



## IMPROVING THE NUMERACY LEVEL OF GRADE FIVE LEARNERS THROUGH PROJECT MATH-YAGA

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### ABSTRACT

Learners suffered learning loss in mathematics due to education disruptions caused by the COVID-19 pandemic. To address these challenges, the researcher conducted a study aimed to determine the effectiveness of Project MATH-YAGA (Yielding Authentic Results through Games and Activities) in improving the numeracy level of Grade 5 learners of Lual Elementary School. The study utilized the pre-experimental one-group pre-test-post-test design using universal sampling. Respondents of the study were 37 grade five learners. A 40-item validated researcher-made test instrument was utilized as a tool for data gathering. The mean and t-test dependent sample were utilized for data analysis using MS Excel Data Analysis Toolpak.

The results of the study revealed that there were 21 or 56.76% non-numerates and 16 or 43.24% emergent learners during the pre-test with a mean of 10.24 and standard deviation of 3.15. After the implementation of Project MATH-YAGA for 10 months, the post-test was administered. It has a mean of 23.59 and a standard deviation of 7.14. The results denote that the average performance of the class increased. Only 1 or 2.70% were non-numerate, 9 or 24.32% were Emergent, 21 or 56.76% were Average Numerates, and 6 or 16.22% were Above Average. There is a significant difference in the numeracy level before and after the implementation of Project MATH-YAGA, which signifies an increase of 13.35 in the average score from the pre-test to post-test. The results proved the effectiveness of games and activities in improving the numeracy level of learners.

**Keywords:** *numeracy level, authentic results, games, and activities*

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## INTRODUCTION

More than half of the in-person schooling for approximately 147 million children was lost between 2020 and 2022, according to UNICEF 2022. It issues a warning that many people -particularly the most vulnerable - risk quitting school completely. They are the least likely to be able to read, write, or perform basic math, and when they are not in school, they run the risk of being exploited and living a life of abuse and suffering. Even when children are enrolled in school, the amount of wasted learning time due to the epidemic is contributing to what UNICEF refers to as "a desperately poor level of learning" in the 32 low-income countries it has investigated. UNICEF continued, "In the nations studied, the current speed of learning is so slow that it would take most schoolchildren seven years to learn the fundamental reading abilities that they should have mastered in two years, and 11 years to learn the fundamental numeracy skills.

Similarly, according to Faingold, the Philippines was already dealing with a learning crisis prior to the pandemic. For instance, the findings of the Southeast Asia Primary Learning Metrics in 2019, a regional learning evaluation created by and for Southeast Asian countries, showed that only 10% of Grade 5 children in the Philippines passed the minimum needed requirements in reading and only 17% in math. As they validated the secondary level results from the Programme for International Student Assessment (PISA) announced in 2018, where the Philippines placed last in reading and math among 79 nations, he noted that these scores were "extremely low and an issue of concern."

With the situation mentioned, Lual Elementary School conducted a Pre-test in Mathematics during the opening of SY 2022-2023. It was revealed that out of 142 learners from grades two to six, 62 or 43.66% were non-numerates. The worst results were out of 37 grade five learners, 21 or 56.76% were non-numerates and 16 or 43.24% were emergent learners.

Because of the alarming result of non-numerates and emergent learners in the grade five level, the researcher implemented Project MATH-YAGA (Yielding Authentic results through Games and Activities). This project responded to the challenges and learning loss of grade five learners brought on by the COVID-19 pandemic with the use of differentiated games and activities in Mathematics.

### Research Questions

This study was designed to determine the effectiveness of Project MATH-YAGA (Yielding Authentic results through Games and Activities) in improving the numeracy level of grade five learners.

Specifically, it sought to answer the following questions:

1. What is the numeracy level of grade five learners before the implementation of Project MATH-YAGA?
2. What is the numeracy level of grade five learners after the implementation of Project MATH-YAGA?
3. Is there a significant difference in the numeracy level of Grade Five learners before and after the implementation of Project MATH-YAGA?
4. What are the implications of the findings in this action research in improving the numeracy level of Grade 5 learners?

