



MATH SPINAL: DEVELOPMENT OF STRATEGIC PROGRAM INTEGRATING NUMERACY AND LITERACY

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ABSTRACT

This study employed developmental research design using the IPO (Input-Process Output) model that determined the Grade 7 learners' numeracy, literacy level, Mathematics performance and attitudes in order to create a remedial program in Mathematics. This study was conducted at a certain public high school in Dumangas, Iloilo. The respondents of this study were the Grade 7 learners who are officially enrolled for School Year 2023-2024 and the number of respondents were determined using the Cochran's Formula. This study utilized instruments such as the standardized Mathematics Performance Test, Enhanced Regional Unified Numeracy Test (E-RUNT) and Phil-IRI test provided by DepEd that were already quality assured process and a researcher-made questionnaire on Attitudes in Mathematics that undergone face and content validation by experts in the field. The result showed that (1) the learner's overall Mathematics performance was at a low performance level ; (2) the learner's overall numeracy skills level was Low Proficient; (3) the learners' overall literacy skills level was Frustration level; (4) the learners' overall attitudes towards Mathematics subject was positive; (5) there is no significant relationship found between the learners' numeracy level and attitudes towards Mathematics; (6) there is significant relationship established in the learner's literacy level and attitudes towards Mathematics; and, (6) by implementing Math SPINAL, schools create a learning environment where students in Grade 7 have the essential literacy and numeracy abilities. It was recommended that the school should strengthen numeracy instruction to develop students' mathematical understanding and problem-solving abilities and Tthe learners should participate if the intervention program is implemented to address areas of weakness like their numeracy and literacy level and improve least learned competencies.

Keywords: *Mathematics, Numeracy, Literacy, Performance, Attitudes, Math SPINAL*

INTRODUCTION

The K to 12 Curriculum highlights the mastery of learners of the core competencies and create career tracks based on the students' competencies and interests for a more effective nation building. The Department of Education (DepEd) Order 55 s. 2016 otherwise known as Policy Guidelines on the National Assessment of the Student Learning for the K-12 Basic Education Program emphasized that early language, literacy, and numeracy must be met by every learner. It hopes to see graduates who have well-mastered the core competencies for a solid foundation for work and life. In addition, with all the information shared across the globe through modern technology, which needs to be processed and analyzed to produce meaningful information, learners must be both literate and numerate.

Thus, literacy and numeracy in complement with the knowledge of key disciplines remain the cornerstone of schooling for young Filipinos today. Reading requires the learners to see the symbols, their shape and their visual sequence (phonics). Phonics involves associating the speech sounds of letters with their written symbols. This structure is keenly similar with mathematics, where logical ideas are represented by a wealth of symbols.

In the recent Program for International Student Assessment (PISA) 2022 result, the Philippines ranked 77th out of 81 countries in Mathematics (Bermudez, 2024). This placement underscores significant challenges within the Philippine education system regarding mathematical proficiency among its students. The low ranking suggests potential shortcomings in mathematics instruction, curriculum design, teacher training, and educational resources within the country. In addition, the numeracy level on pretest of the school where the researcher is connected has a low score of Not Proficient with 16.77% among the Grade 7 learners. With this premise, a strategic program could enhance the numeracy and literacy of learners which is of paramount importance in fostering academic success, critical thinking, and lifelong learning skills.

Such a program serves as a foundational pillar in education, equipping learners with the essential competencies needed to navigate and excel in various academic and real-world contexts. Numeracy and literacy skills are fundamental building blocks that empower individuals to comprehend, analyze, and communicate effectively across diverse subjects and disciplines.

Thus, this study aimed to determine the literacy, numeracy, performance in Mathematics, and attitude of Grade 7 learners and the results would serve as bases to create a strategic program in numeracy and literacy. This study explored how numeracy and literacy work together in developing comprehension among learners toward the development of a strategic program that could enhanced academic performance and communication skills.

