withdraw from the survey without stating a reason. The researcher will be sensitive to participants who are likely to have difficulty with understanding or communication, making sure to use suitable language and dealing with any issues tactfully. To avoid possible discomfort, the study will have clear warnings and opt-out provisions for sensitive questions, have guidelines for data use and sharing strictly for research purposes only, define data ownership and rights of participants, and have open communication about data handling practices to resolve any issues.

Monitoring the benefits of this study for target participants were through a survey and teacher-constructed test with quantitative data. Questionnaire and testing of mathematical knowledge and skills were provided quantitative data, enabling it to be measured directly for learning gains. Through these sources of data, the research was successfully monitored and assessed the advantages of the applied strategies to the targeted

participants to ensure that the research is responsive to their needs and contributes to improvement in mathematics education.

3. Results and discussions

3.1 Findings

Based from the findings, out of a total of 72 respondents, 35 or 49% identified as male and 37 or 51% identified as female. This reveals a slight majority of female respondents compared to male respondents. The small majority of female respondents may have consequences for understanding gender dynamics in educational contexts, particularly in areas like mathematics. Wang and Degol (2017) shown that female students often experience different social and educational hurdles compared to their male counterparts. For instance, research indicate that girls may report reduced confidence in their mathematical talents due to societal stereotypes.

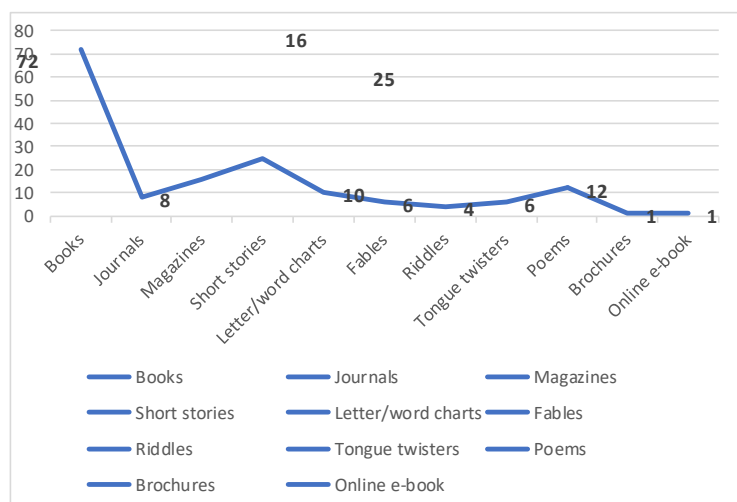
The highest percentage of mothers are college graduate, with 28 respondents or 39%. This suggests that quite a few of the respondents' mothers have earned a college education, which is often correlated with higher educational achievements for their children. While, only 1 or 1% is Elementary Undergraduate, ALS Graduate, Vocational Courses Graduate, and Master's Degree. This shows that very few moms in this group have not completed any formal schooling, indicating a relatively high baseline of educational attainment among the mothers. Research has consistently demonstrated that parental education is a strong predictor of children's academic achievement. The educational achievement of mothers typically correlates with socioeconomic position, which might influence the availability of resources, such as reading materials and educational help at home. This can further modify children's learning experiences and outcomes (Sirin, 2015). Understanding the educational history of parents can help educators and policymakers plan specific strategies that support families with lower educational achievement, ensuring that all children have access to the resources they need to succeed academically.

The highest level of educational attainment among fathers is College graduate, with 28 or 39% respondents. This suggests that a significant number of the fathers have obtained a high level of education, which may positively influence their children's educational outcomes and performance in mathematics. Meanwhile, the lowest levels of educational attainment are with master's units and master's degree, both with only 1 or 1% respondents. This shows that relatively few fathers have not progressed past elementary school, and there are modest representations of those who have pursued further degrees beyond a master's degree. The research reveals a correlation between a father's educational attainment and the potential academic success of their children. Davis-Kean (2014) discovered that greater parental education levels are connected with improved academic achievement in children, particularly in disciplines like mathematics. This is likely related to the resources, support, and educational values that educated parents can supply. Moreover, the prevalence of fathers with college degrees may create an environment that supports academic accomplishment, as these parents are likely to respect education and offer the essential support for their children's learning. Conversely, the low number of fathers with only primary education may signal potential difficulty in providing academic support, which could influence children's performance.