## Brief Review of Related Literature and Studies

The researcher reviewed related literature and studies to have a comprehensive knowledge of the research being conducted. The data acquired from literature and studies substantially aided in the assessment of findings in this study.

### *Causes of Poor Numeracy Skills of Learners*

Elementary schools still have a low numeracy proficiency level. This low numeracy competence is brought on by several factors, including the teacher's inability to create HOTS problems and the pupils' lack of habituation to work on the difficult. The teacher who has not given students practice answering questions with a literacy component is the biggest issue that keeps students from finishing learning based on numeracy and literacy. Many educators, particularly those working with young students in elementary schools, still struggle to create numeracy tests.

Sawchuk S. et al., (2020) stated that the studies vary in how severe they gauge the so-called "COVID slide" to be, but all of them found on average, students would lose more ground in math than in reading. Three studies based on NWEA data predicted students could learn half or up to a full year less math in 2020-21, compared to what they would learn in a typical year. The study based on the Fast Bridge test data showed smaller but still troubling learning losses across every grade: two-and-a-half to four-and-a-half months of learning lost, compared to a month or two in reading. When considering the pandemic and what teachers and school administrators may do to halt it, math learning appears to be suffering more. To assist learners in understanding mathematical concepts and developing their arithmetic abilities, teachers must provide explicit links. Lesson plans, activities, and the learning environment as well as instructional materials that had not been used and shown during distance learning modality because of COVID-19, should be prioritized by teachers.

Moreover, Karikari 2020 stated another reason why pupils performed poorly in mathematics was due to their bad study habits. Also, the primary activity-based teaching approach that may enhance the school's Mathematics curriculum was problem-based learning. Also, the main element that affected the school's Mathematics curriculum was the quality of the teachers. The success of mathematics instruction depends significantly on the caliber of teachers. Thus, there needs to be high-quality teacher development. To help instructors keep up with current advancements in the field of mathematics education and increase their understanding of the topic, opportunities should be provided regularly to enhance teachers' practices and competencies through in-service training, conferences, seminars, and workshops.

Similarly, Landicho (2021), study habits and interests—both of which are related to students—are elements that have an impact on student's performance. In addition, the respondents' academic performance is significantly impacted by the rareness of workbooks and textbooks used as instructional resources.

The study by Makondo et al. (2020) titled Causes of Poor Academic Performance in Mathematics at Ordinary Level: A Case of Mavuzani High School, Zimbabwe showed that teaching methods, students' negative attitudes toward mathematics, teachers' and parents' negative attitudes toward mathematics, some teachers' lack of teaching experience, their instability as teachers, and a lack of adequate resources are some of the causes of poor academic performance in

mathematics at ordinary level. Larzim, Abu, and Wan (2003) have also noted that kids' interest in mathematics decreases as they transition from primary to secondary school because they believe mathematics to be a challenging subject.

### *Improving Numeracy Skills through Games and Activities*

Russo et al., (2021) stated that primary school teachers frequently use mathematical games to supplement their lessons in math. Games were used in a variety of teaching contexts, including as a "warm-up" activity, to introduce fresh mathematical ideas, to reinforce skills and knowledge, and to develop fluency. In line with earlier findings, teachers believed that games were very helpful in getting pupils interested in math. Games, according to teachers, are a good way to practice all four of the skills emphasized in the Australian Curriculum Mathematics, including fluency, understanding, problem-solving, and reasoning (ACARA, 2019).

The study by Singh et al. in 2021 titled Card Game as a Pedagogical Tool for Numeracy Skills Development has proven that card games form a strong tool capable of molding the interest as a pedagogical tool for numeracy skills development in the context of mental calculation. It has been discovered that the Math Zap card game is a highly effective teaching tool for improving students' numeracy calculation abilities in the areas of fractions, percentages, and decimals. A statistically significant increase in pre-post test scores serves as proof of this. The fact that the students' reactions to the game were largely favorable and receptive supports the idea that it is an effective instructional tool.

