

Effectiveness of Study Buddy with Self-Learning Modules to Enhance Numeracy Skills Among Low Performing Students

Lovelyn Joy M. Ambayec, Glaiza N. Cabela, John Rovic M. Cepria,
Lovely Mona C. Deyparine, Aya Nicole B. Santiago

*ambayeclovelynjoy191@gmail.com, glaizacabela@gmail.com, johnrovicepria9@gmail.com,
deyparinelovelymona@gmail.com, santiagoayanicole18@gmail.com
Bubukal, Sta. Cruz, Laguna 4009, Philippines*

Abstract

Recent findings from the Program for International Student Assessment (PISA) reveal that Filipino students' math, reading, and science skills lag behind the global average, with no significant improvement since 2018. This study aimed to evaluate the effectiveness of an intervention program at Mario Z. Lanuza Elementary School designed to enhance the numeracy skills of third-grade students. The program combined peer tutoring through a Study Buddy system and self-directed learning using modules. The results indicate that the Study Buddy approach, paired with self-learning modules, led to significant improvements in students' numeracy abilities. Prior to the intervention, the mean numeracy score was 19.83 (39.66%), categorized as "Low," indicating substantial challenges in understanding numeracy concepts. After the intervention, the mean score increased to 23.23 (46.46%), classified as "Moderate." This improvement highlights the intervention's effectiveness in narrowing the numeracy skills gap. Statistical analysis confirmed the significance of the results, demonstrating that the Study Buddy intervention significantly improved numeracy skills. Based on these findings, the use of the Study Buddy system in combination with self-learning modules is recommended for continued implementation to foster student engagement and academic growth.

Keywords: Numeracy Skills; Self-Learning Modules; Study Buddy

Introduction

Numeracy skills refer to the capacity to use, interpret and communicate mathematical information to solve real-world problems. It involves the ability to understand basic math like addition, subtraction, division and multiplication as well as the use of graphical, spatial, statistical and algebraic concepts and the ability to interpret that data and apply it to real-world situations.

A study buddy program is introduced to enhance numeracy skills of the learners. It is typically defined as a friend or fellow student that you regularly study with. Having a study partner can improve the educational process by fostering accountability, exchanging resources, and offering support to one another. This connection helps with self-organization and workload scheduling, in addition to energizing and motivating you to reach your goals. They are success and growth drivers in the classroom, not just buddies. Studying with a partner allows students to share knowledge and have a deeper understanding of the readings

and course materials. By exchanging materials and offering guidance to one another, students can also increase their productivity by learning more effective study strategies.

Along with this program, self-learning module will be implemented as an intervention. Self-learning modules are collecting, processing, and retaining information without the help of another person. The learner is responsible for learning and retaining knowledge without the assistance of any other human resource. They are an excellent method to learn at your own pace and style.

To assess if the students learned anything from the study buddy, the authors included a self-learning module every Monday, Wednesday, and Friday. This served as their intervention to improve the numeracy skills of the students.

The study buddy program with self-learning modules seek to help students improve their numeracy skills. These two assist learners in discovering their own learning, and getting information from peers is beneficial. On the other hand, students must learn at their own pace, thus the self-learning module will provide as a guide if they truly understand the lesson presented during the study buddy.

Background of the Study

According to recent results from the Program for International Student Assessment (PISA), Filipino students are still among the least proficient in the world in math, reading, and science. Similar to 2018, the most recent PISA results demonstrate that the Philippines underperformed the global average across the board, moving up in the national rankings just slightly above those of nations who saw their rankings decline as a result of the pandemic's effects on student learning.

One essential foundational ability that students must learn and master at a young age in order to excel in their higher learning levels is numeracy. As per Section 12 of Department of Education (DepEd) rule no. 2015 found that a child's improvement in the basic skills, which include numeracy skills, is one of the indicators of a school's performance. On January 30, 2023, DepEd Secretary Sara Z. Duterte introduced the MATATAG Curriculum, also known as "Bansang Makabata, Batang Makabansa." This initiative focuses on enhancing students' proficiency in reading and numeracy to address educational challenges.

