



NUMERACY, PERFORMANCE, AND DIFFICULTY IN MATHEMATICS: BASES FOR THE DEVELOPMENT OF MATHPEDIA CLINIC

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ABSTRACT

This type 1 developmental research aimed to assess Grade Seven (7) learners' numeracy levels, identify their least learned competencies, and understand their challenges in learning mathematics. This served as the basis for designing an intervention program. The participants of this study were Grade Seven (7) learners from a public high school in Iloilo City Division. The study followed five phases: analysis, design, development, implementation, and evaluation. In the analysis phase, the researcher secured permissions and collected data. In the design phase, the least learned competencies were selected from the Department of Education's MELCs and used to structure the intervention program. During the development phase, the MathPedia Clinic intervention program was created and evaluated. In the implementation phase, the program was conducted in a Grade 7 public high school. Finally, in the evaluation phase, both teachers and learners assessed the program's acceptability using adapted evaluation tools. Findings revealed that learners exhibited a "Low Proficient" numeracy level while their Mathematics performance "Did Not Meet Expectations". It was found that learners experience "Significant Difficulties" in learning mathematics attributed to teacher, content-based, and personal factors. The identified least learned competencies and difficulties of learners guided the creation of the MathPedia Clinic intervention program, developed using the ADDIE model. The developed MathPedia Clinic intervention program was found to be "very acceptable" both by teachers and learners who evaluated it to be used as an intervention program. The study recommends integrating the MathPedia Clinic into the mathematics curriculum to enhance learner performance.

Keywords: *Mathematics, Numeracy, Performance, Least Learned Competencies, Difficulty, MathPedia Clinic Intervention Program, Acceptability*

INTRODUCTION

Education empowers individuals to select enduring learning themes for lifelong cultivation. Core subjects serve as starting points for fresh perspectives on life. Among these, Mathematics presents unique challenges that impact numeracy skills, both intrinsic and extrinsic (Education Scotland, 2019).

Numeracy, the cornerstone of mathematical mastery, encompasses knowledge, skills, behaviors, and dispositions essential for applying mathematics across diverse contexts. It entails the ability to reason mathematically and utilize mathematical concepts, procedures, facts, and tools to analyze, explain, and predict phenomena. By fostering numeracy, individuals gain insight into mathematics' significance in the world, enabling informed decision-making as active, thoughtful citizens (OECD, 2019).

The Philippines' low ranking, 77th in the 2022 Program for International Student Assessment (PISA) participants in Mathematics and Science, underscores a concerning trend of increasing numeracy deficiencies. Educators face the urgent task of innovating, implementing intervention programs, or crafting instructional materials to enhance students' mathematical proficiency (OECD, 2023).

At the researcher's school, there is a noticeable struggle among learners, particularly Grade Seven (7) learners, with particular mathematical concepts. The 2023 pretest results of the Enhanced Regional Unified Numeracy Test E-RUNT) revealed that 79% of students lack basic numeracy skills, indicating a widespread challenge in grasping fundamental mathematical principles and methods. Given this concerning trend, it becomes evident that an intervention program in Mathematics is imperative to elevate the numerical competence of these students. Intervention programs serve as vital tools for not only identifying but also providing targeted support to students who encounter difficulties with mathematical concepts. Through personalized instruction and support, these programs aim to cultivate students' mathematical proficiency and confidence. Furthermore, by initiating intervention initiatives, educators can proactively identify areas of struggle early on, thereby preventing the further widening of academic disparities and instilling a growth mindset among learners, ultimately fostering a more conducive learning environment for all.

Despite recognizing numeracy's pivotal role in academic success, a notable gap persists in understanding Grade Seven (7) learners' specific mathematical hurdles. While studies highlight widespread difficulties in basic numeracy, the development and implementation of comprehensive intervention strategies remain insufficient.

Motivated by these considerations, the researcher embarked on a study to assess Grade Seven (7) learners' performance and numeracy levels, identify least-learned competencies, and pinpoint learning difficulties in mathematics. This investigation aimed to inform the design of an intervention program tailored to support struggling students in comprehending and mastering mathematical concepts, ultimately improving academic outcomes.

Research Questions

This study aimed to determine the numeracy level, Mathematics performance level, least learned competencies, and difficulties of learners in learning Mathematics. Moreover, it aimed to develop an intervention program.