In the same way, Hendrix 2020 showed the explicit teaching of ideas like the linear representation of numbers using number board games has been shown to be effective in raising numerical skills (for example, Ramani et al., 2012) and has the potential for joint implementation across school and home. The study discusses the relationship between home and school as well as how playing board games affects the development of numeracy skills.

Furthermore, based on the study of Anwar N. et al (2020) entitled Learning Math through Mobile Games for Primary School Children, the proposed model of learning will be created in games that can entice kids to learn while playing the game, and unintentionally, they would learn arithmetic while playing the games. The adoption of math learning through games will make the method of studying enjoyable and entertaining ways, and ultimately, it will improve the student's arithmetic understanding.

### Synthesis

Due to education-related problems that arose during the COVID-19 epidemic, students nationwide, especially those in elementary school, experienced learning loss in mathematics. The cited research and literature are crucial to the success of this investigation. Low numeracy skills can be attributed to a variety of factors, including poor study habits and insufficient experience responding to even straightforward, in-depth inquiries. Other factors that contribute to having a low numeracy outcome include the teacher's methods and strategies for teaching, and the learners', and parents' negative attitudes toward math.

On the other hand, effective teaching methods can alter students' perceptions of how tough and difficult math is. To help students develop their numeracy abilities, a variety of games and

activities can be used. To improve the learning abilities in numeracy, games, and activities should incorporate regular practice, participation encouragement, and even teacher incentives.

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## **METHODOLOGY**

### **Scope and Limitation**

This research was limited to all grade five learners of Lual Elementary School in the District of Infanta in the Division of Quezon. Its main concern was determining the effectiveness of Project MATH-YAGA in improving the numeracy level of grade five learners for the SY 2022-2023.

### **Research Design**

The study utilized the pre-experimental one-group pre-test-post-test design to know the effectiveness of Project MATH-YAGA in improving the numeracy level of grade five learners. According to Creswell (2012), the pre-experimental is the simplest form of research design that follows the basic steps in experiments. It does not have a comparison group and researchers test ideas (practice or procedure) to determine their effect on an outcome.

### **Research Locale**

Lual Elementary School served as the locale of the study. At present, it has 8 permanent teachers handling kindergarten to grade 6 with 200 enrolled learners. The school is headed by Principal 1.

### **Sampling**

The study utilized universal sampling. The respondents were all 37 grade-five learners who belong to the non-numerates level after the conduct of the pre-test in Mathematics.

### **Data Gathering Procedure**

At the beginning of the School Year 2022-2023, the researcher sought permission from the school principal regarding the launching and implementation of Project MATH-YAGA. Upon her consent, the researcher immediately informed and oriented her learners on the conduct of the pre-test in Mathematics. Also, she communicated with parents regarding the purpose of the said test at the beginning of the school year. After securing all necessary communications with the school principal, parents, and learners, the researcher administered the test. The data gathered was treated using statistical tools.

### **Research Instrument**

In this study, the instrument utilized for data gathering was a 40-item researcher-made test. The pre-test was conducted in September 2022 and the post-test was done in June 2023. The content validation was done by experts. The validity of the instrument was tested through test item analysis. Similarly, the table of specifications of the teacher-made test was checked by master teachers and verified by the school head.

### **Process of Analysis**

The study utilized the pre-experimental one-group pre-test-post-test design to know the effectiveness of Project MATH-YAGA in improving the numeracy level of grade five learners. According to Creswell (2012), the pre-experimental is the simplest form of research design that follows the basic steps in experiments. It does not have a comparison group and researchers test ideas (practice or procedure) to determine their effect on an outcome.

