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PROJECT SAYON (STUDENT AID FOR YIELDING OUTSTANDING NUMERACY): ENHANCING STUDENTS' MATHEMATICAL PROFICIENCY

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ABSTRAK

This study evaluated the effectiveness of Project SAYON (Student Aid for Yielding Outstanding Numeracy) as an intervention to enhance mathematical proficiency among Grade 10 students at Luna National High School. Using a pre-experimental design, the study compared pre-test and post-test results to assess the impact of the project. The pre-test indicated a moderate level of proficiency, with a mean score of 10.09. After implementing Project SAYON, the post-test results revealed a significant improvement, with a mean score of 13.52. The hypothesis was tested at a 0.05 level of significance, showing a meaningful difference between the pre-test and post-test scores. This demonstrates that Project SAYON effectively improved students' mathematical skills by offering targeted tutoring and resources. The study highlights the importance of structured, innovative interventions in enhancing academic performance, particularly in mathematics.

KEYWORDS: *mathematical proficiency, intervention, pre-experimental*

RATIONALE

In the last few years, learning and teaching have come to depend on having a solid grasp of mathematical proficiency. Research has high significance, particularly in global educational reforms over the past 15 year despite its growing importance, mathematical proficiency remains somewhat vague and is not fully grasped by educators. Further exploration into how to better define and communicate the concept of mathematical proficiency can enhance teachers' ability to foster this essential skill among students (Sa'dijah et al., 2023).

In an Indonesian study, researchers investigated the mathematical proficiency of students. One analysis revealed that the students did not meet established standards for mathematical proficiency. Specifically, none of the students demonstrated proficiency at high or medium levels. Among male students, there was a notable weakness in formulating and planning strategies, although they showed relative strength in communication and utilization of mathematical symbols, formal language, techniques, and operations. Similarly, female students exhibited low proficiency in formulating and planning strategies but excelled in communication and utilization of mathematical symbols, formal language, techniques, and operations. Furthermore, the study delved into the reasons behind the low mathematical proficiency observed among eighth-grade students at SMP Negeri 9 Kendari Junior High School (Salim et al., 2018).

In the Philippines, many junior high school students struggle with mathematical proficiency, encountering difficulties that extend beyond rote memorization of formulas. These challenges often stem from a lack of foundational understanding of mathematical principles, making problem-solving tasks daunting and fostering negative attitudes towards the subject. This widespread struggle underscores systemic issues within math education (Faustino, 2022).

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In Tagum City, Davao del Norte, a study found that students struggled with mathematical proficiency. Common challenges included difficulty in analyzing problems, understanding concepts, identifying correct solutions, and simplifying expressions. Students also faced issues with self- perseverance, seeking expert help, studying, practicing regularly, and building confidence in their mathematical abilities. The study recommended that teachers teach problem-solving procedures and apply concepts to real-life situations in word problems to demonstrate their relevance. Additionally, incorporating fun and engaging elements into teaching methods and encouraging open communication between teachers and students could help address these challenges (Velez et al., 2023).

The urgency of conducting this study lies in addressing the critical need to help struggling students at Luna National High School improve their mathematical proficiency. In today's fast-paced world, being good at math is really important for personal growth, getting a job, and making society better. By trying out different methods to teach math better, we hope to help these students do better in school. This study is important because it could help close the gap in education, make sure everyone gets a fair chance, and give students the skills they need to succeed in a world where math and data are becoming more and more important.

REVIEW OF RELATED LITERATURE

In this section presented the related literature and studies after the thorough and in-depth search done by the researcher. It is from the different readings from internet sites and other related literature and study that are conducted with different authors/ researchers regarding the theories that are related to this study.

Mathematical Proficiency

"The state of being competent", "advanced or proficient in any art, science or subject" and "having appropriate or sufficient skills, knowledge, experience, etc." are some definitions for the word skill, with a specific purpose". According to these definitions, being mathematically proficient could be described as having the right or necessary skill, knowledge, experience, or other qualities for a given situation. A framework was developed by Kilpatrick et al. to describe what mathematical expertise entails. The authors contend that for students to be effective in mathematics, they must possess knowledge in five distinct strands that take into account concepts, procedures, techniques, reasoning, and attitudes (Guita et al., 2018).

Additionally, classes in mathematics may be able to have a larger focus, incorporating conceptual discussions and explorations. However, it is usual to see the larger focus of mathematics turn to procedures when it comes to assessment. When evaluating student's mathematical proficiency, solutions are frequently the only thing considered rather than their learning and working methods. According to Kilpatrick and Swafford, "Most current mathematics exams, whether they are standardized performance tests or classroom quizzes, cover only a small part of mathematical proficiency - usually only the computer part and simple parts of understanding and applying. Mathematical proficiency includes conceptual knowledge, strategic competence, procedural fluency, adaptable reasoning, and a positive attitude (Correa, 2020).