Specifically, it sought to answer the following questions:

1. What is the level of numeracy of learners?
2. What is the level of Mathematics performance of learners?
3. What are the least learned competencies of learners?
4. What are the difficulties of learners in learning Mathematics?
5. What intervention program can be developed based on the result of the study?
6. What is the level of acceptability of the intervention program as assessed by teachers and learners?

METHODOLOGY

This study was conducted in one of the public high schools in the Schools Division of Iloilo City. The respondents in this phase were the two hundred thirty-eight (238) Grade Seven (7) learners enrolled in one of the public high schools in the Schools Division of Iloilo City for SY 2023-2024 and were chosen using stratified random sampling. The sample size was determined using the Cochran formula that allows the researcher to calculate an ideal sample size given a desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population.

To obtain the necessary data for the study, the researcher used three instruments: E-RUNT, Mathematics Performance Test, and Difficulties of Learners in Learning Mathematics Rating Scale. The Enhanced-Regional Unified Numeracy Test (E-RUNT) is a 40-item standardized test adapted from the Department of Education Region VI to assess the numeracy level of learners. The Mathematics Performance Test is a 50-item researcher-made multiple-choice type performance test that was used to determine the least learned competencies of the learners in Mathematics 7. This instrument underwent face-and-content validation by the three (3) experts. The Difficulties of Learners in Learning Mathematics Rating Scale is composed of a 60-item five-point Likert Scale researcher-made instrument used to measure learner's difficulties in learning mathematics based on the following factors: teacher, personal, and content. This instrument was validated by three (3) experts in the field.

The study followed five phases: analysis, design, development, implementation, and evaluation. In the analysis phase, the researcher secured permissions and collected data. In the design phase, the least learned competencies were selected from the Department of Education's MELCs and used to structure the intervention program. During the development phase, the MathPedia Clinic intervention program was created and evaluated. In the implementation phase, the program was conducted in a Grade 7 public high school. Finally, in the evaluation phase, both teachers and learners assessed the

program's acceptability using adapted evaluation tools. The data gathered were subjected to appropriate descriptive statistics using SPSS version 22.

The following statistical tools were utilized in interpreting the results of the study: frequency distribution was utilized to present the distribution of the participants according to their responses on the difficulty of learners in learning Mathematics; rank was used to determine the top 5 lowest mean average on least learned competencies and the difficulties of learners in learning Mathematics as classified according to teacher-, personal-, and content-based factors; mean was used to summarize the and describe the average value on numeracy level, least learned competences and difficulties in learning Mathematics of the respondents; standard deviation was used to measure the extent of scattering in a set of values, typically compared to the mean value of numeracy level, least learned competences and difficulties in learning Mathematics of the respondents; and, Mean Percentage Score (MPS) indicates the ratio between the number of correctly answered items and the total number of test questions or the percentage of correctly answered items in a test, the National Achievement Test. This was used in the score on the performance test of the learners.

RESULTS

The following tables show the result of the study:

Table 1 shows the numeracy level of Grade Seven (7) learners in the four basic operations of integers. The Grade 7 learners have Low Proficiency (M=38.77, SD=3.88) Level in Numeracy which means that Learners at this level struggle with basic operations of integers. This finding indicates that low math numeracy levels among learners suggest several critical implications for educational practices and policy. The low proficiency scores and poor performance on mathematics assessments highlight the need to delve deeper into the underlying causes and to address them effectively. The data suggests that current teaching methods may not be effectively engaging learners or adequately addressing their learning needs.

Table 1
Numeracy Level of Grade 7 Learners

	Rating	SD	Description
Over-all Numeracy level	38.77	3.88	Low Proficient
Addition of Integers	47.34	1.78	Low Proficient
Subtraction of Integers	34.03	1.54	Low Proficient
Multiplication of Integers	42.23	1.76	Low Proficient
Division of Integers	31.46	1.70	Low Proficient

Scale: 0%-24% (Not Proficient), 25%-49% (Low Proficient), 50%-74% (Nearly Proficient), 75%-89% (Proficient), and 90%-100% (Highly Proficient)

The numeracy level of the learners in this study showed low proficiency and this result can be related to their Mathematics performance level presented in Table 2. The results showed that the Mathematics Performance Level of grade 7 learners Did Not Meet

the Expectations (M=45.97, SD=3.59), “Indicates a lack of understanding or effort, with work that falls significantly below expectations.”