MATATAG is a reform in the Philippine education system designed to enhance its quality and effectiveness. It covers kindergarten to 10th grade, emphasizing reading, math, and essential life skills. The curriculum focuses on fundamental abilities such as literacy, numeracy, and practical knowledge for employment and daily life, marking a significant step toward addressing issues in Philippine schools.

To ease academic pressure, the number of subjects per class will be reduced, allowing students to concentrate more on reading and math. DepEd believes that streamlining subjects and competencies, particularly in elementary school, will also help lighten teachers' workloads. This transition will take place over four years, from 2024 to 2027.

Currently, many students struggle with reading comprehension and fall behind their international peers. The updated education plan aims to resolve this by enhancing essential skills to align with global standards.

An approach used to examine pupils' basic math and numeracy skills is the Early Grade Mathematics Assessment (EGMA). Following the pandemic, Mario Z. Lanuza Elementary School's EGMA results indicate that 35.3% of students are non-numerate and 34.2% are low numerate. In addition, 21.2% individuals are literate, 6.8% are highly literate, and only 2.5% are advanced literate. The results of EGMA serve as the basis of the authors to conduct this study.

Statement of the Problem

This study aims to improve the students' numeracy skills by the use study buddy with self- learning modules.

Specifically, it sought to answer the following questions:

1. What is the level of grade 3 students' numeracy skills before the implementation of study buddy program through self-learning modules?
2. What is the level of grade 3 students' numeracy skills after the implementation of study buddy program with self-learning modules?
3. Is there a difference in the numeracy skills of Grade 3 students before and after the implementation of the Study Buddy program with self-learning modules?

Objectives of the Study

The main objective of this study is to:

1. identify the level of the students' numeracy skills before the implementation of study buddy with self-learning modules;
2. identify the level of the students' numeracy skills after the implementation of study buddy with self-learning modules; and
3. determine if there is a difference in the numeracy skills of Grade 3 students before and after the implementation of Study Buddy with self-learning modules.

Significance of the Study

Policy - the purpose of this study is to strengthen students' mathematical foundation through providing them extra resources and fostering a friendly learning environment. Study Buddy's collaborative features and the self-paced learning options offered by modules will be used to provide a holistic approach that will improve students' numeracy skills.

This study can contribute valuable data to inform educational policies on numeracy education for early grades. The effectiveness of self-learning modules with a "study buddy" in improving numeracy skills

could provide evidence for incorporating such methods into curriculums or as supplemental resources. Moreover, Self-learning modules can potentially address educational equity concerns by providing additional support for students who may need extra practice or struggle in traditional classroom settings. And self-learning modules with study buddies might offer a cost-effective way to supplement numeracy instruction, particularly in areas with limited resources or large class sizes.

Social and Society- the study buddy and self-learning modules in mathematics subject build a culture of continuous learning and knowledge sharing. It promotes academic success, and the acquisition of significant abilities that can help build a more educated and productive community.

In the modern world, having strong numeracy abilities is essential for navigating a culture that is becoming more and more data-driven. Through problem-solving, information analysis, and decision-making abilities, students can benefit from this study's development of tools for both their personal and professional lives. These self-learning modules and study buddy could help students overcome math anxiety and cultivate a positive attitude towards numeracy by offering a self-paced and interactive learning environment. However, many people develop math anxiety early on, especially the younger generations now that they are fonder of gadgets and technology.

Theory - this research, which incorporates study buddy with self-learning modules, has substantial theoretical value, for it is in line with accepted theories of learning and may help students improve their numeracy skills. It can add to the expanding number of studies on efficient methods for teaching numeracy. The authors can strive to provide a more thorough and engaging learning experience for students, ultimately enhancing their numeracy abilities and providing a good learning environment, by examining the impact of these interventions and exploring further modifications.

This study can also contribute to the theory of constructivism by demonstrating how self-learning modules with a "study buddy" can facilitate active learning and knowledge construction in numeracy education. Also, through this study we can explore how the "study buddy" functions as a scaffolding tool, providing temporary support and gradually withdrawing it as students gain confidence. This can contribute to the development of more effective scaffolding techniques in self-learning environments.