Furthermore, learning mathematics might trigger troubling and anxious recollections of formulas and step-by-step instructions. Many people think that mathematics is all about memorizing formulas and following rules. According to Kilpatrick, Swafford, and Findell, classroom mathematics does not always reflect the fact that deductive reasoning is a big part of mathematics. According to the authors, "mathematics learning has frequently been more a question of memorization than of comprehension," for a long time, the educational system engaged complex knowledge, but only superficially and without a concern for comprehending it. There is no denying that mathematics uses formulae and methods. But this is hardly the core of mathematics. Because mathematics requires thinking, reasoning, analyzing, and conjecture, it may also be frustrating (Correa, 2020).

In relation to this, Khairani and Nordin created a mathematical proficiency test to gauge the improvement in the conceptual knowledge, procedural fluency, and strategic competence of 588 14-year-old students. The subjects covered on the test were "Linear Equation, Algebraic Expressions II, Ratios, Rates, and Proportions I, and Coordinates and Circles I," with no additional instruction or classes offered to assist students in their preparation. The conceptual understanding test's questions were thought to be the easiest for students to answer. The students thought that procedural fluency was the most challenging strand, followed by strategic competency. Students performed well on questions that "explicitly" revealed the material, but struggled when they were required to "apply their past knowledge" to come up with solutions (Correa, 2020).

Moreover, Math proficiency is necessary for the student, according to Schoenfeld, because mere mathematical knowledge is insufficient. This information ought to be practical for the student to use. His aptitude in mathematics is a sign of long-term success. It is important to take into account the five strands of math skill listed above because they are connected, indivisible, and developed in an integrated manner (Altarawneh et al., 2021).

In addition, the concept of mathematical proficiency and the issues that were relevant when measuring it served as the foundation for proficiency evaluation. Kilpatrick et al. were used in the study. Procedural fluency, Conceptual understanding, Adaptive reasoning, and Strategic competency are the four distinct strands of math proficiency (Kilpatrick et al., 2001).

Procedural fluency. The first strand of math proficiency which is procedural fluency is described by Al-Shammari as "the capacity to select the appropriate mathematical processes to solve problems skillfully and precisely." According to MacGregor, it is the capacity to carry out mathematical operations and procedures deftly and precisely. Siegfried emphasized that memorizing mathematical rules without conceptual comprehension results in a poor understanding of the subject (Altarawneh et al., 2021).

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In addition, the ability to solve problems in familiar settings creatively rather than just memorizing them is known as procedural fluency. The learner's capacity to recall mathematical operation steps, to utilize them quickly and precisely, and to correctly and expertly use them to relate concepts and relations among operations are also reflected in their level of fluency (Al-Shammari, 2019).

Moreover, procedural fluency entails knowledge of the procedures, knowing when and how to employ them, and having the flexibility, accuracy, and efficiency to execute the procedures. Understanding a procedure is being aware of its purpose, foundation, and algorithm. Students with Procedural fluency are able to use a process to solve difficulties as well as simply know about it. Additionally, students are familiar with the knowledge required to use a method. Students with Procedural fluency can also use the algorithm in a variety of ways. This indicates that they have the ability to alter a process to arrive at the ideal solution to a challenge (Laswadi et al., 2017).

Hence, procedural fluency involves both mental processes and activities related to memory. Because it will promote students' conceptual understanding as the foundation of processes, thinking process is a crucial component of Procedural fluency. Students can choose the approach they should take to a problem by using the thinking process. Additionally, through the creative process, students with PF can develop their own effective methods (Bahr & Garcia, 2018).

Indeed, a crucial aspect of mathematical proficiency is procedural fluency. It is the capacity to apply procedures in a precise, effective, and flexible manner; to transmit processes to various issues and situations; to create or alter procedures based on existing procedures; and to recognize the instances in which one strategy or procedure should be used instead of another. Students require practice combining ideas and methods, building on established methods as they develop their own informal tactics, in order to become procedurally fluent. Students require opportunities to support and defend their decisions on suitable processes, to enhance their understanding and expertise through dispersed practice, and to quantitatively justify both informal tactics and frequently used procedures.