Table 2
Mathematics Performance of Grade 7 Learners

	MPS	SD	Description
Math Performance	45.94	3.59	Did Not Meet Expectations

Scale: 90%-100%(Outstanding), 85%-89% (Very Satisfactory), 80% 84%(Satisfactory), 75%-79% (Fairly Satisfactory), Below 75% (Did Not Meet Expectations)

The numeracy level of the learners in this study showed low proficiency and the Mathematics performance showed Did Not Meet Expectations and Table 3 presents in what areas/topics of Mathematics they failed to master.

The result showed that the top four competencies least mastered competencies involve performing the basic operations of integers: addition, subtraction, multiplication, and division. This result is in consonance with the result in Table 1, where it was found that the learners have low proficiency in Performing basic operations on integers.

Table 3
Ten (10) Least Learned Competencies of Grade 7 Learners

Competencies	No. of Learners who got Correct Answers (N=238)	Percent	Rank
Performs fundamental operations of integers:			
1) Performs Addition of Integers	18	7.73	1.5
2) Performs Subtraction of Integers	18	7.73	1.5
3) Performs Multiplication of Integers	23	9.87	3.5
4) Performs Division of Integers	23	9.87	3.5
5) Expresses rational numbers from fraction form to decimal form and vice versa. M7NS-le-1	28	12.02	5
6) Illustrates the different properties of operations on the set of integers. M7NS-ld-2	29	12.45	6.5
7) Performs operations on rational numbers. M7NS-lf-1	36	15.45	6.5
8) Represents real-life situations and solves problems.			
9) Illustrates well-defined sets, subsets, universal sets, null sets, the cardinality of sets, union and intersection of sets, and the difference between sets. M7NS-la-1	81	34.76	9
10) Solves problems involving sets with the use of a Venn diagram. M7NS-lb-1	86	36.91	10

The numeracy level of the learners in this study showed low proficiency and the Mathematics performance showed Did Not Meet Expectations while the least learned competency was four operations in integers and these may be affected by learners' difficulties in learning Mathematics. Table 4 showed that the difficulties of learners in learning Mathematics are Significant Difficulties which means that in Content Factors- Learners have a hard time understanding and retaining foundational concepts, leading to gaps in knowledge, for Teacher Factors- Often find the teacher's methods ineffective, possibly due to a lack of differentiated instruction or support, and for Personal Factors- Experience low self-confidence and high anxiety when dealing with math, which hinders their learning process.

Among these three factors in the difficulties of learners in learning Mathematics, the personal factors have the highest mean (M=3.05) which signifies that this is based on learners' motivation and attitude towards mathematics that greatly influence their learning. Those who see math as irrelevant or too difficult are less likely to put in the necessary effort. Low motivation can lead to disengagement, lack of practice, and a failure to develop essential math skills. A negative attitude can also spread to peers, creating a challenging classroom dynamic.

Table 4
Difficulties of Learners in Learning Mathematics

Factors	Mean	Rank	Description
Teacher Factors	2.99		Significant Difficulties
1) My teacher encourages me to actively engage during math lessons.	2.73	1	Significant Difficulties
2) My teacher is understanding when I am struggling with math problems.	2.78	2	Significant Difficulties
3) I find the math class environment provided by my teacher to be enjoyable.	2.88	4	Significant Difficulties
4) My teacher encourages me to actively participate during discussions.	2.88	4	Significant Difficulties
5) My teacher uses different methods to make learning math concepts easy.	2.88	4	Significant Difficulties
Content-Based Factors	2.94		Significant Difficulties
1) Memorizing mathematical rules is hard for me.	3.32	1	Significant Difficulties
2) I struggle with mental calculation and solving problems mentally.	3.23	2	Significant Difficulties
3) I struggle with understanding the relationships between different math topics.	3.01	3	Significant Difficulties
4) I have trouble connecting higher math concepts to real-world situations.	3.00	4	Significant Difficulties
5) Understanding the steps in math problems is challenging for me.	2.95	5	Significant Difficulties
Personal Factors	3.05		Significant Difficulties
1) I easily become discouraged when I encounter complicated mathematical lessons when presented in plain text.	3.37	1	Significant Difficulties