Scope and Limitations

This study primarily focused on the study buddy and self-learning modules to enhance grade 3 students' numeracy skills.

This study was conducted at Mario Z. Lanuza Elementary School. It is located at Brgy. Buboy, Pagsanjan, Laguna, wherein the respondents are studying. Furthermore, the authors used pre-test and post-test as the method of conducting the research. The pre-test and post-test were given out to the respondents to gather data and interpret them using quantitative research approach. This study contains 30 students from one section.

Related Literature

Numeracy Skills

G.D. Celemin (2023) defined numeracy as the ability to apply mathematical concepts to all areas of life. Numbers, addition, subtraction, counting, number recognition, solving multiplication problems, sorting, observing, finding, and creating patterns are some of the tasks involved. After their basic education, children ought to have acquired this essential skill. Despite the obvious significance of mastering numeracy skills, learners' low performance and achievement in this area were noted.

Numerical ability is the ability to solve everyday problems with various types of numbers and symbols connected to basic mathematics, as well as the ability to understand the information provided in many forms, such as graphs, tables, charts, and other representations (Mariamah et al., 2021).

Moreover, numeracy skills are essential in daily life because they enable pupils to comprehend and evaluate data that is presented in numerical form. Everyone benefits from numeracy by being able to read graphs and analyze statistics from the news and make informed decisions. The cornerstone of many other topics, including science and engineering, is numeracy. Learning new things throughout your life is made easier by having strong numeracy abilities.

As per Sa'dijah et al. (2023), educators might enhance students' numeracy skills in Indonesia by employing task-oriented learning experiences, including constructivist teaching methods. Teachers in the Philippines, however, recommend several courses of action. Layug et al. (2021), for instance, used parent-student conferences, one-on-one tutorials, retelling of tasks with poor scores, home visits, additional resources, less activities, and remedial instruction for pupils in Grade 7 who are having difficulty in math. These tactics, which try to reduce the gap between math and other subjects, range in effectiveness from modest to highly effective failed learners.

Early acquisition of numeracy abilities is essential for a number of reasons. They play a crucial role in daily life and serve as a foundation for future academic achievement. It gives them the skills they need to think critically, solve issues, and confidently navigate their environment.

According to Halisa et al. (2022), children's learning of numeracy is crucial for both the development of vital life skills and their future academic performance. By using study buddy method, children can learn in an engaging and participatory way that encourages exploration and a deeper understanding of the mathematical world. By focusing on supporting numeracy skills, they are provided with a strong foundation for mathematical development, making them more confident and prepared to tackle increasingly complex learning tasks in the future.

Beyond the classroom, numeracy is necessary for everyday tasks. Strong numeracy abilities enable youngsters to be self-reliant and self-assured in a variety of situations, from navigating spatial relationships and interpreting measurements to understanding money and following recipes.

This skill is crucial for handling the obstacles and problems that kids face in a new setting. These pupils' right to an education must be upheld even when they lack official documentation (Loganathan et al., 2022). As a society, everyone has an obligation to work toward fostering inclusivity and ensuring that everyone has access to education.

Furthermore, numeracy is a talent that includes confidence and proficiency with numbers and measurements, as defined by the United Nations Relief and Works Agency (2013). The ability to solve numerical issues in a range of situations, a grasp of the number system, and a repertoire of computing skills are all necessary (Central Foundation, 2022).

Hartatik and Nafiah (2020) argue that teachers are required to act professionally in improving students' numeracy skills with teachers who have good numeracy skills first. If the teacher does not have numeracy literacy skills, it is very likely that students will not be able to explore concepts more deeply and see concepts only as material that is in school without anything to do with their daily lives.

Teacher plays a vital role in children's lives that's why they need to know every area or subject they are teaching. They must employ an effective strategy on how students will enhance their numeracy as it will help them in real-life contexts and on a day-to-day basis.