Research Questions

This study aimed to design a remedial program based on the Grade 7 learners' Math performance, numeracy level, literacy level, and attitudes towards Math.

Specifically, this sought answers to the following questions:

1. What is the Math performance of Grade 7 learners?
2. What is the numeracy level of Grade 7 learners?
3. What is the literacy level of Grade 7 learners?
4. What is the attitude of Grade 7 learners in learning Mathematics?
5. Is there a significant relationship among numeracy, literacy, math performance, and attitude of learners?
6. What remedial program could be designed based on the result of the study?

METHODOLOGY

This study aimed to determine the literacy, numeracy, performance in Mathematics and attitude of Grade 7 learners and the results served as bases to create a strategic program in Mathematics. This study used the Type I developmental research and utilized the IPO (Input-Process- Output) model.

Developmental research has been defined as "the systematic study of designing, developing and evaluating instructional programs, processes and products that must meet the criteria of internal consistency and effectiveness." Type 1 developmental research which focuses upon a given instructional product, program, process, or tool. They reflect an interest in identifying either general development principles or situation-specific recommendations (Richey, 2005).

This study was conducted at a certain public high school in Dumangas, Iloilo. The respondents of this study were the Grade 7 learners of a certain public high school in Dumangas, Iloilo who were officially enrolled for School Year 2023- 2024. Only the respondents with parent's consent were allowed to participate in the study.

The respondents were selected from 13 sections and the number of respondents were determined using the Cochran's Formula. Quota sampling was employed to determine the samples to be taken in each section so that the respondents were distributed and have equal chances to be chosen. Quota sampling is a non-probability sampling method where the researcher selects participants based on specific characteristics, ensuring they represent certain attributes in proportion to their prevalence in the population (Simkus, 2023).

The following flow was taken when conducting the study.