Most of the respondents had a below Php10,000 monthly parents' income with 25 or 35%, while just 2, 3% have a monthly income of Php26,000- Php30, 000. This shows that a considerable share of the respondents came from families with lower income levels. The data suggests a troubling trend where a considerable number of responders come from lower-income families. This can have various ramifications for educational attainment, particularly in disciplines like mathematics. Duncan and Murnane (2014) has proven that socioeconomic status is a strong predictor of academic success. Students from lower-income homes sometimes encounter problems such as less access to educational resources, less parental support for learning, and higher levels of stress, which can negatively affect their academic performance. Moreover, the low presence of higher-income families shows that

the educational interventions and resources may need to be modified to accommodate pupils from lower-income backgrounds. This could involve giving additional tutoring, access to learning materials, and building supportive learning settings that address the unique problems experienced by these individuals.

Figure 1 *Profile of the Respondents along Availability of Reading Materials at Home.*



As can be gleaned from the figure, this shows that all respondents (72, 100%) had access to books at home, which is a favorable sign for literacy development. However, the availability of different reading resources varies substantially. On the other hand, just a single respondent or 1% has brochures and an online e-book. The results imply that while basic reading materials (books) are available, there is a lack of several different reading resources that could increase literacy skills. The limited availability of reading resources may hinder students' exposure to multiple genres and forms, which are necessary for developing comprehensive literacy abilities.

Meanwhile, smartphones (60, 83%) and mobile phones (40, 56%) are the most commonly used gadgets among respondents, while desktop PCs (5, 7%) are less frequently utilized. This shows a reliance on mobile technology for educational purposes, which can have both positive and bad repercussions. The increased usage of cellphones shows that students have access to digital learning resources, which can enhance their learning experience. Studies have indicated that mobile devices can facilitate learning through interactive applications and online resources (Kukulski-Hulme, 2022). While mobile gadgets can be good for learning, they can also serve as distractions. The popularity of cellphones may lead to multitasking, which can significantly affect students' focus and learning outcomes (Ravizza, Hambrick, & Fenn, 2014).

Table 1

Level of Performance of The Learners in The Different Classroom Strategies to Facilitate Learning Mathematics

Range of Scores	<i>f</i>	%
Manipulative Based Strategy		
18-20	26	36.11
15-17	20	27.78
10-14	21	29.17
5-9	4	5.56
0-4	1	1.39
Mean Score	15.07	
Descriptive Rating	Very Good	
B. Game Based Strategy		
18-20	22	30.56
15-17	22	30.56
10-14	21	29.17
5-9	7	9.72
0-4	0	0.00
Mean Score	15.75	

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Descriptive Rating	Very Good	
C. Cooperative Learning Strategy		
18-20	1	1.39
15-17	17	23.61
10-14	40	55.56
5-9	10	13.89
0-4	4	5.56
Mean Score	14.40	
Descriptive Rating	Very Good	
D. Explicit Instructions		
18-20	20	27.78
15-17	19	26.39
10-14	22	30.56
5-9	9	12.50
0-4	2	2.78
Mean Score	12.01	
Descriptive Rating	Good	
Over-all Mean Score	14.31	
Over-all DR	Very Good	
Legend: 14.01 – 17.00	Very Good	9.01.01 – 14.00 Good

Table 1 presented the level of performance of the learners in the different classroom strategies in teaching mathematics in terms of manipulative based strategy, game-based strategy, cooperative learning strategy, and explicit instruction. The overall mean score of learners' performances in mathematics, based on the implementation of various classroom strategies, is 14.31, described as "Very Good." This result indicates that students, on average, are demonstrating strong understanding and achievement in mathematics when exposed to differentiated instructional strategies such as manipulative-based, game-based, cooperative learning, and explicit instruction. The data imply that these strategies are generally successful in improving learners' mathematical proficiency. This corresponds with the ideas of differentiated education, which advocate for the adaptation of teaching methods to meet diverse student requirements and learning styles (Tomlinson, 2014).