Study Buddy

Hashimoto (2020) asserted that the study buddy system is a fundamental component of the instructional strategy. Similar to numerous educators, he depends on students working in pairs and groups. In the past, students would usually switch groups during most class meetings and work with the same partner(s) for a brief period of time. Hashimoto thought that extracurricular activities gave kids the chance to connect and form connections, the social component of learning was not the main focus. Based on the feedback provided by students through surveys and the higher-than-average class ratings gathered through officially issued forms throughout time, it appears that the majority of students were content with this method of instruction.

A "triad buddy" in math is a notion where students collaborate in groups of three to complete mathematical assignments or activities, according to J. Miles (2020). Three people work together to learn collaboratively in this method, which emphasizes group interactions, discussions, and problem-solving. The goal of math triad friends is to improve mathematical comprehension through group problem-solving techniques, idea exchange, and peer learning. Through group interactions and a variety of perspectives and mutual support, the triad structure facilitates the development of mathematical skills.

The study buddy implemented by the authors has a triad grouping wherein they are grouped according to their numeracy level. It fosters their collaboration and critical thinking skills.

The peer tutor approach, as defined by Sukrawati et al. (2021), is a learning process that makes use of a learning method in which someone helps others with learning activities by offering guidance and support. As stated by S. Koontz (2023), the traditional teaching method involves a student learning a new skill and then passing it on to another student. It's an excellent approach to get all pupils interested in their studies and to help them retain the new information. With the development of the Math Buddies program, Math & Movement advanced this concept.

Evidently, Koontz statement is connected to Social Learning Theory by Vygotsky because social interactions can direct and moderate a child's cognitive growth and learning capacity. Same-age tutoring is a type of peer tutoring in which students are in the same grade as each other. In the field of Mathematics, group discussions are another technique that can help students get better at solving

mathematical problems. Students' learning of Mathematics was significantly improved by peer tutoring (Alegre et al., 2020)

For the same reason, Peer-assisted learning, or PAL, is a teaching approach where students both support and learn from one another. Students gain information and skills through active assistance and support processes through PAL. substitute words for PAL encompass "peer mentoring," "peer teaching," and "peer support" in common (Shihabuddin et al., 2022).

Self-learning Module

The self-learning modules, according to Anzaldo (2021), allow students the freedom to study whenever and wherever they choose. The usage of learning modules is defined as a way for providing instructional materials in a direct style, with a chapter-by-chapter guide and the freedom to regulate the release of the material in each turn, by Educational Technologies, JPGM (2020). It accepts the notion of "chunking" data and supports various content kinds, including text, images, multimedia as well as assessment tools and multimedia. Given the existing educational landscape, where a large number of pupils struggle to learn because there are insufficient resources available.

Talimodao and Madrigal (2021) found that regardless of the environment, modular learning improved students' academic achievement. Nonetheless, the existing circumstances resulted in even subpar performance in the mathematics domain. As per the directives of the Schools Division of Quezon, the Mean Percentage was obtained from the diagnostic test in Mathematics V administered by the researcher and the pre-test in Division Numeracy 47.6 and 44.5 points, in that order. Compared to the Division's 75.0 standard MPS, the MPS are comparatively lower. These student accomplishment numbers unmistakably show a challenge that falls within the learners' computational proficiency.

In any case, self-learning modules assist the student in catching up what was missed because the instructor may assign them as homework to be completed when students are unable to attend class for a variety of reasons. This way, the students are not left behind.

One thing teacher may do to enhance their learning process is to create educational resources for both themselves and their pupils, as stated by Utami et al. (2020). Instructors may also utilize the student workbook (LKS) as an educational resource for their pupils. Students may gain a deeper comprehension of the material by using summaries found in student workbooks. A student workbook containing a variety of practice questions is believed to have an impact on pupils' learning.

Modular instruction is more effective in the teaching-learning technique than traditional teaching approaches since students' study at their own pace using a modular approach (DepEd, 2020). Self-learning modules provide users total control over what they learn, where they study it, and how and when they grasp it. Open learning's adaptability is a crucial characteristic. Alternative teaching methods are progressively disappearing as information technology for communication advances (Anduyan, 2021; Valentin, 2021).

