Bases and Design of Mathema-Teka Muna: A Contextualized Mathematics Enhancement Program

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ABSTRACT

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This study evaluates the effectiveness of intervention programs—Brigada Pagbilang, Enrichment Program, and HatEdukasyon Program—on Grade 7 students' mathematics performance. The research aims to describe the effectiveness of these programs in teaching mathematics and design a contextualized mathematics enhancement program. A multimethod approach was used, combining quantitative (Paired t-test, ANOVA, Cohen's D, Tukey HSD) and qualitative (thematic analysis) methods. Quantitative analysis compared the effectiveness of the interventions, while qualitative analysis identified recurring themes from open-ended questions. This comprehensive approach provided a thorough understanding of the interventions' effectiveness. The study followed the structured approach outlined by the Department of Education (DepEd), including project title, time frame, target beneficiaries, rationale, objectives, program implementation and mechanics, budget, source of funds, expected output, monitoring and evaluation, and working committee. Additionally, the IPO (Input-Process-Output) Model was utilized to evaluate the interventions systematically. Findings revealed that all three programs significantly improved numeracy skills, with Brigada Pagbilang showing the most remarkable impact (Cohen's d = 11.37, Tukey's HSD = 1.233). Based on these findings, Brigada Pagbilang's personalized tutoring and collaborative learning strategies—such as peer tutoring, group projects, and digital tools—are highly recommended for integration into the standard curriculum. These interventions can significantly enhance mathematics education by fostering deeper understanding, improving academic performance, and boosting students' confidence in their mathematical abilities.

Keywords: mathematics intervention programs, teaching and learning mathematics, mathematics pedagogy, grade 7 performance in mathematics.

Dedication

To the dreamers, doers, and believers. To my family, friends, learners, and the University of Nueva Caceres' School of Teacher EducationThis work is a testament to your support and my perseverance.

INTRODUCTION

Mathematics is essential in student education, offering numerous career opportunities in science, technology, engineering, and mathematics. Despite its importance, many students find it challenging to learn mathematics. According to Garoof and Karukkan (2015), 88% of students in their sample group expressed difficulty with mathematics due to the subject's complex nature and the teaching methods. This difficulty contributes to low math literacy among students nationwide, presenting a significant barrier to their academic and professional success.

The issue is particularly pronounced in the Philippines, where the 2018 Programme for International Student Assessment (PISA) ranked the country second lowest out of 79 participating nations. This alarming statistic highlights the widespread struggle with mathematical proficiency among Filipino students. Further emphasizing this concern, a Numeracy Assessment conducted in August 2022 at Paracale National High

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School revealed that 638 out of 640 Grade 7 students required significant support in learning mathematics. This indicates a dire need for effective intervention strategies to address this educational challenge.

The Philippine Department of Education has implemented various interventions to enhance mathematical literacy and combat these challenges. According to "Teaching + Learning Lab at MIT," interventions are defined as evidence-based teaching and learning processes designed to support student improvement. Machera (2017) suggests that well-administered interventions can offer numerous benefits, including fostering self-direction, cooperation, and student teamwork. These interventions help students develop emotional resilience and demonstrate teacher involvement and support, which is critical for student success.

Despite these efforts, student performance in mathematics needs improvement, indicating that the current interventions may need to be revised or optimally implemented. This persistent issue underscores the need for further investigation into effective and efficient mathematical interventions. Matthew (2019) defines academic interventions as strategies to address students' academic problems. Some interventions implemented in the Philippines include peer tutoring, peer assessment, and self-assessment. However, the continued decline in student performance suggests that additional or alternative interventions may be necessary.

This study aims to fill this gap by evaluating the effectiveness of various intervention programs for Grade 7 students and designing a comprehensive mathematics enhancement program to improve their performance. The study will provide valuable insights into the most effective interventions and how they can be optimized for a more significant impact. By doing so, the study will benefit students, teachers, school communities, and administrators at Paracale National High School. Students can bridge gaps in their mathematical knowledge and improve their performance, while teachers will gain access to research-backed strategies to address educational challenges. School communities and administrators will be empowered to actively support and participate in

students' academic achievements.

Furthermore, this study's findings will serve as a valuable reference for future research on mathematics performance and intervention strategies, contributing to the broader educational discourse on best supporting students' mathematics learning. This research can inform professional practice by providing educators with practical strategies and tools to enhance math instruction. Additionally, it can guide policy development by highlighting successful intervention models that can be scaled and implemented across other schools and regions, aiming to improve mathematical literacy and student outcomes nationwide.

Research Objectives

This study aimed to describe the effectiveness of selected intervention programs for Grade 7 students at Paracale National High School and to design a contextualized mathematics enhancement program to address learners' low performance in mathematics. Specifically, it sought to achieve the following:

1. describe the effectiveness of selected intervention programs in teaching mathematics; and

2. design a contextualized mathematics enhancement program based on the selected intervention program.

Scope and Delimitation

This study focused on ten (10) Mathematics Teachers who were part of selected intervention programs at Paracale National High School. Since the data, precisely the pre-test and post-test results, had already been collected, the researcher used that data to analyze the effectiveness of the identified intervention programs on the student’s performance in Mathematics. Moreover, the ten (10) Mathematics Teachers answered open-ended questions related to the selected intervention programs. This study was conducted during the first quarter of the School Year 2024–2025. It sought to describe the effectiveness of the different intervention programs based on the student’s performance in Mathematics and to design a contextualize mathematics enhancement program based on the selected intervention programs.

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Theoretical Framework

The researcher adopted the following theories related to this study: collaborative Learning Theory, Constructivist Learning Theory, and Multiple Intelligence Theory. This is shown in Figure 1.

Collaborative Learning Theory

The collaborative learning approach is part of social constructivist epistemology (Bruffee, 1993) or, using the words of Quiamzade, Mugny, and Butera (2013), a "social psychology of knowledge." Knowledge is a negotiation or joint construction of meanings, which applies to the entire teaching process. Although the main idea of the concept is the recognition of the value of cognitive peer interaction, collaborative learning also involves teachers and, in general, the whole context of teaching. In this sense, it is not about the circumstantial application of group techniques but the promotion of exchange and participation of each member to build a shared cognition. This theory is connected to the

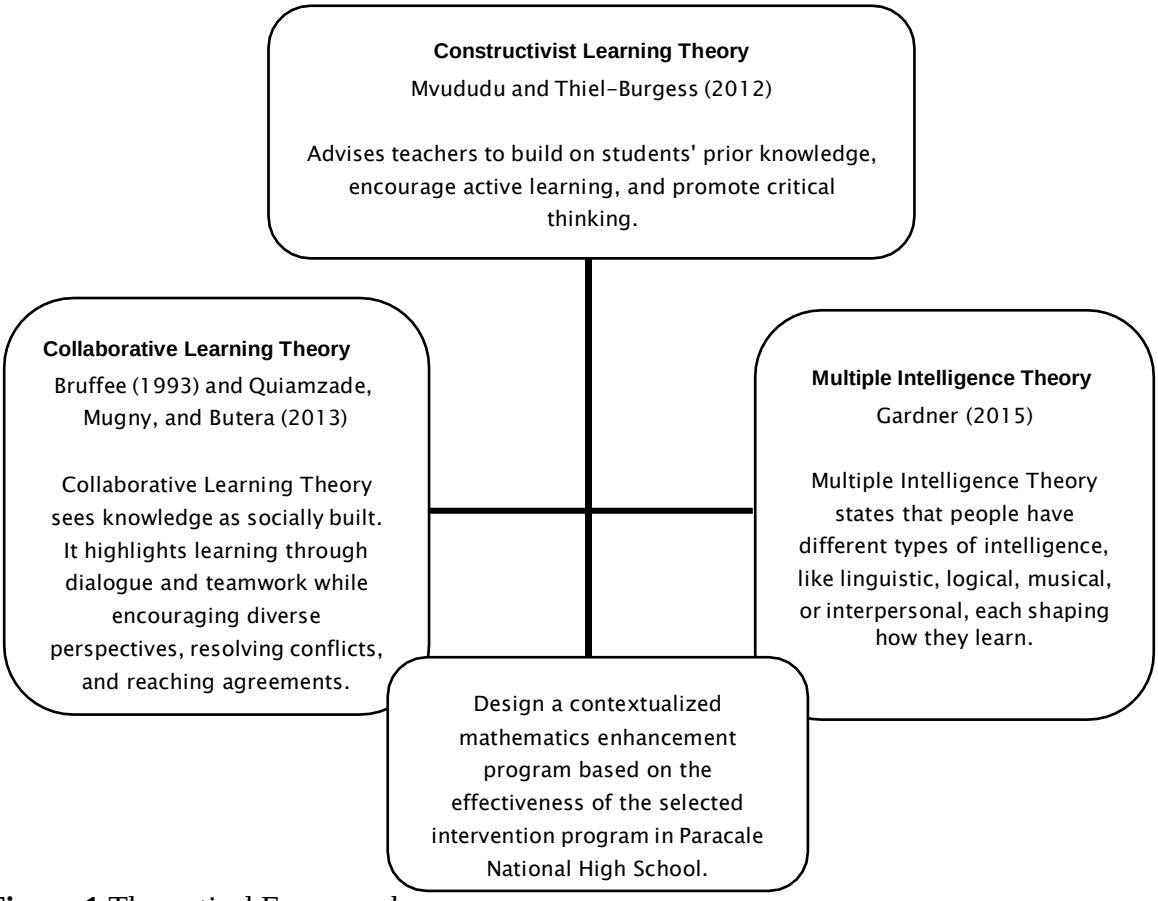

Figure 1 Theoretical Framework

circumstantial application of group techniques but the promotion of exchange and participation of each member to build a shared cognition. This theory is connected to the study. It shows how important the interactions and relationships between teachers and students are to other students. The relationship in each intervention can be a factor in learning.

Constructivist Learning Theory

Constructivism is a synthesis of multiple theories diffused into one form. It is the assimilation of both behavioralist and cognitive ideals. The “constructivist stance maintains that learning is a process of constructing meaning; it is how people make sense of their experience" (Merriam & Caffarella, 1999, p. 260). Mvududu and Thiel-Burgess (2012) state that Constructivism is widely touted as an approach to probe children's level of understanding and show that that understanding can increase and change to higher level thinking. Thus, Constructivism refers to how to learn and think. Constructivism describes how the students can make sense of the material and how the materials can be taught effectively. With Constructivism as an

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educational theory in mind, teachers should consider what students know and allow their students to put their knowledge into practice. This theory is connected to the study because, as Constructivist Learning Theory states, applying their knowledge to practice can give mastery in a specific topic. The following interventions offer different practices that will help the students.

Multiple Intelligence Theory

According to Gardner (2015), there are biological and cultural bases for multiple intelligences. Gardner's Theory of Multiple Intelligences has several implications for teachers regarding classroom instruction. The theory states that all seven intelligences are needed to function in society productively. Since all children do not learn in the same way, they cannot be assessed similarly. Therefore, an educator must create an "intelligence profile" for each student. Knowing how each student learns will allow the teacher to accurately assess the child's progress (Lazear, 1992). This theory is connected to the study. Multiple Intelligence Theory should be considered when developing a mathematics enhancement program since every learner has unique characteristics and intelligence.

Conceptual Framework

The conceptual framework in Figure 2 illustrates the interconnectedness of various intervention and enrichment programs designed to improve the mathematics performance of Grade 7 students in Paracale National High School.

The framework's core is the Grade 7 Performance in Mathematics, which serves as the primary focus and outcome of the educational interventions. Positioned at the top is the Intervention Programs, representing the broader initiative that encompasses all strategies aimed at supporting student learning. These interventions are *Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon Program*, which serves as a central conduit for the implementation of specific support activities.