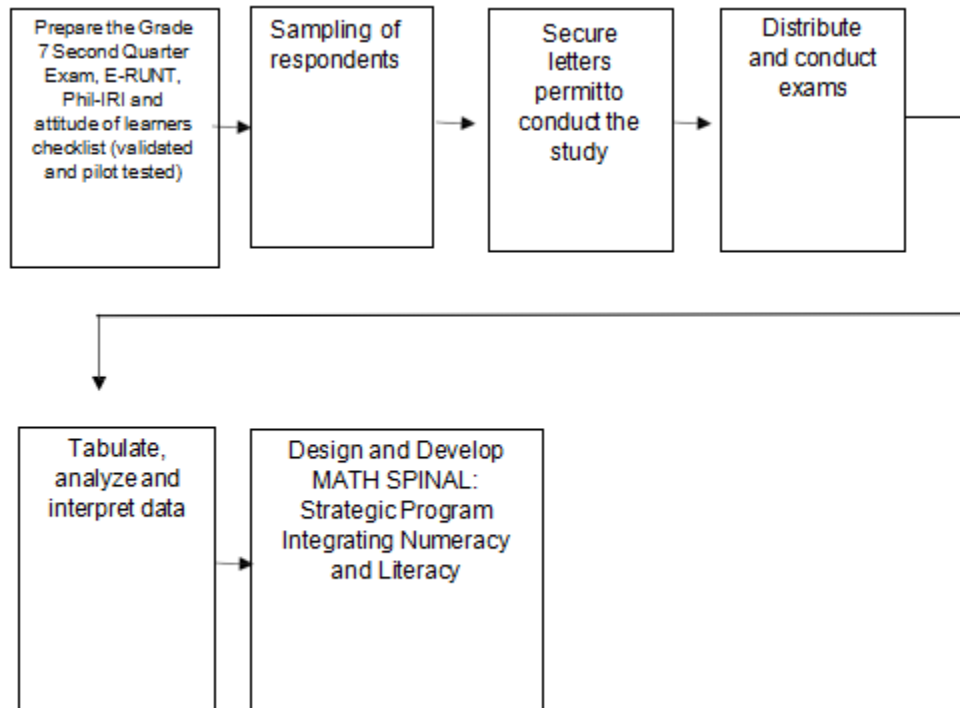


Figure 2
Flow of Data Collection Procedure

The researcher utilized instruments such as Mathematics Performance Test, Enhanced Regional Unified Numeracy Test (E-RUNT) and Phil-IRI Test by DepEd and a researcher-made questionnaire on Attitudes towards Math Test. The list of Grade 7 learners was secured and employed the sampling through Cochran's Formula and Quota Sampling Technique was done to determine the number of samples in each section. Then, a letter of permission to conduct the research was sent and sought for the approval of the Schools Division Superintendent, School Head, and respondents in the Division of Iloilo. Once the permission to conduct of the study was approved, the researcher conducted the study at Dumangas National High School. The data gathered were tabulated, analyzed, and interpreted. The result of the study were the basis in developing the Math SPINAL: Strategic Program Integrating Numeracy and Literacy.

RESULTS

The following tables show the result of the study:

Table 1 discusses the result of the learners' score in order to determine their performance in mathematics. This exam has a passing score of 37. The Mathematics

Performance of grade 7 learners is “low” since the mean score of 237 learners is 20.13 (SD=6.94), which is below the passing score of 38 out of 50 item test.

Table 1
Math Performance of Grade 7 Learners

	Mean	SD	N	Description
Math Performance	20.13	6.94	237	Did Not Meet Expectations

Legend: Below 37=Did Not Meet Expectations, 37-38=Fairly Satisfactory, 39-41=Satisfactory, 42-44=Very Satisfactory, 45-50=Outstanding

Table 2 discusses the result of the learners’ scores to determine their numeracy level. The data shows the numeracy level of Grade 7 learners with a mean average of 17.70 (SD=8.69), described as “low proficient” for having a low average score on the E-RUNT test.

Table 2
Numeracy Level of Grade 7 Learners

	Mean	SD	N	Description
Numeracy Level	17.70	8.69	237	Low Proficient

Legend: 0-9= Not Proficient, 10-19= Low Proficient, 20-29= Nearly Proficient, 30-35= Proficient, 36-40=Highly Proficient

Table 3 discusses the result of the learners’ scores to determine their literacy level. The table presents the literacy of Grade 7 learners that shows “frustration level” having the mean of 5.69 (SD=2.29) after taking the Phil-IRI test. This result means that the grade 7 learners find reading materials difficult that they cannot successfully respond to them.

Table 3
Literacy Level of Grade 7 Learners

	Mean	SD	N	Description
Literacy level	5.69	2.29	237	Frustration

Legend: 0= Non-Reader, 1-13= Frustration, 14-17= Instructional, 18-25= Independent

Table 4 provides a detailed overview of the results obtained from the "Attitude of Learners toward Mathematics" questionnaire, shedding light on students' attitudes toward the subject. The analysis reveals a predominantly positive disposition among learners, as indicated by the mean average score of 3.63 (SD=0.498).

Table 4
Attitude of Grade 7 Learners in Mathematics

	Mean	SD	N	Description
Attitude	3.63	.498	237	Positive Attitude

Legend: 1.00-1.49= Highly Negative Attitude, 1.50-2.49= Negative Attitude, 2.50-3.49= Neutral, 3.50-4.49= Positive Attitude, 4.49- 5.00= High Positive Attitude

In Table 5, a comprehensive analysis of the interrelationships among math performance, numeracy, literacy, and learners' attitudes is presented through the utilization of Spearman rho correlation. This statistical technique allows for a nuanced examination of how these variables interact and influence one another within the context of the study.