2)	I lose interest when facing math lessons presented in plain text.	3.25	2	Significant Difficulties
3)	I feel discouraged when I encounter math lessons without illustrations and diagrams.	3.10	3	Significant Difficulties
4)	I lack motivation in learning math-related topics.	2.92	4	Significant Difficulties
5)	Fear of making mistakes hinders my attempts at solving math problems.	2.88	5	Significant Difficulties

Legend: 1.00-1.49(Minor Difficulties), 1.50-2.49(Moderate Difficulties), 2.50-3.49 (Significant Difficulties), 3.50-4.49(Severe Difficulties), 4.50-5.00(Profound Difficulties)

Table 5 presents the level of acceptability of the designed MathPedia Clinic and Infographics intervention program as assessed by teachers in terms of content, format, presentation and organization, accuracy, and up-to-datedness information. It can be seen from the table the teachers who evaluated the program believe that the designed MathPedia Clinic and Infographics intervention program was *Very Acceptable (Rating=100%)* for use in class which implies satisfaction with the intervention program that was created.

Table 5
Level of Acceptability of the Developed MathPedia Clinic and Infographics Intervention Program as Evaluated by Teachers

	Mean	Description
Content	100	Very Acceptable
Format	100	Very Acceptable
Presentation and Organization	100	Very Acceptable
Accuracy and up-to-datedness of Information	100	Very Acceptable

Legend: 75%-100%(Very Acceptable), 50%-74%(Quite Acceptable), 25%-49%(Slightly Acceptable), 0%-24%(Not Acceptable)

Table 6 offers a comprehensive assessment of the level of acceptability of the developed MathPedia Clinic and Infographics intervention program, as evaluated by learners. The data reveals that the majority of learners rated the program as "Very Acceptable," with a satisfaction rating of 100%. This high level of acceptability underscores the effectiveness and success of the intervention program in meeting the needs and expectations of the learners.

Table 6
Level of Acceptability of the Developed MathPedia Clinic and Infographics Intervention Program as Evaluated by Learners

	Mean Percentage Score	Description
Content	100	Very Acceptable
Format	100	Very Acceptable
Presentation and Organization	100	Very Acceptable

Accuracy and up-to-datedness of Information	100	Very Acceptable
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Legend: 75%-100% (Very Acceptable), 50%-74% (Quite Acceptable), 25%-49% (Slightly Acceptable), 0%-24% (Not Acceptable)

DISCUSSION

Level of Numeracy of Learners

It was revealed that the learners have low proficiency in performing all four operations on integers: Addition (M= 47.34, SD= 1.78), Subtraction (M=34.03, SD=1.54), Multiplication (M=42.23, SD=1.76), Division(M=31.46, SD=1.70). The inability to proficiently perform basic operations on integers suggests that learners have gaps in foundational mathematical knowledge. These gaps can hinder their ability to grasp more advanced mathematical concepts and operations, which are built upon these fundamental skills.

This result is similar to the study of Rubin et al. (2014) on learners who have difficulty with the concept of integers which makes them struggle when they algebraically solve equations. The researchers analyzed the effect of various activities using models of integers like the Target integer, Integer chips, the use of Damath, and the online game Number Cruncher. The results assessed learners' conceptual understanding, procedural skills, and perception. These activities led to a greater increase in learners' performance and conceptual understanding of integers. Results were compared using the same assessment tool, Pre-Post Tests. Learners' interviews and surveys were conducted. The combination of these data sets suggests that learners' conceptual understanding and procedural skills are enhanced when activity-based teaching is used.

Level of Mathematics Performance of Learners

The result suggests that low performance in mathematics can hinder academic achievement and slow progression through the education process of the learners. Learners who struggle with math are less likely to succeed in related subjects and may face difficulties meeting grade-level standards.

This result agrees with the result of the 2022 Pisa study that the Philippines ranked sixth to last in mathematics (OECD, 2023). According to the report, 16 percent of Filipino learners reached at least Level 2 proficiency in the subject, which was significantly less than the average across OECD countries. A Level 2 proficiency means that at the very least, learners could interpret and recognize how to mathematically represent a situation without direct instructions like comparing the total distance across two alternative routes or converting prices into a different currency.