The *Brigada Pagbilang* focuses on strengthening foundational numeracy skills, ensuring that students have the basic mathematical understanding necessary for higher-

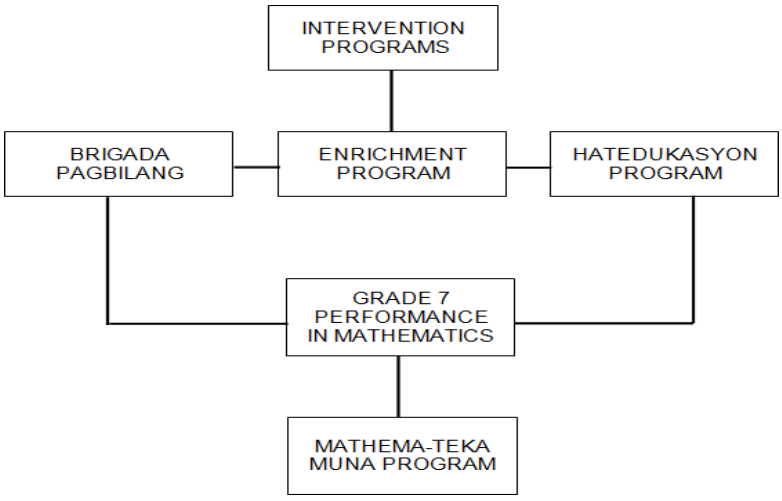

Figure 2 Conceptual Framework

level problem solving. The Enrichment Program involves tasks designed by mathematics teachers to reinforce mathematical concepts, offering extra practice and targeted support to deepen learning. The *Hatedukasyon Program* likely addresses differentiated instruction and inclusive education, catering to learners with diverse needs and learning styles.

Positioned below the core performance outcome, the Mathema-Teka Muna Program serves as a reinforcing mechanism that likely provides additional remediation, drills, or review activities to sustain and further improve performance.

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Furthermore, the framework emphasizes a multi-layered and comprehensive approach to education, highlighting how different programs are strategically aligned to support and enhance student achievement in mathematics. By linking intervention and enrichment efforts, the conceptual paradigm demonstrates the importance of holistic and continuous academic support in fostering meaningful learning outcomes for Grade 7 learners.

Assumptions

The study is based on the following assumptions:

1. Paracale National High School implemented various intervention programs to address the low performance in mathematics.
2. Teachers had differing perceptions of the effectiveness of the selected intervention programs.

Hypothesis

The selected intervention programs (*Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon Program*) significantly improved students' mathematics performance at Paracale National High School.

Definition of Terms

For clarity, the following terms were defined operationally and conceptually as used in the study.

Academic Intervention Programs. It refers to structured strategies designed to support students facing learning challenges and improve their academic performance (Damerow, 2023). In this study, they include Brigada Pagbilang, Enrichment Program, and HatEdukasyon Program, as outlined in the Department of Education Memorandum, to enhance student performance.

Brigada Pagbilang. This refers to a mathematics intervention program designed exclusively for students facing challenges in mathematics, specifically catering to those who scored significantly low during the initial assessment, as described in the Numeracy Program Proposal.

Contextualized. This refers to the process of adapting educational content and teaching methods to fit the unique needs, experiences, and realities of learners, considering factors like culture, society, economy, and environment (Gersaniva, 2025). In this study, it refers to the customization of teaching strategies and materials based on students' backgrounds, learning styles, and socio-cultural contexts, ensuring relevance and engagement in academic instruction.

Enhancement Program. This refers to structured activities aimed at improvingstudents' understanding and mastery of specific subjects (Paolini, 2015). In this study, it involves tasks designed by mathematics teachers to reinforce mathematical concepts, offering extra practice and targeted support to deepen learning.

Hatedukasyon Program. This refers to a community-based initiative that brings together students from various grade levels within each barangay to foster collaborative learning (Villani & Atkins, 2000). In this study, the HatEdukasyon Program serves as a structured effort to enhance learning through localized, community-driven strategies.

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Review of Related Literature and Studies

This chapter reviews literature and studies that highlight the significance of the research. It explores innovative strategies and approaches in mathematics education crucial for enhancing student performance and engagement. The current performance of Filipino students in international examinations such as PISA and TIMMS highlights significant challenges. Integrating academic intervention programs and differentiated instruction improves student achievement, addressing disparities noted in these assessments. The chapter delves into blended learning, collaborative and inquiry-based learning, and peer-assisted strategies, all of which contribute to a dynamic and supportive classroom environment.

Additionally, it examines how real-world applications and conceptual understanding approaches deepen students' mathematical understanding. The integration of technology and the implementation of flipped classroom models further personalize and enrich the learning experience. Together, these themes highlight the transformative potential of a comprehensive and adaptive approach to mathematics education.

Current Performance of Filipinos in International Examination

Even before the pandemic, students' deficient performance in Mathematics is vividly visible. According to the Program for International Student Assessment (PISA) of the Organization for Economic Cooperation and Development (OECD) in 2018, Filipino students ranked the lowest among 79 countries in mathematics, science, and reading. In math and science, Filipino 15-year-old students obtained 353 points and 357 points, respectively, against the 489 OECD average for both categories. The OECD 2018 PISA Country Note for the Philippines stated: "Fifteen-year-old students in the Philippines scored lower in reading, mathematics, and science than in most countries and economies that participated in PISA 2018…" In another international test, the 2019 Report of the Trends in International Mathematics and Science Study (TIMMS), our Grade 4 students obtained the lowest scores in mathematics and science among the 58 countries involved in the study. There was an apparent deterioration from 2013 to 2019. The Philippines scores decreased by 61 points (from 358 in 2003 to 297) and 83 points (from 332 in 2003 to 249) in mathematics and science achievement, respectively. A third international test, the Southeast Asia Primary Learning Metrics (SEA-PLM) Program 2019 Main Regional Report, revealed that only 10% of our Grade 5 students met the proficiency standards in reading, 2% in writing, and 17% in mathematics.

It reveals that eight (8) emerging themes on the disparities in performance in Philippine mathematics education are multifaceted, influenced by socioeconomic factors, teaching quality, curriculum inadequacies, language barriers, technological integration, assessment mechanisms, parental involvement, and governance, necessitating a comprehensive and interconnected approach to improve equity and outcomes for students. To mitigate disparities in PISA performance, targeted interventions may include supporting low-income families, investing in teacher training, aligning the curriculum with international standards, enhancing English instruction, improving technological infrastructure, fostering parental involvement, and implementing evidence-based policies with robust accountability and responsibility.

In contrast, to halt the continued deficient performance, the Philippine Department of Education has been undertaking several studies and interventions to increase the mathematical literacy of Filipino students with difficulty learning mathematics concepts. According to the Department of Education (DepEd), participating in PISA will establish a baseline for global standards and benchmark the effectiveness of the reforms moving forward. The PISA results and our assessments and studies will aid policy formulation, planning, and programming.

The intervention programs implemented at Paracale National High School—*Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon Program*—were designed to tackle these issues. These initiatives focus on improving students' numeracy skills through personalized tutoring, collaborative learning methods, and extra instructional hours. The success of these local interventions highlights the potential for substantial student performance improvements when customized support and innovative teaching methods are applied. By incorporating these effective strategies into the regular curriculum, schools can provide better student support and enhance overall academic achievement.

Academic Intervention Programs

Intervention defined in the website Achievement for All, is a selection of evidence-based teaching and learning processes to help students improve their learning. This entails choosing suitable interventions to assist a particular learner in making purposeful changes in his or her learning. This was supported by Machera (2017); according to him, interventions have benefits if administered properly; self-directing, cooperation, and teamwork among students comprise some benefits.

One of the intervention programs launched by DepEd is the "Sulong EduKalidad," which involves reforms in four key areas: 1) K to 12 review and updating (2) Improvement of learning facilities (3) Teachers and school heads' upskilling and reskilling through a transformed professional development program and (4) Engagement of all stakeholders for support and collaboration. Also, a Learning Action Cell (LAC) as a K to 12 Basic Education Program School-Based Continuing Professional Development Strategy will be conducted for the improvement of teaching and learning.

Different regions and schools participated in the said intervention. Each school prepared a unique intervention to cater to the student’s needs and fill the gap, particularly in their locality. In Region V – Bicol, a mandatory conducting at the beginning of the school year, numeracy assessment and submission of consolidated grade level Albay Numeracy Assessment Tools (ALNAT) were conducted. The report shows that 99% of the students in Paracale National High School need significant support. It happened that the learners got an average rating of 74% and below and did not achieve the passing rate of 75% per DepEd Order No. 8 s. 2015. Most skills and processes in numeracy need significant support. This assessment will be the basis of different interventions and strategies in Mathematics.

In addition to the current initiatives, Paracale National High School has previously developed several intervention programs aimed at enhancing the numeracy skills of students. Notably, these include *Brigada Pagbilang*, the Enrichment Program, and the *HatEdukasyon Program*. These programs are specifically tailored to address the diverse mathematical needs of students, providing personalized tutoring, engaging collaborative strategies, and additional instructional hours. By targeting fundamental arithmetic concepts and promoting interactive learning environments, these programs have successfully demonstrated the potential for substantial improvements in student performance. The continued implementation and refinement of these interventions

underscore the school's commitment to fostering academic excellence and building a strong mathematical foundation for all students.

The Impact of Differentiated Instruction on Mathematics Achievement

In the realm of mathematics education, the concept of differentiated instruction has emerged as a powerful pedagogical approach. This review delves into existing literature to explore the impact of differentiated instruction on mathematics achievement, particularly among middle school students. By tailoring teaching methods to individual learner needs, readiness levels, and interests, educators aim to create a more inclusive and effective learning environment.

Tomlinson and Moon (2014) emphasize the pivotal role of differentiated instruction. It goes beyond the traditional one-size-fits-all approach, recognizing that learners have diverse learning profiles. There are three differentiated instructions involved. First, *Flexible Grouping*, wherein students work in various group configurations (individual, pairs, small groups) based on their learning needs. Second, *Varied Content*, wherein teachers provide multiple pathways to understand the same content and accommodate different learning styles. Lastly, *Assessment Differentiation*, wherein assessments align with instructional goals and consider individual progress.

Dosch and Zidon (2014) conducted a comprehensive study focusing on Grade 7 students. They compared the outcomes of differentiated instructional strategies with those of a uniform teaching approach. As it shows, students exposed to differentiated instruction demonstrated improving problem-solving abilities and enhanced conceptual understanding. In contrast, students in the one-size-fits-all group struggled to engage deeply with mathematical concepts. Moreover, the long-term effect of this study shows that longitudinal studies are needed to assess the lasting impact of differentiated instruction. Effective implementation requires well-trained educators who can adapt instruction to diverse classrooms. Also, ensuring equitable access to differentiated instruction is important.

The study and the reviewed literature on differentiated instruction underscore the vital role of tailored educational strategies in enhancing mathematics performance among students. The study focuses on the effectiveness of specific intervention programs like *Brigada Pagbilang,* Enrichment Program, and *HatEdukasyon Program* at Paracale National High School. Differentiated instruction, as discussed by Tomlinson and Moon (2014) and Dosch and Zidon (2014), emphasizes flexible grouping, varied content, and assessment differentiation to meet individual learner needs. Both methods strive to create an inclusive and effective learning environment. However, this study uniquely evaluates the impact of these interventions on Grade 7 students' mathematics performance through a hybrid approach combining quantitative and qualitative methods. Conversely, the reviewed literature highlights the broad application of differentiated instruction across various educational contexts, emphasizing the need for well-trained educators and equitable access to resources. Differentiated instruction stands as a beacon of educational equity and excellence. That's why considering the diversity of the students when creating strategies to be used in interventions is essential. Educators can unlock mathematical potential and pave the way for lifelong learning.