The self-learning module used as an intervention for this study. The SLM may help the students learn at their own pace in unforeseen situations. Moreover, the SLM can also be used as an alternative instruction for the students as class suspensions become more frequent due to the extreme heat index in the Philippines

during the month of April and May. The objectives are clearly stated in the said module, the discussion and activities are also given in order for them to truly understand the lesson.

Knowing that the pandemic had an effect on the execution and quality of education (Rasmaitilda, 2020), it is essential to understand the experiences of the educators in question regarding their current circumstances. To further evaluate the caliber of such an indirect form of instruction, the researchers in this study have chosen to ask about the experiences of self-learning module (SLM) creators during the educational paradigm transition. The informants are mostly educators with prior expertise with writing modules; they have been evaluated based on their backgrounds to better meet the study's selection criteria. The results show that the informants' initial experiences overseeing the assignment of writing the aforementioned modules and their capacity to adjust to the shift to indirect instruction given that the present paradigm shift has prevented them from using their previous mode of instruction are comparable. They employ various strategies, such as peer support or technology.

Self-learning materials are important because they can significantly increase student achievement by supporting student learning by involving their active participation. For example, a worksheet or self-instruction module may afford a student important opportunity to exercise a new skill in class according to their own pace and style. This process mainly focuses on the development of independent practice among the learners. On the other hand, learners who possess the capacity to learn on their own can be regarded as suitable subjects for using SLMs. In a constructivist classroom, learners are supposed to construct their own knowledge on the basis of their prior experiences; on the other hand, self-learning materials also promote ways to construct knowledge on their own.

Synthesis

The collection of foreign and local studies provides data that strengthens the authors' findings and shows significance in study buddy with self-learning module to support the authors' conclusion that there's an existing problem when it comes to learners' numeracy skills.

The authors acknowledge the use of study buddy with self-learning module to enhance the students' numeracy skills. The significance of numeracy skills in children's academic success and everyday life is underscored in the research discussed. Numeracy, defined as the application of mathematical concepts in practical scenarios, is crucial for problem-solving and interpreting numerical data. Educators globally utilize diverse methods, including constructivist teaching and intervention programs, to enhance numeracy skills and bridge performance disparities. Peer tutoring, study buddy systems, and self-learning modules are recognized for their effectiveness in promoting collaborative learning, peer support, and personalized learning experiences in mathematics education.

Mathematics education highlights the study buddy system, triad grouping, and peer tutoring as effective strategies of fostering collaborative learning, problem-solving and peer interaction. These methods encourage students to engage in discussions, share ideas or participate in group activities so as to improve their understanding in mathematics or develop critical thinking abilities. Moreover, self-learning modules are lauded due to enabling students learn at their own pace conveniently accessing educational resources materials that assist them apply what they have learnt into real life situations.

In conclusion, the Study Buddy with Self-learning Modules, is a teaching strategy that focus on enhancing the grade three students' numeracy skills. This approach aligns with constructivist learning theory and offers a promising intervention for enhancing students' mathematical understanding.

Theoretical Framework

Constructivist Theory (Jean Piaget)

According to Westhuizen (2023) who conducted a study, he encouraged the integration of social engagement as well as cooperative learning opportunities in the early grade math instruction. The study further defined about the need of caring and enriching environment that fostered students use interactions with teachers and peers to construct mathematical knowledge. This constructionist approach was found to fit well within Piaget's perspective on the nature of knowledge as being social and constructed active role of students embedded the mathematical concepts to the context of their development.

Furthermore, in order to include a constructivist approach into early grade numeracy instruction, it was essential to give teachers with the resources and support they needed to establish developmentally appropriate instructional approaches. Tools such as manipulatives, teaching supplies, and training in many faculties were necessary to bring together effective teaching and learning experiences as required by the constructivist method.