Table 5
Relationship among Math Performance, Numeracy, Literacy and Attitude of Learners

	Numeracy		Literacy		Attitudes	
	rs	P	Rs	P	rs	P
Math Performance	.811	.000*	.871	.000*	.133	.041*
Numeracy			.852	.000*	.016	.811
Literacy					.101	.121

DISCUSSION

Mathematics Performance of Grade 7 Learners

Table 1 indicates that the learners are not meeting the expected standards or competencies in Mathematics and may require additional support, instruction, or intervention to improve their proficiency in the subject. This result confirmed other studies that have shown Filipino students' poor or unsatisfactory performance in mathematics (Azucena et al., 2022; Capuno et al., 2019; Pentang et al., 2020). The Philippines has consistently performed poorly in international mathematics large-scale assessments. In the recent student assessment of PISA 2022 result, the Philippines ranked 77th out of 81 countries in Mathematics. This placement underscores significant challenges within the Philippine education system regarding mathematical proficiency among its students (Department of Education, 2023).

This observation underscores a concerning trend: a significant portion of Filipino students are lagging behind their international peers in terms of mathematical proficiency. This discrepancy points to a deficiency in mathematical skills among Filipino students when compared to their counterparts of the same age from other countries. The implications of this gap extend beyond academic performance, potentially impacting future opportunities and competitiveness on a global scale. Addressing this disparity requires a concerted effort to enhance mathematics education and support the development of strong mathematical foundations among Filipino students. By investing in targeted interventions and educational initiatives, policymakers and educators can work towards closing this gap and ensuring that Filipino students are equipped with the necessary skills to succeed in an increasingly competitive and interconnected world.

Numeracy Level of Grade 7 Learners

Table 2 indicates that learners with low numeracy levels may encounter difficulties in mastering fundamental arithmetic operations such as addition, subtraction, multiplication, and division. Moreover, they may struggle to apply mathematical concepts to real-world scenarios and solve practical problems involving numerical reasoning. This deficiency in numeracy skills not only hampers academic performance but also impedes the ability to navigate everyday situations requiring mathematical proficiency.

The persistence of low performance in Mathematics, as highlighted by Almerino et al. (2020), underscores an ongoing challenge within the education system. This issue is further supported by previous research, such as that of Mushtaq (2013), which emphasizes the continuous nature of the problem surrounding student achievement in mathematics. Additionally, the study's findings align with the observations made by Care et al. (2015), indicating that Filipino students' performance in national and international assessments of mathematics and science competencies consistently trails behind that of neighboring countries such as Singapore, South Korea, Hong Kong, Chinese Taipei, and Japan.

These collective insights underscore the urgent need for targeted interventions and educational reforms aimed at addressing the root causes of low numeracy levels among Filipino students. By implementing evidence-based strategies and fostering a supportive learning environment, policymakers and educators can work towards improving mathematics education and empowering students to succeed academically and thrive in an increasingly competitive global landscape.

Literacy Level of Grade 7 Learners

Table 3 presents the literacy of Grade 7 learners that shows “frustration level” which means that the Grade 7 learners find reading materials difficult that they cannot successfully respond to them. The recent 2022 Program for International Student Assessment (PISA) results shed light on the stark reality of the Philippines' educational landscape, revealing a concerning disparity in learning competencies compared to global standards (OECD, 2023). As reported by the Department of Education (2023), Filipino

students are estimated to be lagging behind by approximately five to six years in terms of learning proficiency, as indicated by their performance in the PISA assessments.

According to the latest PISA report released just last week, participating countries exhibited mean scores of 472 for mathematics, 476 for reading, and 485 for science. In stark contrast, the Philippines reported substantially lower scores, with a score of 355 for mathematics, 347 for reading, and 373 for science. These figures signify a significant discrepancy of approximately 120 points below the global average across all three domains (OECD, 2023).

This glaring disparity underscores the urgent need for comprehensive reforms and targeted interventions within the Philippine education system. Addressing the root causes of this educational shortfall requires a multifaceted approach, encompassing curriculum enhancements, teacher training programs, infrastructure improvements, and policy reforms. By prioritizing educational excellence and equity, stakeholders can work collaboratively to narrow the achievement gap and ensure that all Filipino students have access to quality education that prepares them for success in an increasingly competitive global landscape.