Conceptual understanding. Reflects the student's capacity to comprehend concepts and mathematical relationships, build a mathematical knowledge base, connect it to prior knowledge, and apply it to new mathematical contexts and situations. For a deeper understanding, the learner is better able to remember steps and make accurate calculations (NRC, 2004).

Additionally, conceptual understanding is defined as "the capacity to fully comprehend mathematical ideas, the capacity to present such concepts in more than one way, the capacity to correlate them to relevant procedures, and finally the capacity to conclude and assess interrelations in a reasonable and correct manner.". To give the student the flexibility and fluency required for solving mathematical problems, it also entails using these symbols correctly and quickly in a mathematical language (Shteiwi et al., 2019).

Furthermore, deep and developed knowledge, the proper processing of mathematical ideas in the learner's cognitive framework, and all pertinent generalizations are all parts of conceptual understanding. The indicators show a comprehension of mathematical concepts, including their properties, symbols, corresponding procedures, and methods for applying them in real-world contexts, as well as the ability to derive pertinent mathematical generalizations (Obieda, 2017).

A student with conceptual understanding has access to a variety of skills. Kilpatrick and colleagues claim that students who possess CU can use their knowledge of previously understood mathematical ideas to explain recently discovered ideas. Students can increase their knowledge with the use of this aptitude. Additionally, students with CU are able to articulate their thoughts by using a variety of representations. Lastly, students using conceptual understanding have the option of selecting a representation that is appropriate for a certain circumstance. This skill aids pupils in effectively and efficiently presenting their ideas (Laswadi et al., 2017).

Furthermore, the emphasis of the common core math's standards is the significance of conceptual understanding as a crucial element of mathematical proficiency. Understanding of conceptual mathematics entails a solid comprehension of the fundamental ideas that underlie the mathematical procedures. As a result, it involves a setting where students are free to choose and actively apply what they have learned. If a learner is to fully comprehend mathematics, they must possess both types of comprehension.

Adaptive reasoning. Logic-based thinking about the relationships between ideas and circumstances is referred to as adaptive reasoning. Additionally, it says that students who reflect, explain, and justify their decisions demonstrate adaptive reasoning. Different mathematical concepts that were later developed make up mathematics (Francisco, 2017).

Consequently, adaptive reasoning skills (ARS), a term coined by the National Research Council to refer to a broad range of thinking, serve as a learning framework for pupils. ARS is regarded as a general mode of reasoning because it includes not only informal justification and explanation but also intuitive reasoning and inductive reasoning based on pattern, analogy, and metaphor (Rizki et al., 2018). Moreover, Kilpatrick et. al define Adaptive reasoning skills as the capacity to consider, justify, explain, and reason logically about the link between the situation and the concept. While the ability to reflect relates to the capacity to evaluate the validity of a technique or mathematical argument, the logical thinking abilities pertain to the capacity to produce conjectures. Students with strong adaptive reasoning could generalize and extend the answer to other situations as well as utilize reasoning to explain and defend solutions to issues (Rizki et al., 2018).

Students who combine adaptive reasoning skills and metacognitive abilities may find it easier to articulate complex problem situations, engage in self-reflection, and defend their positions to others or to themselves. Additionally, learners with strong adaptive reasoning are capable of determining whether a

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solution is right or wrong as well as providing a reasoned reasoning (Rizki et al., 2018).

In relation to this, adaptive reasoning covers how to defend mathematical inferences as it links several concepts together. Adaptive reasoning is the capacity for emotionally considering relationships, ideas, and circumstances while also incorporating intuition, inference, and conjecture. It is employed to fully comprehend all facets of the issue. Additionally, it aids in learning process direction and solution measure selection. The students track their development by putting their solution plan into practice. Additionally, reasoning entails applying logic to interpret and support a particular problem's answer or to synthesize one (Qarni & Shalhub, 2019).

Strategic Competence. According to Groves, the learner's capacity to design, reassess, and write down solution plans for problems utilizing the conceptual understanding and appropriate methods constitutes the third strand of mathematical competency, or strategic competence. Strategic competence refers to a learner's capacity to solve mathematical problems, identify crucial mathematical information and present it using a variety of methods, find mathematical connections, and elicit novel solution approaches that are appropriate for the problem at hand (Al- Shammari, 2019).

Consequently, the student acquires the perseverance required for the processes of solving mathematical problems to present them in multiple ways through the drawing, mentally or in writing, of a formula that reveals the interrelationships by choosing appropriate strategies such as: figure drawing, hypotheses, construction of tables, use of elicitation logic and use of templates to present the context of a mathematical problem, etc. there is a relationship between conceptual understanding, procedural fluency, and strategic competence. The learner must have the fluency and expertise to solve routine problems as well as an understanding of implicit knowledge and the relationships between problems in order to build non-routine solution techniques (Qarni & Shalhub, 2019).