Least Learned Competencies of Learners

The top four least learned competencies involve performing the basic operations of integers: addition, subtraction, multiplication, and division. This result is similar to the study of Harun et al. (2023) on the mastery level and misconceptions of the Grade Seven (7) learners involving operations on integers. The Mean Percentage Scores (MPS) per operation on integers were calculated to describe the mastery level and the assessment results were analyzed to identify possible misconceptions of the learners in operating integers. Findings show that the overall MPS result is 50.56%, indicating that the learners demonstrated Average Near Mastery (AVR) of the concepts involving operations on integers. Although the learners demonstrated Average Near Mastery (AVR) in the given assessment, the item analysis showed various misconceptions and errors exhibited by the learners regardless of sex and section. Learners' misconceptions include subtracting integers and dealing with negative numbers. Hence, an intervention is needed to address the misconceptions in subtracting integers and a reinforcement is proposed to enhance the learners' mastery in other operations on integers.

Difficulties of Learners in Learning Mathematics

The top five teacher-related factors identified by learners as challenging in learning Mathematics include: (1) My teacher encourages me to actively engage during math lessons; (2) My teacher is understanding when I am struggling with math problems; (3) I find the math class environment provided by my teacher to be enjoyable; (4) My teacher encourages me to actively participate during discussions; and, (5) My teacher uses different methods to make learning math concepts easy. In light of these findings, during the MathPedia clinic, the researcher and teacher-implementer ensured that learners were motivated to complete their tasks and received supportive guidance when tackling activities. They also emphasized approachability and readiness to provide clear explanations when learners sought assistance.

Conversely, the leading five (5) content-related factors include: (1) Memorizing mathematical rules is hard for me; (2) I struggle with mental calculation and solving problems mentally, (3) I struggle with understanding the relationships between different math topics, (4) I have trouble connecting higher math concepts to real-world situations; and, (5) Understanding the steps in math problems is challenging for me. These factors were considered in program development by designing activities that encourage learners to establish connections and rely not only on memorization but also on contextual understanding to solve the given problems.

Furthermore, the primary five personal factors include: (1) I easily become discouraged when I encounter complicated mathematical lessons when presented in plain text, (2) I lose interest when facing math lessons presented in plain text, (3) I feel discouraged when I encounter math lessons without illustrations and diagrams; (4) I lack motivation in learning math-related topics; and, (5) Fear of making mistakes hinders my attempts at solving math problems. These considerations informed the development of

materials, ensuring they are engaging, visually stimulating, and illustrated to facilitate immediate understanding.

The findings presented here stand in stark contrast to those of Mulwa's study conducted in 2015, which aimed to investigate the challenges learners faced in learning and applying mathematical terminology. The impetus for Mulwa's study stemmed from concerns raised by the Kenya National Examinations Council and the wider public regarding consistently low annual mathematics performance rates. Mulwa's research revealed that learners encountered significant difficulties in grasping and employing mathematical terms and their associated concepts. These findings underscored the critical need for innovative teaching methods aimed at imbuing mathematical terminology with deeper meaning for learners. Suggestions were made for potential instructional approaches that could enhance learners' comprehension and utilization of these terms. It is envisaged that implementing such strategies will not only benefit learners but also support mathematics educators, curriculum developers, and textbook authors in addressing the persistent issue of poor academic performance in mathematics across Kenya. By refining pedagogical practices and curricular materials to better align with learners' learning needs, stakeholders can work collaboratively towards improving educational outcomes in the subject.

Intervention Program Developed Based on the Result of the Study

The need for the MathPedia Clinic and Infographics intervention program stems from the observed low proficiency in numeracy and mathematics performance among learners, as evidenced by standardized tests such as the Enhanced Regional Unified Numeracy Test (E-RUNT) and quarterly mathematics exams. The primary goal is to address the foundational gaps in mathematical skills and improve overall learner performance through a targeted, comprehensive intervention program.

The MathPedia Clinic and Infographics effectively addressed what learners faced when learning mathematics. The difficulties of learners in learning Mathematics in three areas such as teacher factors, content-based factors and personal factors and how these difficulties were addressed in the MathPedia Clinic and Infographics. For teacher factors, the learners said that the teachers did not encourage them in class and that their teachers are not using varied strategies in instruction so MathPedia and Infographics has a MathPedia Clinic Flowchart that will enable the teachers to encourage the learners to be active in the topic. In addition, the Yakapsul and Kisspirin visuals and activities can encourage the learners to actively participate in class. For content-based factors, learners stated that calculations are difficult and trouble in relating to the lesson in Mathematics so the MathPedia and Infographics has practice and challenging activities where they will be given enough time to practice the lesson until they master the Mathematical solution. For personal factors, most learners complain about difficulty solving problems on plain text and memorizing numbers in Mathematics so the MathPedia Clinic's Yakapsul and Kisspirin have varied activities and challenging questions presented with colorful pictures and graphics to encourage learners that Mathematics is not all about numbers but also fun and engaging activities.