Attitude of Learners

Table 4 suggests that, on average, students exhibit a favorable attitude towards mathematics. A mean score above the midpoint of the scale indicates a tendency towards positive attitudes, reflecting a general inclination towards engaging with and embracing mathematical concepts and challenges. A positive attitude towards mathematics is a significant factor in fostering academic success and long-term achievement in the subject. A favorable attitude not only promotes enthusiasm and motivation but also enhances students' willingness to persist in problem-solving and mathematical exploration.

Moreover, a positive attitude towards mathematics can have far-reaching implications beyond academic performance. It can contribute to the development of essential skills such as critical thinking, logical reasoning, and problem-solving abilities, which are valuable assets in various aspects of life and future career pursuits.

Understanding and nurturing positive attitudes towards mathematics among students is essential for educators and policymakers. By recognizing the factors that influence attitudes towards the subject and implementing strategies to cultivate a positive learning environment, stakeholders can empower students to develop a lifelong appreciation for mathematics and harness its potential to enrich their lives.

This result is similar to the study of Naungayan (2022) that aimed to assess and find the relationship between the attitude of high school students towards mathematics and their level of achievement in the subject. It used the descriptive correlation design with a validated questionnaire and documentary analysis as its main data-gathering tool. Gathered data were analyzed and interpreted using weighted mean, and Pearson r . The attitude towards mathematics, as reflected by the responses of the students, was

described as positive. Moreover, the students' mathematics achievement is approaching proficiency level.

Relationship among Math Performance, Numeracy, Literacy and Attitude of Learners

The correlation coefficients provided in Table 5 offer insights into the strength and direction of the relationships between pairs of variables. For instance, a positive correlation coefficient indicates that as one variable increases, the other tends to increase as well, while a negative coefficient suggests an inverse relationship. Spearman rho correlation revealed a significantly strong positive relationship between numeracy and Math performance with $r_s=.811$ and $p<.001$.

The result of this study is similar to the study of Pitogo and Oco (2023) that sought to determine the numeracy skills of the pupils based on their pre-test and mid-year assessment test, determine the mathematics performance of the pupils during the First and Second Quarter, and determine the significant relationship between the numeracy skills and the Mathematics performance of the pupils during the First and Second Quarter. The primary research instrument employed for this study was the ASER TOOL – Annual Status of Education Report materials in determining the numeracy skills of the pupils. The numeracy skills of the pupils were computed. The results showed the numeracy skills in the pupils was at advanced level. The pupils' performance in Mathematics was at outstanding level. There exists a significant difference between the numeracy skills and Mathematics performance among the pupils. It is recommended that teachers and parents shall continue in providing the guidance and assistance to the pupils.

Statistical analysis also revealed the significant relationship of Mathematics performance to literacy level that shows there is a significant difference at .871 level of significance. This means that positive correlation exists between the variables, that is a high literacy score comes with a high Math performance. Since the correlation is high, the coefficient of determination is also high, that is 75.86% ($r^2=.7586$) of the variation in the Math performances is attributable to the variation in the literacy scores.

The result of this study provide further evidence of the importance of reading comprehension on applied mathematics assessment (Jordan et al., 2003). This indicates that applied math tests are not solely measuring mathematics skill. As such, it is possible for a child to be proficient in mathematics, but perform poorly on an applied mathematics assessment if they have poor reading comprehension. Thus, it would be an incomplete assessment to give a student an applied mathematics test as the only measure of mathematics skill. This finding is also important because it can help with mathematics intervention development.

Statistical analysis presents the significant relationship of Mathematics performance to attitude of learners that shows there is a significant relationship at 133 level of significance. This means that positive correlation exists between the variables, that is a high attitude in learning Math comes with a high Math performance. Since the

correlation is high, the coefficient of determination is also high, that is 1.77% ($r^2=.0177$) of performances is attributable to the variation in the literacy scores.