Additionally, problem-solving skills are another name for mathematical strategic competency in other publications. Kilpatrick J., Swafford, J., & Findell, contends that the circumstances and requirements of the mathematical tasks that teachers assign to their students in the classroom are frequently extremely apparent. But outside of the classroom, students encounter issues that are difficult to frame as mathematical issues. For instance, the student must manage his parents' allowance so that it may cover all of his demands under specific conditions. Students must express these issues as the mathematical issues they have covered in school and decide what is known and what to look for. They must therefore have experience and skill expressing the problem from a specific circumstance to a mathematical problem (Supiyanto et al., 2018).
Also, numerous researches investigating the effectiveness of teaching in terms of the mathematical building blocks competency among future math teachers. The findings of this investigation demonstrated that in terms of procedural fluency and conceptual knowledge of trigonometric inequalities, student teachers fare poorly. Additionally, the student teachers' performance in the area of trigonometric inequalities was weak in terms of their strategic competence and overall math ability (Usman, 2020).

Moreover, the ability to choose the appropriate approach to a problem is a crucial component in solving any mathematical problem. To choose the method of problem solving and comprehend the steps to take to arrive at a solution, one needs strategic competency. According to de Jong and Ferguson-Hessler and Posner and McLeod, a strategy is a logical sequence of acts, such as information analysis, issue representation, tool selection, and planning of the many steps to be taken to arrive at the answer.

RESEARCH OBJECTIVES

The study determined the effectiveness of Project SAYON as a strategy for enhancing mathematical proficiency among Grade 10 students of Luna National High School. Further, this study elicited pertinent information by answering the following questions:

1. To determine the level of math proficiency among Grade 10 Students of Luna National High School during the pre-test.
2. To determine the level of math proficiency among Grade 10 students of Luna National High School during post-test; and
3. The null hypothesis which will be tested at 0.05 level of significant difference between pre-test and post-test of math proficiency among Grade 10 students.

Project SAYON (Student Aid for Yielding Outstanding Numeracy) sought to address the pressing issue of students in mathematics by proposing a comprehensive intervention, innovation, and strategy. The rationale for this initiative was deeply rooted in the belief that every student deserves an equal opportunity to excel, with a particular emphasis on developing mathematical proficiency. By fostering a positive learning environment, the project aimed to empower students and pave the way for academic success.

The extent of this proposed intervention encompassed students in Grade 10 enrolled in the school year 2023-2024 at Luna National High School. The innovation laid in a blended approach combining personalized tutoring, interactive workshops, and digital resources to cater to diverse learning styles. Recognizing the multifaceted nature of the challenge, the strategy was designed to provide holistic support that extended beyond traditional classroom boundaries.

Personalized Tutoring. It is when a teacher gives special help to a student based on their needs. It means the teacher pays close attention to what the student knows and doesn't know. The teacher then makes lessons and activities just for that student, so they can learn better. Personalized tutoring helps students understand things more easily because it's tailored to them. It's like getting a custom-made learning plan that fits exactly what the student needs to learn.

Preparation. Researcher assigned each student to a student teacher. These student teachers then spent two hours every week giving one-on-one tutoring to their assigned student. Before the tutoring sessions start, the student teacher needed to

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understand the specific needs and goals of their student. This involved reviewing the student's previous work, talking to their regular teacher, and planning lessons and activities tailored to the student's learning style. The preparation included gathering any materials or resources needed for the tutoring sessions to be effective and engaging.

Interactive Workshops. It referred to learning sessions where everyone got involved. Instead of just listening, participants did activities, asked questions, and shared ideas. These workshops were like a team effort where everyone learned from each other. They used games, group discussions, and hands-on tasks to make learning fun and engaging. Interactive workshops encouraged active participation, which helped people remember and understood things better. They're a great way to learn because they're not boring; they're exciting and kept everyone interested. The goal of interactive workshops was to make learning enjoyable, memorable, and meaningful for everyone involved.

Preparation. The interactive workshop involved planning for a session every Friday, where different speakers, who were student math teachers, shared their knowledge. The preparation varied based on the student-teacher leading the session, but ensured alignment with the workshop's goals. This included creating engaging activities, gathering relevant materials like presentations or handouts, and coordinating with the speaker to cover key topics. The aim was to make each workshop informative and interactive, fostering collaboration and learning among all participants. The preparation process emphasized adaptability and coherence with the overall objectives of the workshops.