Along Manipulative-Based Strategy. The table shows that majority of students (26, 36.11%) scored between 18–20, classified as "Very Good". Only one (1.39%) scored in the lowest range (0–4), showing widespread success among learners. These findings support the study that hands-on, experiential learning employing manipulatives helps children grasp and integrate abstract mathematical ideas more successfully (Clements & Sarama, 2014). Manipulatives provide concrete representations of abstract concepts, making mathematics more accessible and relevant, especially for visual and kinesthetic learners. Furthermore, Miller (2020) underlined that student motivation and long-term retention are boosted by tactile and interactive experiences—benefits abundantly reflected in the present study's results.

Along Game-Based Strategy. As gleaned in the table, game-based strategy has a high mean rating of 15.75, described as "Very Good." Around 30.56% or 22 of students got scores between 18-20, while 7 (9.72%) scored between 5 and 9. These results show that game-based learning generates a dynamic and engaging classroom setting that stimulates healthy competition, enjoyment, and motivation—factors that are crucial in increasing interest in mathematics (Gee, 2014). Furthermore, game-based activities generally integrate problem-solving, critical thinking, and real-time feedback, all of which contribute to cognitive development (Hamari et al., 2016). When learners are involved in meaningful play, they are more likely to persist through tough tasks, interact successfully, and develop a deeper comprehension of mathematical operations and reasoning. This is also consistent with my personal experience in my class, wherein learners are more interested and engaged when presented with game-based activities.

Along Cooperative Learning Strategy. The table shows a mean score of 14.40, classified as "Very Good". Although just 1 (1.39%) of learners scored between 18–20, the technique remains useful for developing cooperation, communication, and peer-assisted learning. According to Johnson and Johnson (2014), cooperative learning boosts academic achievements when it is well structured, ensuring that all group members are accountable and engaged. The present findings show that while cooperative learning facilitates collaborative

problem-solving and social contact, its effectiveness may be increased with clearer roles, guided facilitation, and well-defined objectives. Moreover, as Slavin (2015) highlighted, peer explanations during group work can assist clarify topics in ways that are more relatable than typical teacher-led training.

Along Explicit Instructions. The table presents that explicit instructions received the lowest mean score of 12.01, described as “Good.” Most learners (22, 30.56%) scored in the middle range from 10–14, indicating that although direct instruction has merit in delivering clear, step-by-step procedures, it may lack the interactivity needed to sustain student interest and engagement in mathematics. Research by Rosenshine (2016) indicates that explicit education is most successful when accompanied with active practice, guided feedback, and interactive features. The findings emphasize the significance of mixing explicit instruction with alternative student-centered techniques to accommodate varied learning requirements. Tomlinson (2014) also underlines that even in structured education, instruction should be flexible and responsive to individual differences, suggesting that a more differentiated use of explicit instruction could enhance its impact on learning outcomes.

Table 2

Relationship Between Profile and Performance of The Learners in Learning Mathematics

Performance of The Learners in Learning Mathematics	Profile of the Respondents					
	Sex	Mother’s Educ. Attainment	Father’s Educ. Attainment	Parents’ Income	Availability of Reading Materials	Gadgets Used
Manipulative Based Strategy	0.229	0.084	0.096	0.011	0.123	0.177
Game Based Strategy	0.236*	0.108	0.102	0.002	0.018	0.086
Cooperative Learning Strategy	0.273*	0.067	0.018	0.028	0.117	0.209
Explicit Instructions	0.207	0.025	-0.047	0.002	0.142	0.183
Level of Performance of The Learners in Learning Mathematics	0.261*	0.074	0.032	0.020	0.135	0.195