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This result is consistent with the study of Subia, Salangsang and Medrano (2018) that determines the relationship between attitude and performance in Mathematics of 105 Bachelor of Elementary Education (BEEd) freshman students by using correlational research with the questionnaire as the main instrument. The study found that the performance in Mathematics I of the respondents was below average. Their attitudes are significantly correlated with their performance in Mathematics I. The higher their positive attitude, the higher their performance, whereas the higher their negative attitude the lower their performance. Further, the respondents believe that working with Mathematics problems will make them better critical thinkers and they assume that they have more chance of becoming successful in life if they are good in Mathematics. However, the respondents consider Mathematics as the most difficult subject. They were scared of Mathematics problems and easily give up with answering when they cannot solve them. The overall result revealed that the respondents exhibit negative attitude towards Mathematics. The significant findings of this study provide valuable information for Mathematics teachers, administrators and curriculum planners to enhance policies and pedagogies relating to Mathematics instruction.

Statistical analysis presents the significant relationship of numeracy level to literacy level of learners that shows there is a significant relationship at .852 level of significance. This means that positive correlation exists between the variables, that is a high numeracy score comes with a high literacy score. Since the correlation is high, the coefficient of determination is also high, that is 72.59% ($r^2=.7259$) of the variation in the numeracy scores is attributable to the variation in the literacy scores.

The result of this study is similar to the study of Chang (2023) that explored the influence of early literacy and numeracy skills on fourth-grade math achievement using

the Trends in International Mathematics and Science Study (TIMSS). Results show that early literacy skills have a stronger effect on G4 math scores than early numeracy skills. Findings from the conditional direct and indirect effects of early numeracy skills on G4 math achievement suggest that children who had more proficient early literacy skills utilize strategies beyond just early numeracy skills to solve G4 math problems and that children's strategies to solve math problems may be enhanced by the proficiency of their literacy skills.

Statistical analysis presents the significant relationship of numeracy level to attitude in Mathematics of learners that shows there is no significant relationship at .016 level of significance since $p > 0.05$. This means that no positive correlation exists between the variables. Since the correlation is low, the coefficient of determination is also low, that is 0.03% ($r^2 = .0003$) of the variation in the numeracy scores is not attributable to the variation in the attitude of learners towards Mathematics. The result of this study is contrary to the study of Capuno et al. (2019) was conducted in a public national high school in the Mandaue City Division, Cebu, Philippines. The respondents were asked to answer a standardized survey questionnaire to assess their attitudes and study habits. The tool consists of three parts. Part 1 gathers the socio-demographic profile of the respondents. Part 2 assesses the attitudes of the respondents towards mathematics, while Part 3 was used to assess the study habits of the respondents. Furthermore, their academic performance in mathematics was measured based on their first quarter grade, which was retrieved from the Registrar's Office. The study revealed that those respondents had positive attitudes towards mathematics in terms of its value while they had a neutral attitude when it comes to their self-confidence, enjoyment, and motivation in mathematics. Also, the study shows that there was a negligible positive correlation between the attitudes and academic performance of the respondents in terms of their self-confidence, enjoyment, and motivation while there was a weak positive correlation between the value of math and their academic performance in math. It was concluded that students' attitudes and their study habits are significant factors that affect their performance in mathematics. The researchers strongly recommend the utilization of the enhancement plan in the teaching of mathematics to junior high school students.

Statistical analysis presents the significant relationship of literacy level with the attitudes of learners in Mathematics that shows there is a significant relationship at .101 level of significance. This means that positive correlation exists between the variables, that is a high literacy score comes with a high attitude in learning Math. Since the correlation is high, the coefficient of determination is also high, that is 1.02% ($r^2 = .0102$) of the variation in the attitude of learners towards Mathematics is attributable to the variation in the literacy scores.

This result is true according to the study by Andamon and Tan (2018), stated that there are issues and problems of the students in learning mathematics in the language and fundamental concepts of understanding. Thus, this affirms that language difficulties of the learners were aligned on the vocabulary of mathematics, comprehension on the recognition of words and numbers (Sandoval, 2009).