## Statistical Treatment of Data

The collected data from the pre-test and post-test assessment were analyzed using the statistical tools illustrated below:

1. Mean. This was used in analyzing the numeracy level of grade five learners before and after the implementation of Project MATH-YAGA

The formula is:

$$M = \frac{\sum x}{N}$$

Where:

M = Mean

$\sum x$  = summation of frequencies

N = number of cases

2. Standard Deviation. This was used to determine the distance of individual numeracy levels of learners.

The formula is:

$$S = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

Where:

S = Standard deviation

x = Score

$\bar{x}$  = Mean

3. Paired t-test. This was used to determine the significant difference in the academic achievements of learners before and after the implementation of the intervention program.

The formula is:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s^2 \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

Where:

t = t-test

X1 = Mean of the first variable

X2 = Mean of the second variable

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## RESULTS AND DISCUSSION

This chapter presents the results and discussion of various data derived in this study concerning the effectiveness of Project MATH-YAGA in improving the numeracy level of grade five learners. The results follow the order of the specific statement of the problem.

Specific Question No. 1. What is the numeracy level of grade five learners before the implementation of Project MATH-YAGA?

**Table 1**  
**The Numeracy Level of Grade Five Learners Before the Implementation of Project MATH-YAGA**

Range of Values	Interpretation	Frequency	Percentage
0 - 10	Non-numerate	21	56.76%
11 - 20	Emergent	16	43.24%
21 - 30	Average Numerate	0	0
31 - 40	Above Average	0	0
Total		37	100%

Table 1 presents the numeracy level of Grade 5 learners in Lual Elementary School before the implementation of Project MATH-YAGA. The mean is 10.24 with a standard deviation of 3.15, which means that most of the scores were homogenous or close to each other. The results denote that there were 21 or 56.76% non-numerates and 16 or 43.24% emergent learners in the administered 40-item pre-test.

Sawchuk S. et al., (2020) stated that the studies vary in how severe they gauge the so-called "COVID slide" to be, but all of them found on average, students would lose more ground in math than in reading. Three studies based on NWEA data predicted students could learn half or up to a full year less math in 2020-21, compared to what they would learn in a typical year. The study based on the FastBridge test data showed smaller but still troubling learning losses across every grade: two-and-a-half to four-and-a-half months of learning lost, compared to a month or two in reading. When considering the pandemic and what teachers and school administrators may do to halt it, math learning appears to be suffering more.

To assist learners in understanding mathematical concepts and developing their arithmetic abilities, teachers must provide explicit links. Lesson plans, activities, and the learning environment as well as instructional materials that had not been used and shown during distance learning modality because of COVID-19, should be prioritized by teachers.

*Specific Question No. 2. What is the numeracy level of grade five learners after the implementation of Project MATH-YAGA?*

**Table 2**  
**The Numeracy Level of Grade Five Learners After the Implementation of Project MATH-YAGA**

Range of Values	Interpretation	Frequency	Percentage
0 - 10	Non-numerate	1	2.70%
11 - 20	Emergent	9	24.32%
21 - 30	Average Numerate	21	56.76%
31 - 40	Above Average	6	16.22%
Total		37	100%

Table 2 presents the numeracy level of Grade 5 learners in Lual Elementary School after the implementation of Project MATH-YAGA. The mean is 23.59 with a standard deviation of 7.14, which means that most of the scores were heterogenous or different from each other. The results denote that there were only 1 or 2.70% non-numerates, 9 or 24.32% emergent learners, 21 or 56.76% average numerates, and 6 or 16.22% above average numerates in the administered 40-item post-test.

According to Russo et al., (2021), primary school teachers frequently use mathematical games to supplement their lessons in math. Games were used in a variety of teaching contexts, including as a "warm-up" activity, to introduce fresh mathematical ideas, to reinforce skills and knowledge, and to develop fluency.

Teachers thought that engaging learners in numeracy through games and activities was a great way to spark their interest. Playing games and engaging in activities can help students improve their fluency, comprehension, and problem-solving abilities in addition to their basic mathematical abilities.