Blended Learning Approaches in Mathematics Education

In recent years, blended learning has gained prominence as an innovative approach in mathematics education. Blending traditional face-to-face instruction with online learning, this pedagogical model aims to enhance student engagement and performance. This review explores the impact of blended learning on middle school students' mathematical achievement, drawing insights from research conducted by Horn and Staker (2015). Blended learning combines the best of both worlds: physical classroom interactions and digital resources. It offers flexibility, personalization, and opportunities for self-paced learning.

Horn and Staker's longitudinal study examined the effects of blended learning on middle school students. It shows that students in blended learning environments demonstrated higher levels of engagement and interaction with online content and collaborative activities that led to better performance. Blended learning allows tailoring instruction to individual needs. Students can access resources beyond classroom hours and

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reinforce mathematical concepts. Moreover, educators need training to effectively implement blended learning. They must ensure that students have equal access to online resources. Researchers should explore the sustained impact of blended learning on mathematics achievement.

The study and the research by Horn and Staker (2015) both highlight innovative strategies in mathematics education aimed at improving student performance. While the study focuses on specific intervention programs like *Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon Program* at Paracale National High School, Horn and Staker examine the benefits of blended learning, which combines face-to-face instruction with online components. Both approaches emphasize enhancing student engagement and performance through personalized learning experiences. However, the study employs a hybrid methodology to measure the effectiveness of these interventions, whereas Horn and Staker's research underscores the need for proper educator training and equal access to online resources for successful implementation. Despite these differences, both highlight the transformative potential of tailored educational strategies in mathematics education.

Collaborative Learning Strategies in Mathematics

Collaborative learning has emerged as a powerful pedagogical approach in mathematics education. Promoting active student engagement, cooperative problem-solving, and collaborative learning enhances mathematical understanding and critical thinking. It explores the impact of collaborative learning strategies on students' mathematical achievement, drawing insights from research conducted by Johnson and Johnson (2016) and Gillies and Boyle (2018).

Johnson and Johnson (2016) investigated the impact of cooperative learning strategies on students' mathematical achievement. Collaborative learning fosters more profound understanding and enhanced critical thinking. Students engage in meaningful discussions, explore diverse perspectives, and develop a richer grasp of mathematical concepts. Additionally, collaborative problem-solving encourages analytical reasoning and creative solutions.

Gillies and Boyle (2018) conducted a significant study with Grade 7 students. The results show that students participating in structured collaborative learning activities demonstrated improved Mathematical Reasoning and their ability to articulate mathematical ideas. In this research, it implies that effective implementation requires skilled facilitation by teachers. Understanding group dynamics and promoting positive interactions are essential. Furthermore, assessing individual and group contributions is crucial. The study and the research by Johnson and Johnson (2016) and Gillies and Boyle (2018) underscore the value of tailored educational strategies in improving mathematics performance. The study focuses on specific intervention programs like *Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon Program* at Paracale National High School, such as how collaborative learning promotes active engagement and cooperative problem-solving. Both approaches highlight the importance of personalized and interactive learning environments to enhance mathematical understanding. However, while the study employs a hybrid method combining quantitative and qualitative analysis to evaluate the effectiveness of interventions, Johnson and Johnson and Gillies and Boyle emphasize the need for skilled facilitation and group dynamics in collaborative settings. Both perspectives highlight the transformative potential of structured and interactive educational strategies in fostering student achievement in mathematics.

The Effectiveness of Conceptual Understanding Approaches

Conceptual understanding lies at the heart of effective mathematics education. Recent research highlights the significance of promoting deep comprehension rather than mere procedural knowledge. This review synthesizes findings from studies by Hiebert and Grouws (2015) and Boaler (2016), shedding light on instructional strategies that enhance conceptual understanding among middle school students.

Hiebert and Grouws (2015) focused on a detailed examination of teaching practices. The objective is to promote deep conceptual understanding. It shows that improved overall comprehension and enhanced ability to apply knowledge in novel contexts.

Boaler (2016) investigated Grade 7 students' engagement in tasks designed for conceptual understanding. The results show that students exposed to tasks fostering conceptual understanding demonstrated more remarkable improvement and enhanced mathematical problem-solving and reasoning skills. This shift moves away from rote learning or mere procedural memorization toward deeper comprehension. Moreover, the instructional shifts prioritize connections between mathematical ideas and encourage exploration, reasoning, and sense-making. Educators must be equipped with strategies to promote conceptual understanding and foster a growth mindset in both teachers and students.

The study and the research by Hiebert and Grouws (2015) and Boaler (2016) both highlight the importance of tailored educational strategies in enhancing mathematics performance. While the study focuses on specific intervention programs like *Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon Program* at Paracale National High School, the research by Hiebert and Grouws and Boaler emphasizes strategies that promote deep conceptual understanding over procedural knowledge. Both approaches aim to improve comprehension and problem-solving skills among students, although the study employs a hybrid method combining quantitative and qualitative analysis to evaluate the interventions' effectiveness. In contrast, Hiebert Grouws and Boaler focus on fostering connections between mathematical concepts and a growth mindset in various educational contexts. Despite these differences, both highlight the transformative potential of innovative teaching methodologies in advancing student achievement in mathematics.

Inquiry-Based Learning in Mathematics

Inquiry-Based Learning (IBL) has emerged as a powerful pedagogical approach in mathematics education. By encouraging students to explore, question, and engage in hands-on activities, IBL aims to enhance students' engagement and understanding. This summary synthesizes findings from studies by Lipstein and Renninger (2014) and Artigue and Blomhøj (2016), shedding light on the effectiveness of IBL in mathematics education.

Lipstein and Renninger (2014) focused on investigating the impact of IBL on student motivation and achievement. IBL leads to higher student motivation and improved achievement. Grade 7 students participating in IBL activities demonstrated enhanced mathematical reasoning and critical thinking skills.

Artigue and Blomhøj (2016) explore the effectiveness of IBL in promoting a deeper understanding of mathematical concepts. Thus, IBL's results foster an *Exploratory Mindset*, wherein students develop a curiosity-driven approach to mathematics, and *Conceptual Understanding*, wherein IBL encourages students to delve into mathematical ideas beyond surface-level memorization. In this study, educators play a crucial role in facilitating IBL experiences. It should also be integrated into curriculum planning and resource development. Lastly, encourage active exploration, questioning, and collaborative problem-solving as part of student engagement.

The study and the research on Inquiry-Based Learning (IBL) by Lipstein and Renninger (2014) and Artigue and Blomhøj (2016) both emphasize the importance of innovative pedagogical approaches in enhancing mathematics education. While the study focuses on the effectiveness of specific intervention programs like *Brigada Pagbilang,* Enrichment Program, and *HatEdukasyon Program* at Paracale National High School, the IBL research highlights the benefits of exploration, questioning, and hands-on activities in increasing student motivation and achievement. Both approaches aim to foster a deeper understanding and engagement in mathematics, though the study utilizes a hybrid methodology combining quantitative and qualitative analysis, whereas IBL research underscores the role of educators in integrating IBL into curriculum planning. Despite these differences, both approaches underscore the transformative potential of tailored educational strategies in promoting mathematical success.

The Impact of Peer-Assisted Learning Strategies

Peer-Assisted Learning (PAL) has emerged as a powerful instructional approach in mathematics education. By leveraging peer interactions, PAL aims to enhance student achievement and confidence. This summary synthesizes findings from studies by Fuchs et al. (2014) and Calhoon and Fuchs (2018), shedding light on the effectiveness of PAL in mathematics education.

Fuchs et. al (2024) focus on investigating the effects of PAL on the middle school students' mathematics achievement. The results show that PAL participants exhibited significant gains in improved mathematical performance. Also, PAL positively influenced students' self-assessment and self-confidence.

Calhoon and Fuchs (2018) explored peer-mediated instruction in Grade 7 mathematics classrooms. Students engaged in PAL demonstrated deeper comprehension and retention of mathematical concepts. Also, PAL fosters effective teamwork and improved collaborative skills. Moreover, educators should design the structured of PAL as well-organized. Students train to effectively support each other and ensure equitable participation and positive peer interactions.

Both the study and the research on Peer-Assisted Learning (PAL) by Fuchs et al. (2014) and Calhoon and Fuchs (2018) highlight the importance of collaborative strategies in enhancing mathematics education. The study focuses on the effectiveness of intervention programs like *Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon Program* at Paracale National High School, while the PAL research emphasizes leveraging peer interactions to boost student achievement and confidence. Both approaches aim to improve mathematical performance through personalized support and cooperative learning. However, the study uses a hybrid methodology combining quantitative and qualitative analysis to evaluate these interventions, whereas the PAL research specifically examines the effects of peer-mediated instruction on middle school students. Despite these differences, both underscore the transformative potential of tailored educational strategies in fostering student success in mathematics.

PAL transforms mathematics learning by harnessing the power of collaboration. By working together, students build confidence, understanding, and essential skills.

Utilizing Real-World Applications to Enhance Mathematical Engagement

Integrating real-world applications into the mathematics curriculum is a recognized strategy to enhance student engagement and relevance. This study explores the impact of using real-world problems in teaching mathematical concepts.

Schoenfeld (2015)) investigated the effectiveness of real-world problems in teaching middle school students and explored how real-world applications impact student motivation and comprehension of mathematical concepts.

Felgenhauer and Möller (2017) focused on Grade 7 students who examined problem-solving activities tied to real-world contexts. The objectives of this study are to understand the benefits of integrating real-world applications in mathematics education, to identify factors that enhance student motivation and achievement, and to explore the role of context-based learning in mathematics.

The study and the research on real-world applications by Schoenfeld (2015) and Felgenhauer and Möller (2017) both emphasize the importance of practical strategies in enhancing mathematics education. While the study focuses on intervention programs like *Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon Program* at Paracale National High School, the research by Schoenfeld and Felgenhauer and Möller highlights the benefits of integrating real-world problems to boost student engagement and understanding. Both approaches aim to improve mathematical achievement through relevant and interactive methods. However, the study employs a hybrid methodology combining quantitative and qualitative analysis, whereas the real-world application research focuses on contextual learning and its impact on motivation and comprehension. Despite these differences, both highlight the transformative potential of applying practical, real-world scenarios to enhance mathematical skills and student success.

Flipped Classroom Model in Mathematics Education

The flipped classroom model is a teaching approach where students review instructional content at home and engage in problem-solving activities during class time. This study explores the potential benefits of the flipped classroom model in mathematics education.

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Bergmann and Sams (2014) investigated the impact of the flipped classroom model on student performance and engagement. It focused on Grade 7 students and found that students in flipped classrooms demonstrated improvement in mathematical tasks and a deeper understanding of mathematical concepts.

Abeysekera and Dawson (2015) explored the effectiveness of the flipped classroom approach. It highlighted student-centered learning as a key benefit and emphasized individualized instruction and active learning opportunities. The objectives of the study are to understand the impact of the flipped classroom model on mathematics learning outcomes, identify factors contributing to improved student engagement, and explore the role of active learning in the classroom.