Level of Acceptability of the Intervention Program as Assessed by Teachers

The MathPedia Clinic and Infographics was subjected to evaluation in terms of acceptability. The Four (4) components of the MathPedia Clinic Intervention Program were the following: Factor 1: Content; Factor 2: Format; Factor 3: Presentation and Organization; and Factor 4: Accuracy and up-to-date Information. The level of acceptability of the developed MathPedia Clinic intervention program as assessed by teachers in terms of content, format, presentation and organization, accuracy, and up-to-date information. It can be seen from the table that the teachers who evaluated the program believe that the developed MathPedia Clinic intervention program was *Very Acceptable (Rating=100%)* which implies satisfaction with the created intervention program.

There are a substantial number of reviews of math interventions across several educational settings and age groups, the large majority of them have focused on low-performing learners, learners with psychological disorders, or learners with math or learning difficulties. Meta-analyses focusing on these specific target groups of learners reported overall positive, small to moderate effect sizes. The intervention effects were generally larger for younger compared to older age groups, thus reflecting the general tendency of children in the lower grades having higher achievement growth compared to children in the higher grades (Bloom et al., 2008).

Level of Acceptability of the Intervention Program as Assessed by Learners

The "Very Acceptable" rating indicates that learners not only found the program satisfactory but also expressed a high degree of approval and contentment with its content, delivery, and overall impact on their learning experience. This positive feedback suggests that the intervention program effectively addressed the challenges and difficulties learners faced in learning mathematics, as evidenced by their enthusiastic endorsement.

These findings are related to the framework of mathematical interventions at the secondary level. According to Fuchs & Fuchs (2010) learners with gaps in their knowledge benefit from a learning environment with a very individualized approach. In addition, the Response to Intervention process emphasizes that learners should receive intensive, individual support (Fuchs & Fuchs, 2010). The design of the program was based on data to support the instruction and levels of readiness. Based on the literature review and framework, it is evident that the design of the numeracy program supported the effective components of an intervention program (Buffum et al., 2010; Fuchs & Fuchs, 2010; RIDE, 2009). However, although these components are integral, the learners' experiences encompassed more than just an individualized learning approach with intensive support.

Conclusions

Based on the result of the study, the following conclusions were drawn:

1. The study reveals several critical insights into the numeracy and mathematics performance of Grade 7 learners that is notably low rationalizes the design of an intervention program.

2. The performance of learners in mathematics is low which suggests that the learners are not meeting expected academic standards in mathematics, pointing to systemic issues in the current teaching and learning processes.

3. The identification of four least learned competencies—performing fundamental operations on integers, illustrating properties of integer operations, expressing rational numbers in different forms, and performing operations on rational numbers—indicates specific areas where learners struggle the most. These competencies are crucial for building a solid mathematical foundation and their deficiencies could severely impact learners' ability to progress in more complex mathematical topics.

4. The learners' moderate stance towards the difficulty of learning mathematics suggests that no single factor is perceived as particularly challenging. This neutrality might indicate a lack of engagement or awareness of the underlying issues affecting their performance.

5. The creation of the MathPedia Clinic intervention program in response to low numeracy levels and mathematics performance aims to directly address the identified gaps. This program is designed to provide additional support and resources to enhance learners' understanding and skills in mathematics.

6. The acceptability rating of the MathPedia Clinic intervention program indicates a strong positive reception. This suggests that the intervention is well-regarded by those directly involved in the educational process, which is a promising indicator of its potential effectiveness in improving mathematical competencies.

7. This study showed that learners demonstrated a low proficiency in numeracy, coupled with low mathematics performance and identified least learned competencies, underscores the need for focused remediation and support in fundamental mathematical concepts. The creation and implementation of the MathPedia Clinic intervention program, tailored to address the numeracy level, mathematics performance, and difficulty in learning mathematics, signify a proactive approach to addressing these challenges.