*Specific Question No. 3. Is there a significant difference in the numeracy level of Grade Five learners before and after the implementation of Project MATH-YAGA?*

**Table 3**  
**Test of Significant Difference in the Numeracy Level of Grade 5 Learners Before and After the Implementation of Project MATH-YAGA**

Tests	Mean	P-value	Level of Significance	Decision
Pre-test	10.24	0.00	0.05	Reject the Null Hypothesis
Post-test	23.59			

Table 3 presents the mean between the numeracy level of Grade 5 learners in the pre-test, which is 10.24, and 23.59 in the post-test signifies an increase of 13.35. This was found to be significant as supported by the P-value of 0.00 at a 0.05 level of significance. The result confirms that there is a significant difference in the numeracy level of Grade 5 learners of Lual Elementary School before and after the implementation of Project MATH-YAGA.

The study by Singh et al. in 2021 titled Card Game as a Pedagogical Tool for Numeracy Skills Development has proven that card games form a strong tool capable of molding the interest as a pedagogical tool for numeracy skills development in the context of mental calculation. It has been discovered that the Math Zap card game is a highly effective teaching tool for improving students' numeracy calculation abilities in the areas of fractions, percentages, and decimals. This is demonstrated by a pre-post test score increase that is statistically significant. The game's effectiveness as a teaching tool is supported by the fact that most of the learners' responses to it were positive and receptive.

*Specific Question No. 4. What are the implications of the findings in this action research in improving the numeracy level of Grade 5 learners?*

1. The numeracy level of grade 5 learners before the implementation of Project MATH-YAGA was revealed in the administered pre-test. There were 21 or 56.76% non-numerates and 16 or 43.24% emergent learners, therefore the teacher should conduct an intervention program to help all learners improve their numeracy skills.

2. The numeracy level of grade 5 learners was improved after the implementation of Project MATH-YAGA. It means that Mathematical games and activities as a teaching tool develop positive results and responses among learners. Learners become more proficient at computations by creating helpful methods for formulating the relationships between numbers through gameplay and math activities.

3. There is a significant difference in the numeracy level of the grade 5 learners in Lual Elementary School before and after the implementation of Project MATH-YAGA. Games and activities give learners opportunities to explore fundamental and other important mathematical concepts. Playing fun math games can motivate kids to engage themselves in class or group activities that will help them develop their numeracy skills.

## **Conclusions**

Based on the findings extracted from the study, the following conclusions are drawn:

1. Before the implementation of Project MATH-YAGA, all learners struggled and could not meet the DepEd learning standards in numeracy due to the pandemic.

2. After the implementation of Project MATH-YAGA for ten months, it was concluded that the numeracy level of grade five learners was improved. Almost all pupils improved their numeracy skills.

3. It was highly evident that there was a significant difference in the numeracy level of grade five learners before and after the implementation of Project MATH-YAGA. Mathematical games and activities applying class standards, consistency, and commitment are effective ways to improve the numeracy level of learners.

4. Most learners suffered learning loss particularly in Mathematics due to the pandemic therefore teachers should take steps to help them improve numeracy skills in creative and enjoyable ways.

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## **Recommendations**

Based on the findings and conclusions of this study, the following are recommended:

1. For learners

Learners should continue practicing fundamental skills and other important math concepts.

2. For teachers

The program in Mathematics may be adopted by other teachers, considering the skills, and aligned competencies of their learners.

3. For school administrators

The school head may allocate funds from MOOE or the local budget for the planning, preparation, and implementation of future programs in different grade levels.

4. For future researchers

Future researchers should do similar studies in other schools for more conclusive results.

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## **Compliance with Ethical Standards**

The author declares that informed consent from the respondents was obtained, that they were free to withdraw from the study at any time, that their identities were kept anonymous, their well-being was safeguarded, that there exists no conflict of interest in conducting the study, that plagiarism was avoided, that measures were taken to avoid bias in the analysis of the data and that the results were used only for research.

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