The study and the research on the flipped classroom model by Bergmann and Sams (2014) and Abeysekera and Dawson (2015) both emphasize innovative strategies aimed at improving student performance in mathematics. The study focuses on specific intervention programs like *Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon Program* at Paracale National High School, while the flipped classroom research highlights the benefits of having students review content at home and engage in problem-solving during class. Both approaches aim to enhance mathematical comprehension and performance through personalized and active learning. However, the study employs a hybrid methodology combining quantitative and qualitative analysis, whereas the flipped classroom research focuses on student-centered learning and individualized instruction. Despite these differences, both highlight the transformative potential of tailored educational strategies in mathematics education.

Flipped classrooms lead to the enhancement of student performance, deeper comprehension of mathematical concepts, and opportunities for personalized instruction. Implementing the flipped classroom model can enhance mathematics education by promoting active learning and individualized instruction.

The results of the Program for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMMS) serve as the baseline for the Philippine Department of Education in creating effective academic interventions. Various regions and schools actively participated in these interventions. Each school prepared a unique program tailored to address students' specific needs and bridge gaps, particularly within their local context.

Recently, Paracale National High School conducted a standardized exam called the Albay Numeracy Assessment Tools (ALNAT). The report revealed that 99% of students require significant support. Based on the following assessments, educators design different interventions and strategies. Specifically, the academic interventions—Brigada Pagbilang, Enrichment Program, and Hatedukasyon Program—will serve as valuable references for creating well-suited interventions.

In addition to these interventions, various teaching methodologies have supported my studies. These include differentiated instruction, collaborative learning strategies, inquiry-based learning, the flipped classroom model, and peer-assisted learning strategies. However, it is essential to critically evaluate the effectiveness of each intervention. Considering blended learning approaches and emphasizing conceptual understanding may enhance the overall impact of these programs. Selecting the most effective strategies will lead to the best intervention program.

According to the National Center on Safe Supportive Learning Environments, creating and maintaining safe learning environments involves various strategies and interventions. Understanding the link between issues and contributing factors is key to successful implementation.

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RESEARCH METHODOLOGY

This chapter presents the research design, methods and procedures, respondents' profile, unit of study, ethical considerations, and data analysis techniques utilized in the present study to prove the reliability of the assumption and hypothesis, answer the problems along with this study as well as facilitate the statistical treatment of the data gathered towards valid interpretation so general findings, conclusions, and recommendation can be accurate.

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Research Design

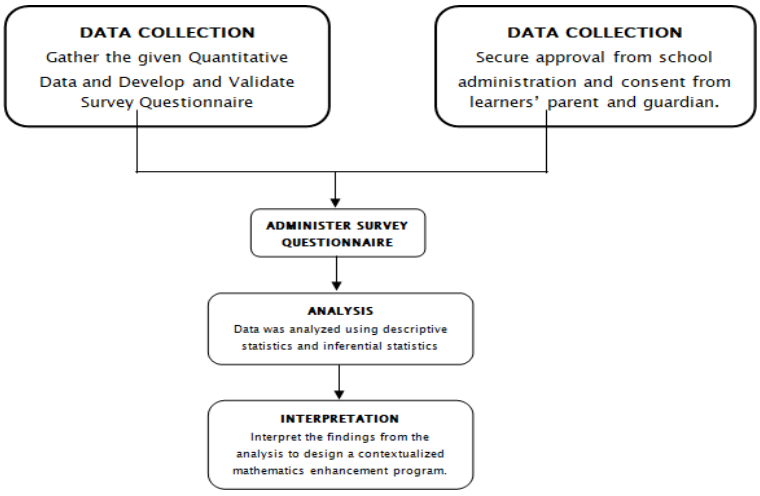
The multimethod approach, combining both quantitative and qualitative methods was used in the study to develop an Enhancement Program in Grade 7 Mathematics. The primary objective was to describe the effectiveness of various intervention programs. The respondents consisted of 10 teachers who played a critical role in shaping educational practices. According to Morse (2003), multimethod research provides a comprehensive approach by combining the strengths of both quantitative and qualitative data. This approach is efficient in educational research where complex phenomena require a multifaceted analysis.

For the quantitative component, since the different interventions had been implemented and the data, specifically the pre-test and post-test results, were known, the researcher proceeded with data analysis. Inferential statistics—specifically, Paired T-test (Dependent samples T-Test) and Analysis of Variance (ANOVA)—were employed to compare the effectiveness of different interventions. Cohen's Effect Size Index (Cohen's D) and Tukey HSD (Honest Significant Difference) were used to determine if at least one of the intervention programs had a different effect on student performance compared to the others. Given the three distinct intervention programs (Brigada Pagbilang, Enrichment Program, and HatEdukasyon Program), Paired T-Test, ANOVA, Cohen's Effect Size Index (Cohen's D), and Tukey HSD (Honest Significant Difference) served as appropriate tools for group comparisons and effectiveness. The use of a paired t-test and ANOVA was supported by Field (2018), who explained that these statistical methods were effective in comparing group means and determining the significance of differences in educational research.

Simultaneously, the qualitative component involved open-ended questions. Teachers shared their experiences, insights, and perceptions related to the interventions. Thematic analysis was applied to these qualitative responses to identify recurring themes and patterns. By exploring nuances and delving into the “why” behind their perspectives, this qualitative exploration complemented the quantitative ratings.

Methods and Procedures

The study was conducted at Paracale National High School, Paracale, Camarines Norte, which is a large school accommodating almost 3,000 students and 130 teaching and non-teaching personnel. To address the first objective, a questionnaire was distributed to ten (10) Mathematics Teachers who had participated in selected intervention programs. Respondents were instructed to identify the intervention programs



they had utilized and respond to open-ended questions regarding the multifaceted nature of effectiveness, including its impact on students' engagement and motivation, interconnectedness with other subjects, and alignment with broader educational goals. Clear instructions were included in the questionnaire to ensure proper guidance for respondents. Furthermore, quantitative data were analyzed to assess the effectiveness of the selected intervention programs based on students' performance. The use of questionnaires and open-ended questions was supported by Dillman, Smyth, and Christian (2014), who highlighted the effectiveness of these tools in gathering detailed and diverse perspectives from participants.

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For the second objective, the mathematics enhancement program was designed and contextualized, adhering to a structured approach outlined by the Department of Education (DepEd). This approach included components such as 1) Project Title, 2) Time Frame, 3) Target Beneficiaries, 4) Rationale, 5) Objectives, 6) Program Implementation and Mechanics, 7) Budget, 8) Source of Fund, 9) Expected Output of the Program, 10) Monitoring and Evaluation, and 11) Working Committee.

Units of Study

Based on the data presented in Table 1, the selected intervention programs, namely Brigada Pagbilang, Enrichment Program, and HatEdukasyon Program, were thoroughly described by the researcher. These programs were specifically created to address various aspects of mathematics education, ensuring that access to the necessary support and resources is provided to all students, regardless of their skill level. Through

Table 1 Units of Study in Selected Intervention Programs at Paracale National High School

Intervention Programs	Description / Objectives	Start of Implementation	Target Level
1. Brigada Pagbilang	• Strengthens arithmetic fundamentals through personalized and interactive instruction. • Provides additional support via extended instructional hours and peer-assisted learning. • Ensures continuous improvement with regular assessments and adaptive teaching strategies.	2022	Grade 7
2. Enrichment Program	• Used in daily lessons to target students' specific learning needs and challenges. • Combines varied instructional strategies, immediate feedback, and tailored support to enhance understanding. • Encourages collaboration through peer learning and interactive activities for deeper comprehension.	2022	All grade levels are from grade 7 to grade 10.
3. HatEdukasyon Program	• Unites students across grade levels within each barangay, promoting a community-centered learning approach. • Strengthens school-community connections by encouraging parental involvement and collaboration. • Utilizes local resources and partnerships to create a sustainable and enriching educational experience.	2021	All grade levels are from Grade 7 to Grade 10.

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a comprehensive approach to learning, mathematical proficiency is aimed to be improved, and a positive attitude toward mathematics is intended to be fostered among students.

Respondents' Profile

Ten (10) mathematics teachers served as respondents in the study. The group consisted of 6 (60%) females and 4 (40%) males. Due to the manageable number of respondents, the researchers opted to survey the entire population, and therefore, no sampling technique was employed in this research. The importance of understanding the demographic profile of respondents was highlighted by Creswell (2014), who noted that demographic data can provide valuable context for interpreting research findings.

In Table 2, the 10 respondents—consisting of 4 males (40%) and six females (60%)—actively participated in all three of the identified interventions. The three intervention programs—*Brigada Pagbilang*, Enrichment Program, and *Hatedukasyon Program*—were rigorously compared based on their impact on student performance. Notably, all three programs utilized the same standardized examination: the ALNAT Pre-test and Post-test. This consistency ensured that the assessment was fair and directly comparable across interventions. Moreover, the sample size was uniform for each program with precisely thirty students participating in each group. This balance helps mitigate potential biases related to group size.

Ethical Considerations

Permission was sought from the Schools Division Superintendent of Camarines Norte through a formal written letter. Upon receiving approval, the letter was presented

Table 2 Participation of Respondents in Three Intervention Programs

Respondents	Brigada Pagbilang	Enrichment Program	HatEdukasyon Program
Male (4)	4	4	4
Female (6)	6	6	6
Total	10	10	10

to the school head of Paracale National High School, allowing the formal proceeding of data collection. Before data collection, input was sought from three (3) validators to review the questionnaire. Additionally, permission was requested from the proponents and participating mathematics teachers of the intervention programs for the utilization of the data they had gathered, including pre-test and post-test results from the students. Confidentiality was assured, and informed consent was obtained from all participants. Ethical considerations in educational research were emphasized, as highlighted by Cohen, Manion, and Morrison (2018). The protection of participants' rights and integrity was ensured through the fundamental practices of confidentiality and informed consent.

Data Analysis Techniques

For the quantitative analysis, inferential statistics, specifically Paired T-test and Analysis of Variance (ANOVA) were employed to compare the effectiveness of different interventions. Cohen's Effect Size Index (Cohen's D) and Tukey HSD were used to determine the practical significance of the differences observed. The use of these methods is supported by Field (2018), who explains their effectiveness in educational research. For the qualitative analysis, thematic analysis was conducted on the open-ended responses to identify recurring themes and patterns. This involved coding the data, grouping the codes into themes, and refining these themes accurately represent the data. Braun and Clarke (2006) describe thematic analysis as a flexible and valuable research tool for analyzing qualitative responses. The findings from both quantitative and qualitative analyses are expected to provide valuable insights into the effectiveness of targeted intervention programs in improving students' numeracy skills and overall academic performance.

Educators and policymakers should consider integrating these interventions into the standard curriculum. Hattie (2009) supports the integration of evidence-based practices into the curriculum. The anticipated results are expected to support previous research on the effectiveness of personalized tutoring and collaborative learning strategies. The findings are likely to align with studies by Tomlinson and Moon (2014) on differentiated instruction and by Johnson and Johnson (2016) on cooperative learning. The study's findings will be relevant to the goals of the Department of Education's literacy and numeracy programs, highlighting the importance of evidence-based teaching strategies.

The IPO (Input-Process-Output) model was used to evaluate a research-based intervention program's effectiveness in teaching mathematics. In the input phase, resources, expertise, and evidence-based practices were identified and analyzed. The process phase involved assessing the implementation's fidelity, quality, and challenges through observations and interviews. The output phase evaluated the immediate outcomes, leading to a proposed new contextualized intervention program that combined the best features of three existing programs. This systematic approach provided a nuanced understanding of the program's effectiveness and highlighted areas for improvement or further research. Furthermore, future research could explore the long-term impact of these intervention programs and test their effectiveness in different educational settings. Creswell (2014) emphasizes the importance of longitudinal studies and the exploration of intervention effectiveness across diverse contexts.