The researchers employed the following processes through the duration of the implementation of the intervention:
First, the respondents were student from Grade 10 at Luna National High School, and they were informed about the intervention of this action research. Also, the planning for the realization of the proposed Project SAYON in the school was discussed. Before conducting the study, the researchers designed and constructed a pre-test and a post-test and subjected it to face validity and content validity in order to collect data. The result of the pre-test and post-test were compared with the statistical tools, weighted mean and two-tailed t-test using the Statistical Package for the Social Sciences after implementing the said intervention.

Before the implementation of the study, the researchers established rapport with the respondents and conducted orientation where the purpose, intentions, and methodologies of the study were explained to them in a language they were familiar with and capable of. After that, the researcher asked for their consent to be one of the respondents in the study, and their availability was considered.

In addition, to ensure the welfare of the respondents, a thorough discussion on the benefits Project SAYON was conducted by the researchers, which served as a guide to the respondents on what possible experiences they were going to experience to realize the strategy that was implemented during the study. The researchers assured that the planning being done will be of great help to the learners in making math more fun and engaging for them. Safety and health protocols were addressed and followed.

Afterwards, the researchers administered the pre-test they made in order to commence the study. Following this was the collection of the pre- test questionnaires after the students were done answering. Next, the researchers implemented the project SAYON intervention for a month. Later on, the researchers conducted a post-test and after gathering the data, the researchers compared the data using the statistical used in the study.

Eventually, the researchers used the collected data to answer the following questions:

1. To determine the level of math proficiency among Grade 10 Students of Luna National High School during the pre-test.
2. To determine the level of math proficiency among Grade 10 students of Luna National High School during post-test.
3. To determine the significant difference between pre-test and post-test

After the implementation, the researchers hoped that there would be improvements on the mathematical proficiency of students with Project SAYON as an innovation in enhancing the said skills. The improvements were beneficial to the students for their future engagement in a variety of mathematical concepts. This enabled them to have a better understanding for more complex mathematical topics.

METHODOLOGY

This chapter presents the methodology employed in this study. This includes the research design, research locale, sample and population, data collection, and statistical tool to be use throughout the study.

RESEARCH DESIGN

The design of this study was pre-experimental as the researcher aimed to measure the effect of Project SAYON on the mathematical proficiency of Grade 10 students at Luna National High School. A pre-experimental design is an investigative approach used to determine whether a specific variable influences outcomes. It provides a conceptual framework within which the experiment is conducted. The primary criterion for this design is its suitability for testing the study's hypothesis, ensuring that the chosen methodology effectively evaluates the impact of the intervention on students' mathematical proficiency (Ary et al., 2021).

In this study, an experimental design was used to conduct action research. The researcher studied whether there was an effect of using Project SAYON as an intervention on the skills of students in solving mathematical problems. The researcher identified a group of participants consisting of 65 students who took a pretest and then received the newly designed intervention over one month. After a month of intervention, the same participants took a post-test.

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RESEARCH INSTRUMENT

This study adapted one (1) survey questionnaire from a web source to measure mathematical proficiency. The instrument is derived from the study of Moodley (2008). The test will consist of 20 algebraic questions, which are multiple- choice items. The mathematical proficiency test has a full score of 20 points. Every correct answer on each item corresponds to 1 point. The test will consist of five items measuring the conceptual understanding strand, five items covering the procedural fluency strand, five items to examine the strategic competence strand, and five items that assess adaptive reasoning.

The math proficiency questionnaire includes twenty (20) items. In assessing the math proficiency of Grade 10 students at Luna National High school, following scale will be used:

Range of Means	Descriptive Level	Interpretation
17 – 20	Very High	This means that the math proficiency of Grade 10 students at Luna National High school is outstanding.
13 – 16	High	This means that the math proficiency of Grade 10 students at Luna National High school is very satisfactory.
9 – 12	Moderate	This means that the math proficiency of Grade 10 students at Luna National High school is satisfactory.
5 – 8	Low	This means that the math proficiency of Grade 10 students at Luna National High school is fairly satisfactory.
0 – 4	Very Low	This means that the math proficiency of Grade 10 students at Luna National High school did not meet the expectations.

To ensure content validity, the research questionnaire had undergo a validation process. Before the study begins, the multiple-choice test for mathematical proficiency was subjected to item analysis to identify which items will be preserved and which will be rejected.

RESEARCH LOCALE

This study was conducted at Luna National High School, a secondary public school located in Luna, Kapalong, Davao del Norte. In this school, many students have experience with low mathematical proficiency.