The significance of understanding mathematics cannot be overstated, as underscored by the findings of this study. Mastery of mathematical concepts goes beyond mere memorization of formulas and procedures; it necessitates a deep comprehension of the underlying principles and the ability to articulate how these principles relate to one another. As highlighted by Edulsa (2022), conceptual understanding in mathematics is achieved when students grasp not only the meaning of mathematical concepts but also the fundamental principles that govern them.

In essence, conceptual comprehension empowers learners to go beyond surface-level understanding and delve into the core principles that underpin mathematical phenomena. Rather than viewing mathematics as a collection of isolated rules and procedures, students develop a holistic understanding of how various concepts interconnect and build upon one another.

This holistic approach to understanding mathematics is essential for fostering critical thinking skills and problem-solving abilities. By grasping the underlying principles behind mathematical concepts, students can apply their knowledge flexibly to solve complex problems and navigate real-world scenarios with confidence. Furthermore, conceptual understanding lays the foundation for lifelong learning and continued growth in mathematics. By equipping students with the tools to comprehend and articulate mathematical ideas, educators pave the way for ongoing exploration and discovery in the field of mathematics.

Conclusions

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

1. The learner's overall Mathematics performance was at a low performance level for getting low scores below 37 passing score indicates a lack of understanding or effort, with work that falls significantly below expectations.
2. The learner's overall numeracy skills level was Low Proficient based on E-RUNT test that means that the learners got low scores which is between 10-19 which learners at this level struggled with basic operations of integers.
3. The learners' overall literacy skills level was Frustration level that means that the learners got low scores which is between 1-13 that they find reading materials difficult that they cannot successfully respond to them.
4. The learners' overall attitudes towards Mathematics subject was positive, which means the learners find taking the Mathematics test a positive experience.
5. The significant relationship between learners' math performance, numeracy level, literacy level, and attitudes toward math highlights their interconnectedness in academic achievement.

6. The significant relationship between learners' numeracy and literacy levels highlights their interconnectedness in education. Numeracy, involving math skills like computation and problem-solving, and literacy, encompassing reading and comprehension, complement each other.

7. No significant relationship was found between the learners' numeracy level and attitudes towards Mathematics.

8. Significant relationship was established in the learner's literacy level and attitudes towards Mathematics.

9. By implementing Math SPINAL, schools may create a learning environment where students in Grade 7 have the essential literacy and numeracy abilities.

Recommendations

Based on the conclusions drawn, the following were recommended:

1. The Department of Education (DepEd) should give precedence to strategies aimed at improving literacy within the curriculum. This may entail integrating activities and materials that focus on literacy skills throughout various subjects, delivering clear instruction on reading comprehension and writing abilities, and extending assistance to students who face difficulties with reading.

2. The school should strengthen numeracy instruction to develop students' mathematical understanding and problem-solving abilities. This may involve implementing hands-on activities, real-world applications, and differentiated instruction to cater to diverse learning needs and preferences.

3. Teachers should encourage learners that exhibited positive attitudes towards mathematics. It is crucial to nurture and sustain this positive mindset by fostering a supportive and engaging learning environment, celebrating students' achievements, and highlighting the relevance and importance of mathematics in everyday life.

4. The learners should participate if the intervention program is implemented to address areas of weakness like their numeracy and literacy level and improve least learned competencies.

5. Conduct further research since no significant relationship was found between the four variables (mathematics performance, numeracy level, literacy level, and attitudes towards mathematics), further research is warranted to explore the underlying factors influencing these aspects of student learning.