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Analysis and Interpretation

This chapter presents the analysis and interpretation of the effectiveness of selected intervention programs, which led to the basis and design of a contextualized mathematics enhancement program in Mathematics 7. Specifically, the objectives were 1) describe the effectiveness of selected intervention programs in teaching mathematics; and 2) design a contextualized mathematics enhancement program based on the selected intervention programs.

Effectiveness of Selected Intervention Programs in Teaching Mathematics

This section presents an analysis of Brigada Pagbilang, the Enrichment Program, and the Hatedukasyon Program, highlighting their effectiveness as the basis for the design of a contextualized mathematics enhancement program for Mathematics 7.

Effectiveness of Brigada Pagbilang

The results illustrated in Table 3 of the paired t-test for *Brigada Pagbilang* indicate a significant difference between pre-test and post-test scores. Specifically, the pre-test mean was 6.2 with a standard deviation of 2.7, while the post-test mean increased substantially to 42.2 with a standard deviation 2. The mean difference of 36 underscores the improvement the intervention achieved. Notably, the p-value (less than 0.001) confirms that this difference is statistically significant. Furthermore, the large Cohen's d effect size (measuring 11.37) emphasizes the meaningful impact of *Brigada Pagbilang* on numeracy skills.

Table 3 The Significant Difference of Brigada Pagbilang to their Pre-Test and Post-Test Results.

Intervention Programs	Test Results	Mean	SD	MD	P – Value	Cohen's D
Brigada Pagbilang	Pre-Test	6.2	2.7	36	p < .001	11.37
	Post-Test	42.2	2			

Legends:

p < .001: Very Highly Significant (VHS)

.001 ≤ p ≤ .01: Highly Significant (HS)

.01 < p ≤ .05: Significant (S)

p > .05: Not Significant (NS)

Brigada Pagbilang is a specialized mathematics intervention to support students struggling with the subject, particularly those with low initial assessment scores. By integrating personalized instruction and interactive learning, the program enhances engagement and achievement, aligning with Palazzo's (2013) findings. Research by Alrajeh and Shindel (2020) highlights that individualized support fosters motivation and ownership in learning. *Brigada Pagbilang* leverages these principles, leading to improved conceptual mastery and problem-solving skills.

Targeted interventions within the program have significantly boosted student confidence, as demonstrated by studies from Gaspard et al. (2022) and Yang et al. (2024). Peer collaboration is also a key component, fostering mutual academic support and collective learning, as noted by Cheng and Walters (2009). Recognizing small victories reinforces motivation and nurtures a growth mindset. Beyond mathematics, *Brigada Pagbilang* positively impacts other subjects like science and economics, strengthening overall academic confidence and metacognitive abilities (National Institute of Teaching, 2023; Mulligan et al., 2020).

To maximize its impact, *Brigada Pagbilang* should be expanded to reach a broader range of students, especially in underperforming schools and marginalized communities. Increasing accessibility will ensure more learners benefit from personalized instruction, leading to improved educational outcomes. Further research and refinement of instructional strategies will enhance its effectiveness, making *Brigada Pagbilang* a sustainable model for fostering long-term academic growth and mathematical excellence.

Effectiveness of Enrichment Program

As illustrated in Table 4, the paired t-test results for the *Enrichment Program* indicate a significant difference between pre-test and post-test scores. Specifically, the pre-test mean was 12 with a standard deviation of 3.2, while the post-test mean increased substantially to 41 with a standard deviation of 1.8. The mean difference of 29 underscores the improvement the intervention achieved. Notably, the p-value (less than 0.001) confirms that this difference is statistically significant. Furthermore, the large Cohen's d effect size (measuring 10.84) emphasizes the meaningful impact of the Enrichment Program on numeracy skills.

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The Enrichment Program utilized specialized activities to enhance students' understanding of mathematical concepts through targeted support and personalized instruction. This approach aligns with Sharma's (2024) findings on personalized learning environments, demonstrating that individual attention significantly improves engagement and achievement. Interactive tasks, such as collaborative problem-solving and hands-on projects, fostered student participation, reinforcing a sense of ownership in their learning journey. Studies by Griffith University (2023) confirm that inquiry-based learning and interactive methods elevate motivation and comprehension in mathematics.

Success in mastering mathematical concepts and overcoming challenges boosted students' confidence, leading to higher motivation and performance. Research from Gaspard et al. (2022) highlights that structured motivation interventions enhance students' academic drive. Additionally, peer collaboration played a crucial role in fostering

Table 4 The Significant Difference of Enrichment Program to their Pre-Test and Post-Test Results.

Intervention Programs	**Test Results**	**Mean**	**SD**	**MD**	**P – Value**	**Cohen's D**
Enrichment Program	Pre-Test	12	3.2	29	$p < .001$	10.84
	Post-Test	41	1.8			

Legends:

p < .001: Very Highly Significant (VHS)

.001 ≤ p ≤ .01: Highly Significant (HS)

.01 < p ≤ .05: Significant (S)

p > .05: Not Significant (NS)

engagement, as Stearman et al. (2008) found that learning in collaborative environments improves individual and collective academic outcomes. The Enrichment Program's impact extended beyond mathematics, strengthening problem-solving skills applicable across disciplines (Institute of Competition Sciences, 2022). By fostering resilience, students developed a positive academic mindset that benefited their overall performance.

Moreover, to maximize its effectiveness, the Enrichment Program should be expanded to reach a broader student demographic, particularly those in underperforming schools. Increasing accessibility to personalized and collaborative learning interventions will ensure more students benefit from tailored academic support. Additionally, refining instructional strategies

Effectiveness of HatEdukasyon Program

From the data shown in Table 5, the paired t-test results for the *HatEdukasyon Program* also indicate a significant difference between pre-test and post-test scores. Specifically, the pre-test mean was 12.5 with a standard deviation of 3.6, while the post-test mean increased substantially to 40.7 with a standard deviation 2. The mean difference of 28.2 underscores the improvement the intervention achieved. Notably, the p-value (less than 0.001) confirms that this difference is statistically significant. Furthermore, the large Cohen's d effect size (measuring 7.52) emphasizes the meaningful impact of the *HatEdukasyon Program* on numeracy skills.

The *HatEdukasyo*n Program brought students from various grade levels together within their barangay, fostering a community-based approach to education. By localizing

Table 5*The Significant Difference of HatEdukasyon Program to their Pre-Test and Post-Test Results.*

Intervention Programs	**Test Results**	**Mean**	**SD**	**MD**	**P – Value**	**Cohen's D**
HatEdukasyon Program	Pre-Test	12.5	3.6	28.2	p < .001	7.52
	Post-Test	40.7	2			

Legends:

p < .001: Very Highly Significant (VHS)

.001 ≤ p ≤ .01: Highly Significant (HS)

.01 < p ≤ .05: Significant (S)

p > .05: Not Significant (NS)

learning, the program strengthened students' connection to their education, increasing motivation and engagement. Joseph and Said (2020) emphasize that community-based education enhances academic learning and civic development by addressing real-world issues. Holmes et al. (2021) found that such localized learning boosts student enjoyment and interest, particularly in STEM fields. Additionally, public recognition of achievements through certificates or community events reinforced motivation and confidence (Ward, 2024).

The program's success extended beyond mathematics, influencing students' study habits and problem-solving skills, which proved valuable across subjects. The Institute of Competition Sciences (2022) highlights the significance of problem-solving skills in improving overall academic performance. As students gained confidence in their abilities, they adopted a proactive approach across disciplines, further strengthening their learning strategies and academic resilience.

Furthermore, to build on its success, the *HatEdukasyon Program* should be expanded to benefit a wider range of students, particularly those in underserved communities. Broadening access will ensure more learners experience the advantages of community-based education. Strengthening partnerships with local government units and educational institutions can further enhance the program's reach, providing additional resources and support for students. Incorporating structured mentorship initiatives within the program can also foster leadership skills, as older students or community leaders guide younger learners in their academic journey. Additionally, continuous program evaluation and refinement through research-based assessments will ensure its long-term effectiveness, allowing educators to optimize instructional approaches based on evolving student needs. By enhancing and scaling the *HatEdukasyon Program*, it can serve as a sustainable model for holistic learning, fostering academic excellence, personal growth, and community engagement.

Comparative Analysis of the Effectivity of the Three Program

The statistical analysis employed in Table 6 was a one-way ANOVA (analysis of variance), which assessed whether there were significant differences in Mean post-test scores among the three programs. The resulting p-value (0.00915) is less than the significance level (0.05), suggesting a significant difference among the intervention programs.

Table 7, using Tukey HSD (Honest Significant Difference), stated that at least one of the intervention programs has a different effect on student performance than the others. Based on the results, the difference of *Brigada Pagbilang* (1.233) is more significant than the critical mean of the Enrichment Program (1.212). The confidence interval (0.0212 to 2.445) does not include zero. The p-value (0.0452) is less than 0.05. Therefore, there is a significant difference between the *Brigada Pagbilang* and the Enrichment Program. In the second part, the difference between the Enrichment Program (0.267) is less than the critical mean of the

HatEdukasyon Program (1.212). The confidence interval (-0.945 to 1.479) includes zero. The p-value (0.86) is greater than 0.05. Therefore, there is no significant difference between the Enrichment Program and

Table 6 The Significant Difference of the Three Intervention Programs Using Analysis of Variance (ANOVA)

Variable	**Brigada Pagbilang**		**Enrichment Program**		**HatEdukasyon Program**		**F Statistics**	**P-Value**	**Remarks**
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**			
Pre-Test	6.2	2.7	12	3.2	12.5	3.6			
Post-Test	42.2	2	41	1.8	40.7	2			
							4.956	0.00915	VHS

Legends:

p < .001: Very Highly Significant (VHS)

.01 ≤ p ≤ .01: Highly Significant (HS)

.01 < p ≤ .05: Significant (S)

p > .05: Not Significant (NS)

Table 7

The Comparative Effectiveness Among the Three Intervention Programs Using Post-hoc Test.

Pair	**Difference**	**SE**	**Q**	**Lower CI**	**Upper CI**	**Critical Mean**	**p-value**
x1-x2	1.233	0.359	3.431	0.0212	2.445	1.212	0.0452
x1-x3	1.5	0.359	4.173	0.288	2.712	1.212	0.0112
x2-x3	0.267	0.359	0.742	-0.945	1.479	1.212	0.86

Group	**x2**	**x3**
x1	1.23	1.5
x2	0	0.27

Legends: x1 = Brigada Pagbilang

x2 = Enrichment Program

x3 = HatEdukasyon Program

the *HatEdukasyon* Program.In summary, among the three intervention programs, *Brigada Pagbilang* differs significantly from the Enrichment and *HatEdukasyon* programs. This data is also supported by qualitative findings shared by the ten teachers who actively participated in our study.

Brigada Pagbilang strengthens foundational math skills by providing personalized support for struggling students. Interactive lessons and tailored instruction boost motivation and problem-solving abilities, aligning with Gaspard et al. (2022) and Alrajeh and Shindel (2020), who highlight the impact of targeted interventions

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on student performance. To maximize its effectiveness, *Brigada Pagbilang* must be expanded to reach more learners, ensuring equitable access to specialized support. Additionally, integrating the program with other subjects will enhance interdisciplinary learning, reinforcing essential skills beyond mathematics and promoting overall academic growth.

The ***Enrichment Program*** seamlessly integrates into daily math lessons, reinforcing comprehension through targeted exercises. Studies by Griffith University (2023) and Stearman et al. (2008) show that inquiry-based learning and peer collaboration improve engagement and problem-solving skills. To broaden its impact, the Enrichment Program should incorporate interdisciplinary applications, enabling students to transfer their problem-solving abilities across various subjects. Strengthening instructional strategies through continuous refinement will further optimize student outcomes, ensuring deeper understanding and sustain academic success.