SAMPLE AND POPULATION

Purposive sampling refers to a group of non-probability sampling techniques in which units are selected because they have characteristics that you need in your sample. In other words, units are selected "on purpose" in purposive sampling (Nikolopoulou, 2023).

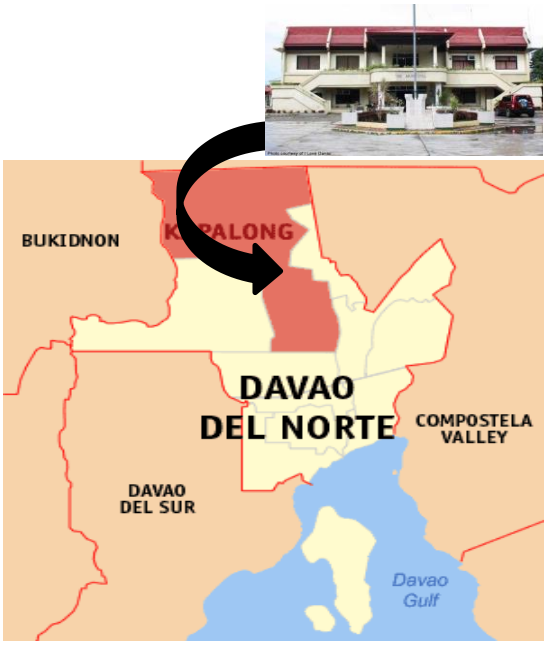

Figure 1. Regional Map Highlighting the Research Locale (District of Davao del Norte)

Also called judgmental sampling, this sampling method relies on the researcher's judgment when identifying and selecting the individuals, cases, or events that can provide the best information to achieve the study's objectives. In this case, the research respondents for this study was 65 students coming from grade 10, enrolled in the Academic Year 2023-2024 at Luna National High School.

DATA COLLECTION

The researcher followed subsequent procedures to collect the required information for the investigation.

Crafting of Questionnaire - Pretest and Post-test Questionnaires. The researcher had initiate group planning sessions to develop questionnaires for both pretest and post-test assessments. To tailor the questionnaire to the respondents, researchers used an adapted questionnaire. Crafting the questionnaire involved meticulous consideration of relevant questions to assess students' mathematical proficiency. The test questionnaire served as the tool for gathering quantitative data from the respondents. Two sets of test questionnaires was administered: the pretest and post-test questionnaires.

Questionnaire Validation. The researcher had undergo validation of the questionnaire from experts or a panel well-versed in questionnaire development to ensure its validity and reliability.

Seeking Permission to Conduct the Study. The researchers had ask the school principal to distribute the pretest questionnaires to the identified students in need and those facing challenges. Additionally, the researchers sought permission to implement the intervention in the identified class group.

Pretest Assessment Administration. Before implementing the intervention, the researcher administer a pretest to Grade 10

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students. This pretest aims to gauge the students' baseline performance levels in solving basic math problems.

Intervention Implementation. The implementation phase was executing the Project SAYON intervention in the grade 10 students during the Independent/Collaborative Learning (ICL) of the subject Mathematics. The intervention had take one month implementation.

Post-test Assessment Administration. After one month of implementing the intervention in the students, a post-test was administered to assess the students' progress in mathematical proficiency. This test had measured the students' enhanced skills and understanding after the intervention.

Data Tabulation and Evaluation. The data gathered from the pretest and post-test had undergo tabulation. The complete questionnaires was collected by the researchers and subsequently entered into a Microsoft Excel spreadsheet for data encoding. The statistician was granted confidential permission to perform calculations, create tables, and analyze the data with utmost discretion. The results of the tabulation served as the basis for evaluating the effectiveness of the intervention in enhancing students' polynomial problem-solving skills. The findings had guide potential modifications or improvements in the intervention strategies to further enhance teaching practices.

STATISTICAL TOOL

The study utilize the Weighted Mean and Paired T-test using the Statistical Package for the Social Sciences (SPSS).

Mean. The weighted mean was utilized to describe the pre-test and post- test results.

Paired t-test. Alternatively referred to as a dependent or correlated t-test, this is a powerful analytical method designed to assess the mean and standard deviation differences between two interrelated groups (Gleichmann, 2020). This particular statistical test is especially well-suited for investigations where the relationship between the two sets of data is essential, such as in pretest and post-test scenarios.

The paired t-test was utilized to discern whether there existed a statistically significant difference between the averages of a pretest and a post-test. This application of the paired t-test enabled the researcher to evaluate whether any observed variations in the mean scores were beyond what could be attributed to random chance. By focusing on the comparison of the pretest and post-test data, the paired t-test became a valuable tool for identifying and quantifying any changes or developments that may have arisen over the course of the research intervention.