Intervention Program: MathPedia Clinic and Infographics

The Math SPINAL: Strategic Program Integrating Numeracy and Literacy was created based on the Mathematics performance, E-RUNT score, Phil-IRI result and the

attitude in learning Mathematics of the Grade 7 learners. The Mathematics performance showed low performance which means that many learners did not pass the given test and since they got low scores, they need enrichment or program that could enhance their performance. The learner's numeracy and literacy level shows significant relationship, means that learners who are Low Proficient are also learners who experiences difficulty and frustration when reading texts that are considered challenging for their current reading abilities. The quarter exam, E-RUNT score, Phil-IRI result and the attitude in learning Mathematics of the Grade 7 learners were the bases in formulating topics in this program.

The factors that mentioned by the learners that made them consider learning Mathematics difficult were also based in making varied activities in each topic. The steps taken in creating the program started with the conduct of the study that enabled the researcher to identify the low Mathematics competence of learners and the factors in attitudes towards in Mathematics were considered in creating activities that would answer the needs and personal differences of learners. When the program was completed, it was validated by experts in the field.

The Math SPINAL will follow the 4Es model which include:

Engage, a thorough needs assessment to identify the specific literacy and numeracy skills that learners need to develop or improve. For literacy, this will involve learners to read the problems orally and explain on how they do the process in finding solution. The numeracy will involve administering assessment tests among the learners that include Mathematics Performance Test, E-RUNT, and attitude of learners in learning Mathematics.

Explore, in this stage the result of the several assessment tests were used to set the objectives of the program such as Mathematics Performance Test, E-RUNT, attitude of learners in learning Mathematics and PHIL-IRI for literacy. The gathered data was tallied and analyzed. The activities include hands-on activities, gamification, performance-based assessment and collaborative learning.

Explain, the researcher defines clear and measurable objectives for the literacy and numeracy program, outlining what learners should be able to achieve by the end of the program. One of the attitudes mentioned by the learners that was among the lowest mean is "I believe that I can easily understand math concepts" and these was addressed in the program aligning the objectives to the identified needs of the learners and address relevant literacy and numeracy skills and competencies. The researcher developed learning activities such as rigid discussion and technology-enabled methods that would cater to different learning styles and preferences of learners. The design of the program also considered the instructional materials and resources that support the delivery of the curriculum and the achievement of program objectives.

Evaluate, in this phase, the learners will be able to apply what they have learned from the program. One of the attitudes that has the least average is the statement “I feel engaged during math class” will be addressed by the program through performance-based assessment, differentiated instruction and graded oral recitation. With these activities the learners will be able to apply what they have learned as well as get engage with the lessons.

August 7 – 30, 2024	To develop the numeracy and literacy skills of Grade 7 students by conducting an intensive remediation/review of the basic concepts in Mathematics and English.	Increase the numeracy and literacy skills of Grade 7 students.	Intensive review on the basic concepts, like Operations on Whole Numbers, Integers, Fractions, Decimals, Percentage and Measurement in Mathematics and basic principles in English.	Engage on the basic Math facts. Explore gamification and other techniques to develop learners' appreciation to learn and improve numeracy and literacy skills. Explain the key concepts of the topic. Evaluate students learning.	Teacher and Learners	Php15,000.00
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Figure 2

Excerpt from MATH SPINAL Showing 4Es Model

Compliance with Ethical Standards

In quantitative research, ethical issues require careful study and tact, especially when students participate as respondents. First and foremost, informed parental consent was secured, making sure that before participating, students were aware of the study's goals, methods, and possible repercussions. Confidentiality and anonymity were given top priority by the researcher.

Students' privacy was secured by using safe data distribution and storage procedures. Furthermore, it is critical to strike a balance between the advantages of study and any potential risks, particularly when it comes to delicate subjects or invasive techniques.

While conducting research, the researcher tried to avoid exerting undue pressure or influence on students and respect their autonomy. Furthermore, since the researcher had control over students, it is critical to address power imbalances and cultivate an

atmosphere of mutual respect and trust. Lastly, the researcher needed to be on the lookout for any potential biases to ensure the objectivity and credibility of their findings. Identifying and addressing biases helps maintain the integrity of the research process and enhances the reliability of the results.

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