HatEdukasyon **Program** fosters community-based education, enhancing learning through local engagement. Research by Joseph and Said (2020) and Holmes et al. (2021) confirms that localized learning boosts student motivation and retention. For greater sustainability and long-term impact, the *HatEdukasyon* Program must strengthen partnerships with local leaders and expand mentorship initiatives, providing students with additional resources and guidance. Continuous evaluation and development will refine its approach, ensuring that students gain both academic knowledge and essential life skills that prepare them for real-world challenges.

Together, these three interventions promote motivation, engagement, and academic success through personalized instruction, integrated learning, and community involvement. By expanding access, enhancing interdisciplinary connections, and fostering long-term sustainability, these programs can empower students with the skills, confidence, and resilience needed for lifelong learning and success.

Design of Mathematics Enhancement Program

The following sections outline the strengths of the three intervention programs, the process of developing the program's features, and the key features of the contextualized mathematics enhancement program. The following sections detail the program's inputs, processes, and outputs, supported by relevant studies and literature, as summarized in Table 8 below.

Input Phase

The inputs for the program centered on three key intervention approaches:

Table 8 Input-Process-Output Framework of the Mathema-Teka Muna.

Phase	**Details**
Inputs	• Brigada Pagbilang: The program emphasized *personalized intervention.* It provides targeted support for students who struggle with foundational math concepts, ensuring their individual learning needs are met through tailored instruction and interactive sessions. • Enrichment Program: The program emphasized an *integrated learning approach*. It seamlessly incorporates reinforcement activities into daily mathematics lessons, ensuring that students continuously build their mathematical understanding without requiring separate interventions. • HatEdukasyon Program: The program emphasized *community-centered learning*. It immerses students in educational experiences within their local barangays, fostering a strong sense of belonging and encouraging active participation in real-world applications.

Process	• Step 1: Study the Previous Program • Step 2: Plan the Main Features • Step 3: Create Learning Materials • Step 4: Add Simple Assessments • Step 5: Involve the Community • Step 6: Test and Improve the Program
Output	• Community-Based Approach • Personalized Learning • Differentiated Instruction • Continuous Assessment • Stakeholder Collaboration • Structured Interventions

personalized intervention, integrated learning, and community-centered learning.

Personalized Intervention. It provides targeted support for students struggling with foundational math concepts through tailored instruction and interactive learning experiences. By adapting teaching methods to individual needs, educators bridge learning gaps and enhance comprehension, fostering engagement and academic success.

Research underscores its effectiveness. Bernacki & Walkington (2014) found that students engaging with interest-based math problems demonstrated increased motivation and improved learning outcomes. Similarly, Sharma (2024) highlights that personalized learning, combined with diagnostic assessments and technology-driven instruction, significantly boosts student engagement and confidence. A study by Manuel S. Enverga University Foundation confirms that strategies such as modeling, explicit teaching, and collaborative learning effectively cater to diverse learning styles, optimizing mathematics performance.

Moreover, to maximize its impact, personalized intervention should be integrated into broader educational programs, ensuring equitable access for struggling students. Schools must implement technology-driven adaptive learning tools to refine instructional approaches and provide individualized support. Additionally, continuous assessment and research on personalized strategies will enhance effectiveness, ensuring sustained academic success and confidence in mathematics.

Integrated Learning Approach. It embeds reinforcement activities into daily mathematics lessons, ensuring continuous skill development. By integrating mathematics

lessons, ensuring continuous skill development. By integrating mathematical concepts with other subjects, students gain a deeper understanding of real-world applications, fostering interdisciplinary connections.

Research supports its effectiveness in mathematics education. Ogunfowote & Asanre (2019) found that integrative teaching approaches significantly improve student achievement compared to conventional methods. Additionally, Vale & Barbosa (2023) highlight that active learning strategies, including interdisciplinary integration, enhance engagement and problem-solving abilities.

To maximize its impact, integrated learning should be systematically incorporated across curricula, strengthening interdisciplinary connections and reinforcing real-world applications. Schools should promote cross-subject collaboration among educators to create cohesive learning experiences. Additionally, continuous

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assessment and curriculum refinement will ensure sustainable improvements, fostering deeper comprehension and skill development across multiple disciplines.

Community-Centered Learning. It immerses students in educational experiences within their local barangays, fostering a sense of belonging and encouraging active participation in real-world applications. By integrating learning into familiar environments, students develop practical skills and build stronger connections with their communities.

Research highlights its effectiveness in enhancing student engagement and learning outcomes. Barangay Literacy Programs in the Philippines help bridge gaps for underserved learners, making education more accessible and relevant. The *Alternative Learning Systems (ALS)* program takes a grassroots approach, ensuring tailored instruction within communities. Additionally, community learning hubs like *Bayanihan E-Skwela* provide structured spaces for collaborative learning, reinforcing the role of community involvement in education.

To strengthen its impact, community-centered learning should be expanded to reach more underserved communities, ensuring equitable access to localized education. Strengthening partnerships between schools, local government units, and community leaders will provide essential resources and mentorship opportunities. Continuous assessment and refinement of community-based learning models will ensure sustained engagement, fostering lifelong academic growth and social empowerment.

Process Phase

The development of the contextualized mathematics enhancement program followed a structured six-step process that began with the following.

Step 1: Studying the Previous Programs. *Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon* Program were evaluated for their impact on student learning. *Brigada Pagbilang* provided personalized arithmetic tutoring, supporting Bernacki and Walkington's (2014) research on Intelligent Tutoring Systems (ITS) that enhance math performance. The Enrichment Program addressed learning gaps through structured lessons, aligning with Tomlinson and Moon's (2014) findings on the effectiveness of targeted interventions. *HatEdukasyon* Program fostered community-based education, reinforcing Chowdhury and Alzarrad's (2025) research on Community-Based Education (CBE), which connects academic learning to real-world contexts. The Community-Based Monitoring System Act in the Philippines further supports localized education in improving accessibility and inclusivity.

Combining the strengths of these programs ensures equitable access and continuous assessment for underserved communities. Dosch and Zidon (2014) highlight how responsive teaching strategies improve problem-solving and conceptual understanding, underscoring the need for collaboration among educators, local leaders, and policymakers to refine methodologies and provide essential resources for long-term student success.

Step 2: Planning the Main Features. The Mathema-Teka Muna Program integrates personalized instruction, differentiated activities, and community involvement to support diverse learners. Bernacki and Walkington (2014) found that personalized learning enhances motivation and academic performance, while Tomlinson and Moon (2017) emphasized that differentiated instruction improves engagement and comprehension. Chowdhury and Alzarrad (2025) highlighted that community-based education strengthens accessibility and participation, reinforcing the importance of integrating localized learning strategies.

To ensure effectiveness, the program fosters engagement and inclusivity through a cohesive, flexible model. Dosch and Zidon (2014) demonstrated that responsive teaching enhances problem-solving and conceptual understanding, underscoring the need for collaboration among educators, community leaders, and policymakers. Strengthening these partnerships will sustain impact and ensure long-term student success.

Step 3: Creating Learning Materials. With the program's features established, the team developed engaging, age-appropriate learning materials aligned with the curriculum. Research by Bernacki and Walkington (2014) highlights those interactive tools, such as worksheets, visual aids, and real-life problem-solving tasks, enhance student engagement and make math more relatable.

To ensure inclusivity, materials were tailored to different learning levels, supporting Tomlinson and Moon's (2014) findings that differentiated instruction fosters comprehension and motivation. This approach builds confidence in mathematics, ensuring meaningful participation for all students, regardless of ability.

Step 4: Adding Simple Assessments. To track student progress and refine instruction, simple and regular assessments were integrated into the program. These included short quizzes, performance tasks, and observation checklists, which effectively monitor learning outcomes and provide valuable feedback for educators.

Research by Mmari, Kasumba, and Ambakisye (2024) highlights that continuous assessment significantly improves student engagement and final academic performance. Additionally, Ali, Younas, and Mushtaq (2021) found that techniques such as oral tests, written assignments, and recap exercises enhance comprehension and retention. These findings reinforce the importance of timely adjustments in teaching strategies, ensuring that learning remains responsive, adaptive, and effective, fostering continuous improvement in student comprehension and engagement.

Step 5: Involving the Community. To extend learning beyond the classroom, the program actively engaged parents, teachers, and local volunteers through training and orientation sessions, particularly in barangay-based learning environments. Research by Chowdhury and Alzarrad (2025) highlights that community involvement enhances accessibility and engagement, ensuring students receive support from both educators and family members.

By reinforcing shared responsibility in education, this approach fostered a collaborative and inclusive learning experience. Dosch and Zidon (2014) found that sustained community participation improves academic success and student motivation, further strengthening long-term learning outcomes.

Step 6: Testing and Improving the Program. Before full implementation, the Mathema-Teka Muna Program was piloted in selected areas to assess its effectiveness. Feedback from students, teachers, and stakeholders identified strengths and areas for improvement, leading to refinements that ensured the program was well-tested, practical, and ready for broader application.

Throughout this process, Brigada Pagbilang provided arithmetic tutoring, supporting research on structured intervention programs that enhance numeracy skills. The Enrichment Program delivered targeted daily lessons, reinforcing findings on enrichment pedagogy that improve student engagement and comprehension. HatEdukasyon facilitated accessible community-based learning, aligning with studies on Community-Based Education (CBE) that strengthen student participation and accessibility.

Regular assessments and feedback sessions refined instructional strategies, while interactive and collaborative activities boosted student engagement, consistent with research on active learning approaches. Tomlinson and Moon (2014) validated differentiated instruction through flexible grouping and varied content, while Dosch and Zidon (2014) highlighted its impact on problem-solving and conceptual understanding. These findings reinforced the value of structured intervention programs in shaping a responsive and inclusive math education model.

Output Phase

The contextualized mathematics enhancement program incorporates several key features designed to support student learning and engagement.

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Community-Based Approach. It integrates learning sessions within barangays, fostering collaboration and accessibility in education. By bringing educational activities directly into communities, students engage in a more inclusive and dynamic learning environment.

Research supports its effectiveness in enhancing student engagement and academic performance. Chowdhury & Alzarrad (2025) highlight that Community-Based Education (CBE) links academic learning with real-world challenges, increasing relevance and motivation. The Community-Based Monitoring System Act in the Philippines has demonstrated how localized education improves accessibility and inclusivity. Additionally, the National Community Driven Development Program (NCDDP) by the DSWD reinforces the role of community participation in strengthening educational outcomes.

To maximize its impact, the Community-Based Approach should be expanded to reach more barangays, ensuring broader accessibility for students in underserved areas. Strengthening partnerships with local government units and educational institutions will provide necessary resources and support. Additionally, continuous assessment and refinement of community-based programs will ensure sustainability, fostering long-term academic and social development.

Personalized Learning. It ensures that students receive tailored tutoring sessions addressing individual needs and fundamental arithmetic concepts. By adapting instruction to each learner's strengths and challenges, personalized learning fosters deeper comprehension, engagement, and academic growth.

Research highlights its effectiveness in mathematics education. Bernacki & Walkington (2014) found that students in personalized math interventions showed increased motivation and improved learning outcomes. Additionally, a report by BYJU'S Math Companion emphasizes that one-on-one tutoring enhances problem-solving skills and builds confidence by allowing students to learn at their own pace.