RESULTS

This chapter presents the findings and results of Project SAYON as a strategy for enhancing mathematical proficiency among Grade 10 students of Luna National High School. Analyses and interpretations of data were done parallel to the research objectives.

Level of Math Proficiency

Table 1. Pre-test

Pre-Test Scores	Frequency	Percentage
3	3	4.62%
4	2	3.08%
5	3	4.62%
6	6	9.23%
7	1	1.54%
8	4	6.15%
9	6	9.23%
10	6	9.23%
11	10	15.38%
12	8	12.31%
13	7	10.77%
14	3	4.62%
15	3	4.62%
16	1	1.54%
17	1	1.54%
18	1	1.54%
Total	**65**	**100.00%**
Overall Mean		**10.09**
Description		**MODERATE**

The pre-test results show that the overall mean score is 10.09, indicating that, on average, students have a moderate level of math proficiency. The highest score recorded on the pre-test is 18, achieved by only one student, representing 1.54% of the total. This suggests that very few students have reached the highest level of proficiency. Conversely, the lowest score is 3, obtained by three students, accounting for 4.62% of the total, indicating a small number of students at the lower end of proficiency. The most frequent score is 11, achieved by ten students, making up 15.38% of the total. This implies that a significant number of students are slightly above the average proficiency level while the average score indicates moderate proficiency, the range of scores shows a distribution with both high and low achievers, and a notable cluster around the score of 11.

Table 2. Post-test

Post-Test Scores	Frequency	Percentage
8	1	1.54%
9	1	1.54%
10	6	9.23%
11	5	7.69%
12	8	12.31%
13	14	21.54%
14	11	16.92%
15	8	12.31%
16	6	9.23%
19	1	1.54%
20	4	6.15%
Total	**65**	**100.00%**
Overall Mean		**13.52**

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Description	HIGH

The overall mean score of the post-test is 13.52, indicating that, on average, students scored around 13.52 out of the maximum possible score. This suggests a generally high level of performance across the group. The highest score achieved was 20, with four students attaining this mark, representing 6.15% of the total number of students. This demonstrates that a small percentage of students achieved a perfect score, showcasing excellent performance. On the other end, the lowest scores were 8 and 9, with one student each scoring these marks, each accounting for 1.54% of the total. This indicates that very few students scored at the lower end of the scale, suggesting that most students performed reasonably well. The most frequent score was 13, with fourteen students scoring this mark, which is 21.54% of the total number of students. This high frequency suggests that the score of 13 was the most common among the students, indicating a central tendency around this score.

Table 3. Significant Difference between Pre-test and Post-test

Type of Test	N	df	Mean	SD	t-value	P-value	Decision $\alpha = 0.05$
Pre-Test	65	64	10.09	3.53	-10.902	**< .001**	**Significant**
Post-Test	65		13.52	2.61			

Presented in table 3 is the significant difference between pre-test and post-test, t (64) = -10.902, p < .001. Since the p-value (< .001) is less than the level of significance (d=0.05), the null hypothesis is being rejected in the context. The significant difference observed in the pre-test and post-test scores indicates a positive outcome resulting from the intervention utilized. This discrepancy suggests an improvement in students' math skills consequent to the implemented approach. The favorable change underscores the efficacy of the intervention, validating its capacity to enhance students' comprehension and proficiency in mathematics.

DISCUSSION

Discussed in this chapter are the summary, conclusions and recommendations on the findings of the research. Presented in the results are the extent of Project SAYON towards the Math proficiency of Grade 10 students in Luna National High School.

LEVEL OF MATH PROFICIENCY

Pre-test

The Pre-test data on the level of math proficiency among Grade 10 students of Luna National High school was illustrated in table 1. The result stipulates that the math proficiency Grade 10 students was satisfactory. This signifies that students have moderate ability to take time to understand and identify the problem, as well as figure out all the possible solutions to solve the problem. This observation aligns with findings by Fülöp (2021), who noted that problem-solving skills in mathematics develop gradually and that students often need structured support and practice to improve their proficiency. Fülöp's research suggests that while students may demonstrate satisfactory performance initially, their skills can be enhanced significantly with targeted interventions and practice.

Post-test

The Post-test data on the level of math proficiency among Grade 10 students of Luna National High school was illustrated in table 2. The result stipulates that the math proficiency Grade 10 students was very satisfactory. This represents an almost fourfold increase from their pretest performance, demonstrating that the students now possess very satisfactory skills in solving math problems. This suggests that the intervention positively impacted their mathematical proficiency.