8. By utilizing the ADDIE model, which emphasizes analysis, design, development, implementation, and evaluation, the program can effectively target the identified areas of need and provide learners with the necessary support and resources to improve their mathematical competence. The positive acceptability rating received by the MathPedia Clinic program among teachers and learners suggests that it is well-received and deemed effective in addressing the identified challenges.

9. MathPedia Clinic program addresses specific areas of weakness and support to learners in their mathematical learning journey. By providing tailored support and

resources, educators can help learners overcome challenges and achieve greater success in Mathematics.

Recommendations

Based on the conclusions drawn, the following were recommended:

1. Implement targeted interventions like MathPedia Clinic and Infographics that aimed at improving numeracy skills. This intervention includes additional practice sessions, hands-on activities, and differentiated instruction tailored to address specific areas of weakness identified in the E-RUNT test.

2. Teachers can prioritize the identified four least learned competencies and allocate dedicated instructional time and resources to reinforce these competencies, provide targeted support for struggling learners, and offer opportunities for remediation and mastery.

3. Although learners indicated that they do not consider mathematics to be either easy or difficult, it is important to monitor and address any emerging negative perceptions or attitudes towards the subject. Teachers can strive to create a positive and supportive learning environment that fosters a growth mindset and encourages learners to persist in their mathematical learning journey.

4. The MathPedia Clinic and Infographics received a "Very Acceptable" rating among teachers and learners, indicating its potential effectiveness in addressing the identified needs. It is recommended to implement and integrate this program into mathematics instruction, ensuring consistent delivery and monitoring its impact on learners' numeracy skills and mathematics performance.

5. As the MathPedia Clinic and Infographics is implemented, it is important to conduct ongoing evaluation and assessment to measure its effectiveness and identify areas for improvement. Teachers and program coordinators shall solicit feedback from learners, monitor progress, and make necessary adjustments to ensure the program meets the evolving needs of learners effectively.

Intervention Program: MathPedia Clinic and Infographics

The need for the MathPedia Clinic and Infographics stems from the observed low proficiency in numeracy and mathematics performance among learners, as evidenced by standardized tests such as the Enhanced Regional Unified Numeracy Test (E-RUNT) and quarterly mathematics exams. The primary goal is to address the foundational gaps in mathematical skills and improve overall learner performance through a targeted, comprehensive intervention program.

The MathPedia Clinic as an Intervention Program contained the following parts:

MathPedia Clinic Flowchart (Figure 1). This showed the flow of the MathPedia Clinic. One important component of this flowchart is the diagnostic test that aids in instructional design. Diagnostic tests measure learners' competencies on components embedded within the theoretical model of learning (Gregoire, 1997), particularly in this material the Mathematics knowledge of the learners. Such diagnostic assessments identify specific deficits or persistent misconceptions in learners' requisite pre-skills or knowledge.