Note: *= $p \leq .05$

The table revealed that the general profile of the respondents displayed a positive correlation ($r = 0.261$) with their performance in mathematics, particularly with game-based ($r = 0.236$) and cooperative learning strategies ($r = 0.273$). Among the variables examined, gender appeared as significantly correlated with performance outcomes, showing that gender may influence how learners respond to different methods of instruction in mathematics. This observation highlights the necessity of detecting gender-based learning preferences and addressing potential discrepancies in classroom engagement. Societal preconceptions frequently assume that boys outperform girls in mathematics; however, performance variations may be more reflective of instructional alignment with gendered learning patterns than innate ability. Therefore, educators must design interventions that foster inclusion, ensuring that both boys and girls are equally supported and encouraged in attaining mathematical ability (Tomlinson, 2014).

The significant positive relationship between sex and performance in game-based learning implies that gender variations may influence how learners interact with competitive and interactive forms. Research has indicated that game-based strategy tends to improve student engagement and motivation, particularly among boys who may respond more positively to elements of challenge, competitiveness, and real-time feedback (Gee, 2014; Hamari et al., 2016). This learning preference can lead to improved cognitive engagement and deeper mathematical processing when suitably handled.

Similarly, the strong connection between sex and cooperative learning performance shows that girls may

benefit more from socially collaborative learning contexts. Cooperative learning, as stressed by Slavin (2015), encourages peer engagement, shared responsibility, and mutual support, all of which can improve academic accomplishment and interpersonal skills. These findings support the idea for a balanced and adaptable strategy in mathematics instruction, where both competitive and collaborative aspects are integrated to respond to a wide range of learner requirements and preferences. Meanwhile, other profile variables, such as, mother's and father's educational attainment, parents' income, availability of reading materials, and type of gadget used, showed no correlation with learners' mathematical performance across the four strategies. While these qualities are typically associated to academic accomplishment, their nonsignificant correlation in this case shows that their influence may be overcome by more immediate classroom factors, such as the teaching strategy or instructional engagement. This finding is congruent with research by Hattie (2015), who suggested that the main influencers on student performance are related to the quality of teaching and the effectiveness of instructional tactics rather than background characteristics. Additionally, the existence of reading materials or gadgets may only translate into academic advantage if accompanied by meaningful pedagogical use and active learner interaction (Mishra & Koehler, 2016). Thus, these results underline the significance of learner-centered, strategy-driven teaching techniques above demographic characteristics in enhancing mathematics achievement.

Table 3

One Way ANOVA (Kruskal Wallis- Non-Parametric) Table

Source	SS	df	MS	F	p-value
Between Strategy	571.04	3	190.346	13.55	2.76E-08
Within Strategy	3,990.46	284	14.051		

Note: $*=p \leq .01$

Post hoc analysis

	Cooperative Learning	Explicit Instructions	Game Based	Manipulative
Cooperative Learning	-----	-----	-----	-----
Explicit Instructions	.0002	-----	-----	-----
Game Based	1.68E-06	.2868	-----	-----
Manipulative	6.68E-09	.0319	.2769	-----

Table 3 presented the significant difference among the strategies used to teaching mathematics. The results revealed a highly significant difference in learner performance across the various teaching strategies, as evidenced by a p-value of 2.76E-08, much lower than the typical alpha level of 0.01. This statistical finding demonstrates that at least one instructional strategy has significantly different impacts on student achievement in mathematics. Post hoc comparisons further reveal which strategies are more effective in facilitating learning.

Among the strategies, cooperative learning appeared as particularly effective, showing its superiority in promoting mathematical knowledge and student engagement. This finding aligns with the work of Johnson and Johnson (2014), who say that cooperative learning not only enhances academic accomplishment but also supports the development of higher-order thinking skills through collaborative problem-solving and group conversation. Such collaboration allows students to articulate their cognitive processes and learn from peers, a setting conducive to deeper knowledge. Slavin (2015) also emphasizes the long-term academic and social benefits of cooperative learning, particularly in enhancing motivation, retention, and interpersonal competence. Given these findings, adding structured group activities into mathematics instruction could significantly enhance student outcomes.