Supporting studies have shown that targeted interventions can significantly enhance students' mathematical proficiency. For instance, a study by Swan (2022) in "Visible Learning Theory" found that feedback, effective teaching strategies, and clear learning goals greatly impact students' academic achievements, including math proficiency. Similarly, research by Sholihah and Lastariwati (2020) highlighted that instructional strategies that encourage problem-solving and critical thinking skills can lead to substantial improvements in students' performance.

SIGNIFICANT DIFFERENCE BETWEEN THE PRETEST AND POST-TEST

The study showed a clear boost in students' math skills, as seen in the substantial difference between their pretest and post-test scores. This improvement underscores the success of Project SAYON intervention in enhancing students' mathematical proficiency. This finding aligns with prior research by Eli (2021), which emphasizes the efficacy of interactive learning approaches in improving academic performance. Their study suggests that students are more engaged and motivated when learning through participatory methods, like those employed in Project SAYON.

Furthermore, recent research by Son and Fatimah (2020) corroborates the positive impact of interactive interventions on students' math abilities. Their analysis indicates that hands-on learning experiences, such as those offered by Project SAYON, not only enhance mathematical proficiency but also foster a deeper understanding of concepts. By actively engaging with mathematical problems in a supportive environment, students develop problem-solving skills and confidence in their abilities.

Additionally, the study's findings align with the research conducted by Malik and Zhu (2023), which emphasizes the importance of incorporating hands-on activities in educational interventions. Their work suggests that experiential learning approaches, such as those implemented in Project SAYON, offer avenues for personalized instruction and timely feedback, resulting in enhanced learning outcomes. Through the utilization of interactive workshops and real-world simulations, educators can cultivate engaging learning atmospheres that accommodate various learning preferences and foster continuous academic progress.

CONCLUSION

Based on the foregoing results of the study, the following conclusions were drawn:

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First, the pre-test results indicated that students had a satisfactory level of math proficiency before the project started. This means they had an acceptable understanding of math concepts but were not excelling. Their performance was good enough to meet basic standards, but they could still improve in areas like problem-solving and complex calculations. The satisfactory rating showed that while they understood some math topics, there were gaps in their knowledge that needed to be addressed.

Second, the post-test results revealed that the students' math proficiency improved to a very satisfactory level after participating in Project SAYON. This significant improvement suggests that the project helped the students enhance their math skills more effectively than their previous learning methods. The students showed a much better understanding of math concepts and were able to solve problems more accurately and quickly. Project SAYON provided the extra support and practice they needed to excel in math.

Third, the study tested the null hypothesis at a 0.05 level of significance and found a significant difference between the pre-test and post-test results. This means that the improvement in the students' math proficiency was not due to chance, but to the intervention of Project SAYON. The significant difference shows that Project SAYON had a real and measurable effect on the students' math proficiency, proving its success as an educational tool.

Hence, the result implies that using structured programs like Project SAYON can greatly improve students' math proficiency. Schools should consider adopting similar methods to help students achieve better academic success. This project shows that targeted interventions can make a significant difference in learning outcomes. Teachers and administrators can use these findings to support and enhance their math teaching strategies, ultimately helping students perform better in their studies.

RECOMMENDATIONS

On the light of the aforementioned findings of the study, the following recommendations were drawn:
Given the significant improvement in math proficiency among Grade 10 students, it is recommended that Project SAYON be adopted and expanded to include all grade levels at Luna National High School. This program should be integrated into the regular curriculum to ensure that students at different stages of their education benefit from its structured approach to math learning.

Also, school administrators and policymakers should support the implementation of Project SAYON by providing clear guidelines and policies. This includes setting realistic goals, providing necessary resources, and ensuring that the program aligns with the overall educational objectives of the school. Continuous support from the administration is crucial for the program's sustainability.

In addition, it is hereby recommended that teachers should receive specialized training to effectively implement Project SAYON. Professional development workshops and continuous training sessions should be conducted to familiarize teachers with the project's methods and materials. This will ensure that teachers are well-equipped to deliver the program and support students' learning effectively.

Also, parents and guardians play a crucial role in students' academic success. It is recommended to engage them in the process by providing information about Project SAYON and its benefits. Workshops or meetings can be organized to help parents understand how they can support their children's learning at home.

Lastly, while the results of this study are promising, further research should be conducted to explore the long-term effects of Project SAYON on students' math proficiency. Comparative studies involving different schools and regions can provide a broader understanding of the program's impact and help refine its implementation.

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