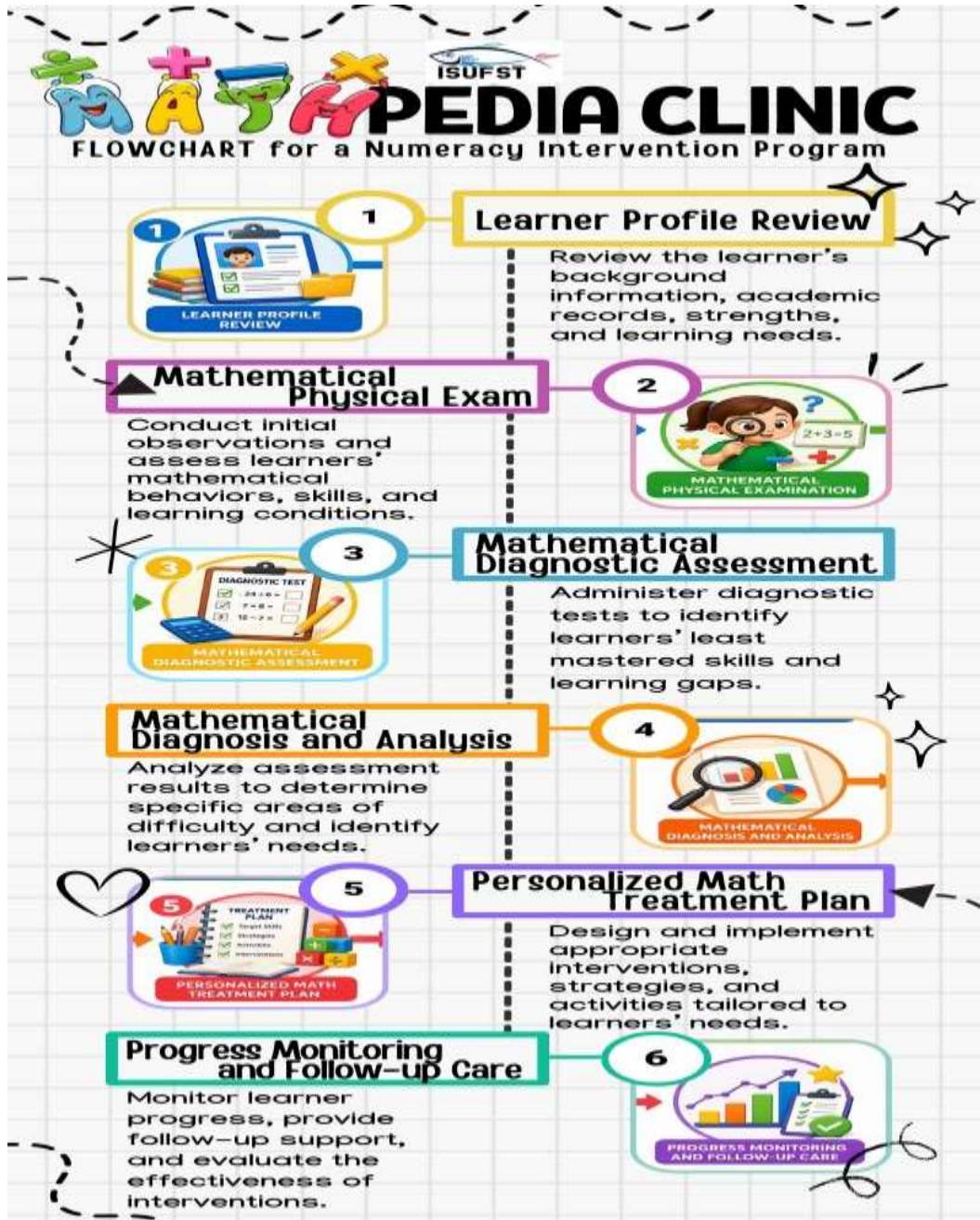


Figure 1
MathPedia Clinic Flowchart

Math Treatment Plan. This contains the topic to be answered by learners. It utilizes an Infographic Materials. All five topics were designed inside the capsule indicating the 500mg that contains the topic discussed using Infographic Materials.

Yakapsul. The first Math treatment plan has a brand name of Yakapsul and a generic name for the introduction of integers.

Kisspirin 1. The second Math treatment plan has a brand name of Kisspirin 1 and a generic name for the addition of integers.

Kisspirin 2. The third Math treatment plan has a brand name of Kisspirin 2 and a generic name for the subtraction of integers.

Peracetamol 1. The fourth Math treatment plan has a brand name of Peracetamol 1 and a generic name for the multiplication of integers.

Peracetamol 2. The fifth Math treatment plan has a brand name of Peracetamol 2 and a generic name for the division of integers.

Compliance with Ethical Standards

This study has always upheld ethical considerations. Fundamental to this process is the principle of informed consent, whereby the researcher diligently obtain voluntary and informed agreement from the respondents, providing comprehensive information about the study's purpose, procedures, and potential ramifications. Considering that the respondents are minors, informed parent consent was required from them. Confidentiality was always practiced with a researcher committed to safeguarding participants' identities and personal information. A core aspect of ethical practice involves fostering a profound respect for participants, wherein if they choose to stop in the middle of conducting the study, they may do so. The researcher was vigilant in minimizing potential harm, both during and after the study, by crafting questions with sensitivity, offering adequate support, and debriefing participants as needed. Additionally, a commitment to social justice and equity underscores the researcher's responsibility to address power imbalances and contribute positively to the communities involved. Transparency in reporting findings, ongoing reflexivity about the researcher's biases, and active engagement with the community ensure that qualitative research adheres to ethical standards, fostering trust, and integrity in the research process.

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