Further supporting this, a study in the *Journal of Interdisciplinary Perspectives* (2025) assessed tutorial programs' impact on mathematics performance, concluding that individualized tutoring significantly improves comprehension and confidence.

To maximize its impact, personalized learning initiatives must be expanded and made more accessible, ensuring that all students, especially those in underserved communities, receive the support they need. Incorporating technology-driven adaptive learning tools will further refine instructional approaches, allowing tutors to customize lessons dynamically. Additionally, integrating personalized learning strategies into broader curricula can enhance interdisciplinary connections, strengthening problem-solving abilities across subjects and fostering long-term academic success. By prioritizing structured and research-backed expansion, personalized learning can serve as a cornerstone for effective educational development.

Differentiated Instruction. It allows educators to tailor lessons to diverse learning styles, abilities, and readiness levels, fostering engagement and academic success. Tomlinson (2014) emphasizes that modifying content, processes, and assessments creates a more inclusive learning environment, while Edutopia highlights Universal Design for Learning (UDL) as essential for accessible education. Flexible grouping and personalized learning paths improve comprehension and retention, boosting motivation and performance (Institute of Learning Research, 2023).

To enhance its impact, differentiated instruction should be widely implemented, ensuring equitable learning opportunities. Schools must provide professional development to equip educators with effective strategies and integrate adaptive learning technologies for personalized instruction. Ongoing research and assessment will refine best practices, supporting long-term student success.

Continuous Assessment. It ensures ongoing student improvement throughout feedback-driven adjustments and adaptive learning. By evaluating performance and providing timely insights, educators refine instruction to meet individual learning needs, enhancing comprehension and engagement.

Research supports its effectiveness. UNESCO highlights formative assessment as crucial for improving teaching and learning, while AI-driven models provide personalized feedback and data-driven analytics that foster a growth mindset. Adaptive learning systems enable dynamic curriculum adjustments, aligning instruction with students' evolving skills.

To maximize its impact, continuous assessment should be widely implemented, ensuring students receive personalized feedback for sustained progress. Schools should invest in AI-driven tools for precise performance tracking and equip educators with training in data interpretation and instructional refinement. Regular evaluation and improvements will make learning more effective, engaging, and tailored to individual needs

Stakeholder Collaboration. It involves teachers, parents, and community members working together to foster a supportive learning environment. By engaging multiple stakeholders, students receive holistic academic and social support, improving their overall educational experience.

Research highlights its impact on student success. The Harvard Graduate School of Education found that strong family and community engagement enhances academic performance, motivation, and school retention. The Teachers Institute reinforces that parental and community involvement creates inclusive spaces where students feel valued and supported. Additionally, DepEd outlines strategies such as open communication, parental engagement, and collaborative learning to strengthen educational communities.

To maximize its effectiveness, stakeholder collaboration should be actively promoted through structured engagement programs. Schools must encourage consistent communication between educators and families, fostering shared responsibility for student success. Strengthening partnerships with local communities will provide additional resources and mentorship opportunities. Additionally, continuous assessment of collaborative efforts will ensure sustainable improvements, making learning environments more inclusive, supportive, and effective.

Structured Interventions. It fosters holistic development by integrating cooperative and collaborative activities that enhance numeracy, engagement, and problem-solving skills. These dynamic learning environments encourage teamwork and critical thinking through group-based problem-solving.

Research highlights their effectiveness in mathematics education. Studies on cooperative learning strategies show that collaborative activities improve engagement and comprehension, while holistic assessment approaches in early math education emphasize interactive learning for developing cognitive skills. Additionally, pedagogical frameworks indicate that peer collaboration and guided learning significantly enhance problem-solving abilities.

Additionally**,** to maximize their impact, structured interventions should be widely implemented across educational settings, ensuring students benefit from active learning experiences. Schools should integrate peer collaboration into daily lessons and provide training for educators on effective intervention strategies. Additionally, continuous evaluation of structured learning approaches will help refine best practices, fostering long-term numeracy and critical thinking development.

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SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter deals with the summary, conclusion, and recommendations based on the gathered data, results, findings, and interpretations presented in the previous chapter.

Objective 1

Describe the effectiveness of selected intervention programs in teaching mathematics and

Findings

1 *Brigada Pagbilang* greatly enhanced students' numeracy skills, raising the mean score from 6.2 to 42.2, with a substantial effect size (Cohen's d = 11.37). This program proved to be the most effective among the three interventions.
2 Enrichment Program significantly improved students' numeracy skills, with a mean score increase from 12 to 41 and a large effect size (Cohen's d = 10.84). This program proved to be the second most effective among the three interventions.
3 *HatEdukasyon* Program significantly improved students' numeracy skills, with a mean score increase from 12.5 to 40.7 and a large effect size (Cohen's d = 7.52). This program proved to be the least among the three interventions.

Conclusions

1. *Brigada Pagbilang* HAS significantly improved students' numeracy skills by providing structured arithmetic tutoring, reinforcing foundational mathematics concepts,and boosting confidence in problem-solving. Research highlights that targeted numeraryinterventions enhance student motivation and competence, enabling learners to stylemathematics with greater enthusiasm and proficiency.
2. The Enrichment Program has strengthened problem-solving abilities by incorporating advanced exercises, real-world applications, and interactive learning strategies. Studies show that enrichment programs improve academic self-efficacy, equipping students with the skills needed to tackle complex mathematical concepts and apply them effectively in various learning scenarios
3. Community support and involvement have played a crucial role in fostering student motivation and engagement. Collaborative efforts between educators, parents, and local volunteers have created a

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supportive learning environment, encouraging students to actively participate and excel in mathematics. Research confirms that strong community engagement enhances student retention, confidence and overall academic success.

Recommendations

1 Expand *Brigada Pagbilang* to reach more students by implementing the program in additional schools and communities, particularly in underserved areas. Providing teacher training and instructional resources will ensure effective delivery, while integrating the program with subjects like science and economics will create an interdisciplinary learning experience, fostering well-rounded academic development.

2 Apply problem-solving skills beyond mathematics by incorporating structured exercises in subject such as science, technology, and social studies. Research

3 highlights that cross-disciplinary integration strengthens critical thinking, logical reasoning, and analytical abilities, equipping students with transferable skills applicable across various fields.

4 Strengthen collaboration with local leaders and communities by establishing formal partnerships with barangay officials, educational institutions, and private organizations. Creating mentorship programs and community-led tutoring initiatives will provide sustainable support systems, ensuring long-term success and fostering an engaged and resourceful learning environment.

Objective 2. Design a contextualized mathematics enhancement program.

The Mathema-Teka Muna integrates *Brigada Pagbilang*, Enrichment Program, and *HatEdukasyon* Program to address diverse learning needs through personalized intervention, integrated reinforcement, and community-centered learning. *Brigada Pagbilang* provides structured tutoring, helping students strengthen foundational numeracy skills with tailored instruction and interactive sessions. Research by Bernacki and Walkington (2014) highlights that targeted interventions enhance math performance and student confidence. The Enrichment Program embeds reinforcement activities within daily lessons to ensure continuous skill development, aligning with Tomlinson and Moon's (2014) findings that differentiated instruction improves engagement and comprehension. Meanwhile, *HatEdukasyon* Program fosters collaborative, real-world learning through barangay-based education, reinforcing Chowdhury and Alzarrad's (2025) study on town and community involvement in improving accessibility and participation.

To ensure effectiveness, the program follows a step-by-step implementation process—beginning with studying past models, refining methodologies, and integrating learning materials and assessments to monitor student progress. Dosch and Zidon (2014) emphasize that continuous evaluation strengthens problem-solving and conceptual understanding, reinforcing the need for adaptive learning strategies. Additionally, local partnerships involving educators, parents, and policymakers ensure sustained support, enhancing accessibility for diverse learners. By combining structured interventions, differentiated instruction, and community-based engagement, the program establishes a comprehensive and inclusive mathematics education framework, fostering confidence and success in students.

To further improve the program's impact, expanding *Brigada Pagbilang* to more schools and communities is essential, ensuring equitable access to quality numeracy instruction for a broader student population. Research highlights that cross-disciplinary integration strengthens critical thinking and logical reasoning, making it beneficial to apply problem-solving skills beyond mathematics. Incorporating structured exercises in science, and social studies will reinforce analytical abilities across subjects. Enhancing collaboration with local leaders through mentorship programs and community-led tutoring ensures sustainable student support. Strong partnerships with barangay officials, schools, and private organizations foster accessibility and a dynamic environment.

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APPENDIX A

Republic of the Philippines

UNIVERSITY OF NUEVA CACERES

School of Teacher Education

Naga City, Philippines

August 27, 2024

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Division of Camarines Norte

Daet, Camarines Norte

Sir:

Greetings!

I am writing to you as a researcher from the University of Nueva Caceres, currently pursuing a Master of Arts in Teaching Mathematics. My thesis, entitled "**BASES AND DESIGN OF MATHEMA-TEKA MUNA: A CONTEXTUALIZED MATHEMATICS ENHANCEMENT PROGRAM**" aims to improve the mathematical skills of Grade 7 students through targeted interventions.

In line with this research, I am seeking permission from your esteemed office to conduct face-to-face surveys with the mathematics teachers at Paracale National High School. The data collected will be instrumental in the successful completion of my study and will be treated with the utmost confidentiality.

Your approval and endorsement of this request would be greatly appreciated.

Thank you very much for your time and consideration.

Sincerely,

JESSICA C. ACEBO

MAT-Math Noted by:

ROMEO C. LAYONES

Adviser

Republic of the Philippines

UNIVERSITY OF NUEVA CACERES

School of Teacher Education

Naga City, Philippines

August 30, 2024

ALEJANDRO F. OIRA III

Officer-in-charge, Assistant School Principal II

Paracale National High School

Paracale, Camarines Norte, Philippines

THRU: **ANDY D. BALCE**

Head Teacher III, Math Department Head

Paracale National High School

Paracale, Camarines Norte, Philippines

Sir:

Greetings!

The undersigned is a researcher completing a Master of Arts in Teaching Mathematics at the University of Nueva Caceres with a thesis entitled "**BASES AND DESIGN OF MATHEMA-TEKA MUNA: A CONTEXTUALIZED MATHEMATICS ENHANCEMENT PROGRAM**"

I humbly request 10 Junior High School mathematics teachers in your beloved school to be my respondents in my thesis. Rest assured that the data gathered are kept confidential.

Thank you very much for your approval and endorsement of this letter.

Sincerely,

JESSICA C. ACEBO

MAT-Math

Noted by:

ROMEO C. LAYONES

Adviser

Republic of the Philippines

UNIVERSITY OF NUEVA CACERES

School of Teacher Education

Naga City, Philippines

August 28, 2024

MICHELLE R. TALLER

Mathematics Teacher -Master Teacher I

Paracale National High School

Paracale, Camarines Norte, Philippines

Madam:

Greetings!

The undersigned is a researcher from the University of Nueva Caceres, Naga City, Philippines, undertaking research entitled "**BASES AND DESIGN OF MATHEMA-TEKA MUNA: A CONTEXTUALIZED MATHEMATICS ENHANCEMENT PROGRAM**"

With your expertise, I humbly request your permission to validate the attached Teacher's Questionnaire of my study and the attached rating tool.

I am looking forward to my request meriting your positive response.

Thank you, and more power.

Sincerely,

JESSICA C. ACEBO

MAT-Math

Noted by:

ROMEO C. LAYONES

Adviser

Republic of the Philippines

UNIVERSITY OF NUEVA CACERES

School of Teacher Education

Naga City, Philippines

August 28, 2024

AIKO F. RETIRO

Mathematics Teacher - Teacher III

Paracale National High School

Paracale, Camarines Norte, Philippines

Madam:

Greetings!