Moreover, the statistically significant difference between explicit instruction and Manipulative-Based Strategies gives deep insights into their unique capabilities. While both strategies were shown to be beneficial, explicit instruction appeared to result in slightly superior performance outcomes, suggesting that direct,

structured instruction may offer students greater clarity and procedural fluency. This is corroborated by Hattie's (2015) meta-analysis, which shows clear instruction as one of the most effective influencers on student progress. Clear modeling, guided practice, and immediate feedback are hallmarks of explicit education that contribute to its efficacy. However, the pedagogical usefulness of manipulative tactics should not be overestimated. Sweller et al. (2019) claim that while explicit training develops cognitive efficiency and mastery of processes, hands-on experiences employing manipulatives support conceptual understanding by enabling learners to envision abstract mathematical notions. Therefore, rather than viewing these strategies in isolation, educators are encouraged to adopt a balanced, integrative approach—leveraging the structure of Explicit Instruction while supplementing it with Manipulative-Based activities to address diverse learning preferences and deepen student comprehension.

Proposed strategic intervention material (SIM)

Strategic Intervention material (SIM) is an instructional material prepared by teachers targeting the least mastered competencies. It is meant to reteach concepts and skills that students were unable to master during regular class schedule. Based from the findings, it was seen that the learners came from a varied profile, and that it was important to integrate teaching strategies that respond to their varied needs. Specifically, it was shown that cooperative learning strategy was one of the more effective strategies compared to others, followed by explicit learning activities. In addition, it was also shown that the different classroom strategies must not be treated in isolation; rather, other strategies must be integrated for complementarity. Therefore, this SIM was made in such as a way that the teacher has the flexibility to implement varied classroom strategies to respond to the varied profile and learning needs of the learners.



Source: Celeridad-Wright, Amelia D., De Joya, Eden C. (2024). Math for Life Matatag Curriculum (Revised Edition). Rex Bookstore Publishing House, Inc.

Validation of Proposed Strategic Intervention Material (SIM)

The SIM underwent validation by people who are expert in the field of mathematics and assessment to make sure that the materials indicated are correct and appropriate. Based on the result, the validation yielded the average mean of 4.73 described as Very Highly Valid (VHV) for the mastery of the specific least mastered competency. This implies that the intervention material made is useful for the school, learners, community, and other stakeholders.

Table 4

Proposed Strategic Intervention Material Validation Result

Criteria	Grand Mean	DR
1. The SIM includes a sufficient number of questions to effectively improve instructions and interventions.	4.66	VHV
2. The questions are appropriate in attaining the mastery of the least mastered competency.	5	VHV
3. The questionnaire is well-organized and clearly stated, making it easy to understand.	4.33	VHV
4. The SIM is designed to address the least mastered competency.	4.66	VHV
5. The SIM effectively meets targeted intervention	4.66	VHV

6. The SIM includes a sufficient number of questions to effectively improve instructions and interventions.	5	VHV
7. Proper font size and text spacing are observed, enabling the respondents to understand every word.	5	VHV
8. The language used is suitable regarding vocabulary and technical accuracy.	5	VHV
9. Sentences are grammatically correct.	4.33	VHV
10. The instructions for answering the questionnaires are clear.	4.66	VHV
Overall Mean	4.73 (VHV)	
Relative Value and Descriptive Rating: 4.21-5.00 - Very Highly Valid (VHD); 3.41-4.20 - Highly Valid (HV); 2.61-3.40 - Moderately Valid (MV); 1.81-2.60 - Fairly Valid (FV); 1.00-1.80 - Not valid (NV)		

4. Conclusions and recommendations

With high overall performance across a range of classroom strategies, this study found that diverse student profiles positively influenced math engagement and achievement. The only significant factor influencing performance was gender. Compared to other approaches, cooperative and explicit instruction worked better. Therefore, it is advised that educators keep applying and refining these effective classroom strategies while simultaneously establishing inclusive practices that take gender differences into account. To further improve student learning, it is also recommended that Strategic Intervention Materials (SIMs) be developed and implemented.

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