The undersigned is a researcher from the University of Nueva Caceres, Naga City, Philippines, undertaking research entitled "**BASES AND DESIGN OF MATHEMA-TEKA MUNA: A CONTEXTUALIZED MATHEMATICS ENHANCEMENT PROGRAM**"

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I am looking forward to my request meriting your positive response.

Thank you, and more power.

Sincerely,

JESSICA C. ACEBO

MAT-Math

Noted by:

ROMEO C. LAYONES

Adviser

Republic of the Philippines

UNIVERSITY OF NUEVA CACERES

School of Teacher Education

Naga City, Philippines

August 28, 2024

FERLEN U. DOLINDO

Mathematics Teacher - Teacher III

Paracale National High School

Paracale, Camarines Norte, Philippines

Madam:

Greetings!

The undersigned is a researcher from the University of Nueva Caceres, Naga City, Philippines, undertaking research entitled "**BASES AND DESIGN OF MATHEMA-TEKA MUNA: A CONTEXTUALIZED MATHEMATICS ENHANCEMENT PROGRAM**"

With your expertise, I humbly request your permission to validate the attached Teacher's Questionnaire of my study and the attached rating tool.

I am looking forward to my request meriting your positive response.

Thank you, and more power.

Sincerely,

JESSICA C. ACEBO

MAT-Math

Noted by:

ROMEO C. LAYONES

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Adviser

Appendix B

VALIDATION OF SURVEY QUESTIONNAIRE

Thesis title: "**BASES AND DESIGN OF MATHEMA-TEKA MUNA: A CONTEXTUALIZED MATHEMATICS ENHANCEMENT PROGRAM**"

Dear Experts,

This inventory contains two (2) objectives and three (3) items related to the identified enhancement programs in Grade 7 Mathematics.
The researcher needs your expert judgment on the degree of relevance of each item to the measured domains.
Your review should be based on the definition and relevant terminologies that are provded to you.

Please be as objective and constructive as possible in your review.

Very sincerely yours,

JESSICA C. ACEBO Researcher

Objective 1: Describe the effectiveness of selected intervention programs in teaching mathematics.

Direction: The following are all the different implemented intervention programs in Paracale National High School. Kindly put a check to identify which intervention program you participated in.

Name of Academic Intervention Program:

☐ Brigada Pagbilang

☐ Enrichment Program

☐ Hatedukasyon Program

Instructions for Validators: Please review the following open-ended questions and provide feedback on their validation criteria. Your feedback will help ensure that the questions effectively capture the necessary information for the study.

Definition: To deepen the insights of the respondents, the following open-ended questions below were crafted by the researcher to test the effectiveness of the identified intervention programs to the students' performance in Mathematics.

Direction: Answer the following questions with the utmost honesty.

Impact on students' engagement and motivation.

1. How did the intervention impact students' engagement and motivation in mathematics?

- **Purpose**: To assess the effect of the intervention on students' attitudes towards mathematics.
- **Validation Criteria**: Clarity, relevance, and ability to capture nuanced insights.
- **Feedback**: _____

The interconnectedness of the program to other subjects.

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Alignment with broader educational goals.

3. How does the intervention contribute to students' overall educational journey during his/her 7th Grade?

- **Purpose:** To identify the long-term impact of the intervention program.
- **Validation Criteria**: Clarity, relevance, and comprehensiveness.
- **Feeback**: _____

_____

_____.

Additional Comments (Optional): Feel free to provide any additional comments or suggestions regarding the program's effectiveness:

Name of Expert and Signature Over Printed Name

Licensed No._____

APPENDIX C

SURVEY QUESTIONNAIRE

Dear Respondents,

I, Jessica C. Acebo, a student at the University of Nueva Caceres, currently enrolled in Master of Arts in Teaching Mathematics. Regarding this, I would appreciate it if you could respond to my survey on my thesis study entitled, "**BASES AND DESIGN OF MATHEMA-TEKA MUNA: A CONTEXTUALIZED MATHEMATICS ENHANCEMENT PROGRAM**"

I assure you that the information you provide in this questionnaire is confidential and will be used solely for educational improvement purposes.

Very sincerely yours,

JESSICA C. ACEBO

Researcher

Demographic Information (Optional)

Name (Optional): _____

Objective 1: Describe the effectiveness of selected intervention programs in teaching mathematics.

Direction: The following are all the different implemented intervention programs in Paracale National High School. Kindly put a check to identify which intervention program you participated in.

Name of Academic Intervention Program: ☐ Brigada Pagbilang
☐ Enrichment Program
☐ Hatedukasyon Program

Directions: Answer the following questions honestly.

Impact on students' engagement and motivation.

1. How did the intervention impact students' engagement and motivation in mathematics?

- _____
_____.

The interconnectedness of the program to other subjects.

2. How does achieving success in that specific intervention impact performance in other subjects?

- _____
_____.

Alignment with broader educational goals.

3. How does the intervention contribute to students' overall educational journey during his/her 7th Grade?

- _____
_____.

Additional Comments (Optional): Feel free to provide any additional comments or suggestions regarding the program's effectiveness:

- _____
_____.

_____

Signature of Respondents

APPENDIX D

Sample Design of Mathematics Enhancement Program Based on the Effectiveness of Different Intervention Programs.

Step-by-step Structured Approach	**Sample Proposal**
1) Project Title	Mathema-Teka Muna Program: A Mathematics Enhancement Program
2) Time Frame	1 whole academic year
3) Target Beneficiaries	Non-numerates of Grade 7 Students in Paracale National High School
4) Rationale	In line with the statement of Vice President and Secretary of Education Sara Z. Duterte, "The improvement of literacy and numeracy programs and the integration of 'peace competencies' will

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	be some of the priorities of the Department of Education (DepEd) in making the K to 12 curriculums relevant to produce job-ready, active and responsible citizens as part of the *MATATAG: Bansang Makabata, Batang Makabansa* agenda". DepEd Order No. 12, s. 2015, otherwise known as the Guidelines on the Early Language, Literacy and Numeracy Program: Professional Development Component, dated April 10, 2015, paragraph no. 1 states that the Department of Education (DepEd) is strengthening its reading program through the implementation of the Early Language, Literacy, and Numeracy Program. The ability to add, subtract, multiply, and divide is referred to as numeracy. It refers to the knowledge and skills required to effectively manage and respond to mathematical problems posed by a variety of situations that include objects, pictures, numbers, symbols, formulas, diagrams, maps, graphs, tables, and text. The ability to order and sort information, count, estimate, compute, measure, and follow a model; it involves responding to information about mathematical ideas that can be represented in a variety of ways. For academic achievement, understanding mathematics is a key topic. Unfortunately, many students struggle with mathematics, and this can have a negative impact on their academic performance. To address this issue, we propose a school-based " Mathema-Teka Muna Program" project that aims to improve students' math skills while also instilling a love of math in them.
5) Objectives	The primary objective of the "Mathema-Teka Muna Program" project is to promote numeracy among students and improve their Math Skills. The project aims to: a) Improve students' math skills, including basic arithmetic, problem-solving, and critical thinking. b) Enhance students' confidence in their math abilities by providing a supportive and engaging learning environment and c) Foster a love of math among students by promoting the practical application of math skills in real-life situations.
6) Program Implementation and Mechanics	Mathema-Teka Muna Program is a numeracy intervention program to support and in response to the statement of Vice President and Secretary of Education Sara Z. Duterte "The improvement of literacy and numeracy programs and the integration of "peace competencies". Then, DepEd Order No. 12, s. 2015 paragraph no. 1 states that the Department of Education (DepEd) is strengthening its reading program through the implementation of the Early Language, Literacy, and Numeracy Program. **MECHANICS:** **1.** Develop a teacher-made pre-test or a numeracy assessment tool to determine the low-performer students in each section. The teacher-made test is validated by experts such as Grade 7 mathematics teachers and master teachers. 2. Interviews for selected stakeholders like

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	students, teachers, and parents will be also conducted. Open-ended questions help to deepen the understanding and to create effective strategies. 3. Grade 7 Mathematics teachers will conduct a Pre-Test in Numeracy Assessment for Grade 7 students. 4. Collect the results and determine the student's numeracy level and assign color code (red – unable to perform four fundamental operations), (yellow – able to add and subtract but unable to multiply/divide two or more digits), (green – able to perform four fundamental operations but need to develop skills in solving simple worded problems). The purpose of color coding of non-numerates is the secrecy and privacy under the Data Privacy Act of 2012. 5. The identified non-numerates will be given parental consent for the approval of the parent/guardian that his/her child will undergo a numeracy program. 6. The students will be scheduled and will be grouped by the numeracy coordinator according to their section and the availability of tutors and teachers. They will be pulled out from their classes at least once a week during Mathematics Class or any subject suggested by the adviser, agreed and duly approved by the school principal. 7. The Mathematics Learning Resource Center will serve as the venue for tutoring sessions. 8. Make an appointment in a selected barangay to request assistance in conducting a tutorial for selected students on weekends. 9. In some time, the teachers will schedule home-visitation to interview the parents or the guardians of the selected students for the observable Progress. 10. Prepare activity sheets and instructional materials that will help the students to add, subtract, multiply, and divide as well as to handle and manage other math topics. 11. Develop and conduct a teacher-made post-test or a numeracy assessment tool for selected Grade 7 students. The teacher-made test is validated by experts such as Grade 7 mathematics teachers and master teachers. 12. Determine the Progress of the students through the results of the teacher-made post-test or Numeracy Assessment Tool. 13. A culminating activity will be conducted during the second and last quarter to recognize passers of Brigada Pagbilang. 14. All participants/non-numerates in the program will undergo also Feeding Program to be funded by the SPTA to monitor their nutritional status. This will help them become active participants in the program.

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7) Budget	**PHASE**	**ESTIMATED BUDGET**
	PRE-IMPLEMENTATION 1. Preparation of project proposal, schedule, memorandum, and list of non-numerated students with color coding.	2 reams of bond paper Php. 400 Ink of printer Php.1,600 Travel expenses Php. 600
	IMPLEMENTATION 1. Printing of assessment tools and materials	5 reams of bond paper Php.1,000
	2. Snacks and school supplies for learners	Snacks Php. 10,600 School supplies Php. 1,000
	POST-IMPLEMENTATION 1. Preparation of accomplishment reports, certificates, and tarpaper	2 reams of bond paper Php. 400
	TOTAL	**Php. 15, 000.00**
8) Source of fund	Project expenses and the activity's financial requirements will be charged to the school MOOE and/or other stakeholders in partnership with other advocacy organizations.	
9) Expected Output of the Program	1. Identified Grade 7 non-numerates students and coded according to numeracy level. 2. Improved numeracy level from needing significant support to at least emerging up to transforming. 3. Produced passers and transformed students who will become peer tutors. 4. Supportive stakeholders to endure and sustain the "Mathema-Teka Muna Program"	
10) Monitoring and Evaluation	The teacher-made post-test or a numeracy assessment tool will be administered as well, and monitoring and evaluation will be done by giving the school essential information to ensure the project's Progress. Moreover, as part of the evaluation, interviews and surveys from the stakeholders are highly valuable. It is important to monitor and evaluate the project since it provides the only consolidated source of information showcasing project progress, generates (written) reports that contribute to transparency and accountability, reveal mistakes and offer paths for learning and improvements.	
11) Working Committee.	Executive Committee, Planning Committee, Lead Technical Committee, Administrative Committee, and Documentation Committee, including Chairperson, Co-chairman, and Member in each committee.	