Based on Constructivist Theory, other kids are one of the greatest instruments in a constructivist teacher's toolbox. There will always be a variety of logical reasoning, vocabulary development, views, and more in a classroom full of kids. Teachers that embrace this diversity and use it into the everyday curriculum will increase the number of teachers by a large margin when the other students grow into individuals on the team. Children cross-reference their own ideas with those of others when they play together, ask each other questions, and dispute about both minor and major problems. Teachers are not able to provide this because of the power gap that exists between adults and youngsters. Particularly in his view of moral development, Piaget acknowledged the crucial role that peers play. Creating opportunities in the curriculum for kids to collaborate and play together is a challenge for educators.

As cited by Sourì and Ashqar (2021), Constructivism is a learning philosophy that holds that knowledge cannot be simply imparted to pupils by the teacher in the front of the classroom. Instead, learners generate knowledge by active cognitive development; they are meaning and knowledge creators. Constructivism is defined by four principles: learning is partially dependent on what we already know; new ideas emerge in response to changes we make to our old ideas; learning entails creating ideas rather than mechanically accumulating facts; and meaningful learning results from rethinking old ideas and reevaluating new ideas that contradict our previous beliefs. Thus, learner-centered and active instruction would characterize a successful constructivist classroom. In this type of classroom, the instructor will set up situations that allow the students to create, hypothesize, predict, manipulate items, ask questions, explore, investigate, imagine, or create. A teacher in this type of class will provide experiences. The instructor is responsible for ensuring this occurs. Constructivism emphasizes active learning. Design modules with engaging activities that go beyond rote memorization, it includes manipulatives like counting blocks or place value chips to allow students to build a concrete understanding of numbers and operations, Incorporate problem-solving activities that require applying numeracy skills to real-world scenarios, encouraging critical thinking and connections to everyday life, ask thought-provoking questions that challenge students to explain their reasoning and thought processes,

offer subtle hints or tiered questions with increasing difficulty when students get stuck, promoting self-discovery and problem-solving, integrate positive reinforcement to acknowledge progress and motivate students to persevere in building numeracy skills and utilize interactive assessment that provide immediate feedback and identify areas needing further exploration

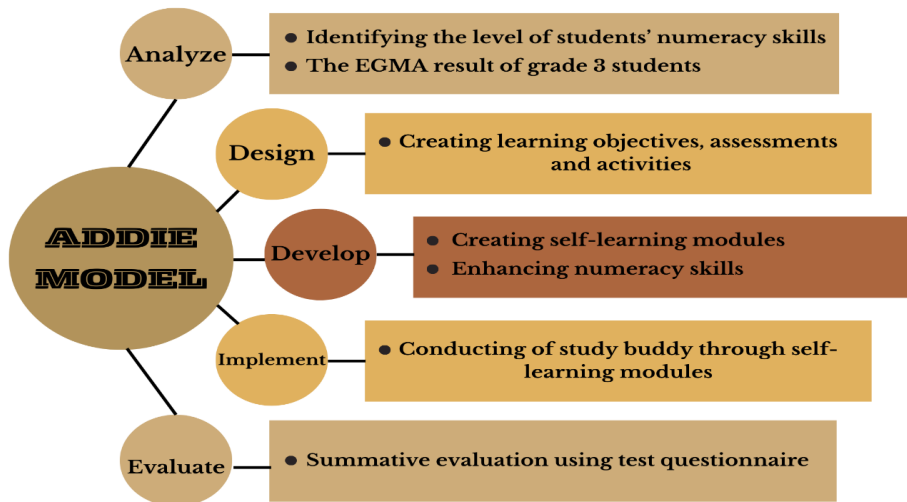
Research Hypothesis

There is a significant difference in the numeracy skills of grade 3 students before and after the implementation of study buddy program through self-learning modules.

Conceptual Framework

Figure 1

Conceptual Framework Paradigm of the Study



This figure illustrates the conceptual framework based on the ADDIE Model, which consists of five phases: Analyze, Design, Develop, Implement, and Evaluate. In the “Analyze” phase, the authors assessed the students’ numeracy skills using the EGMA result of Grade three students. During the “Design” phase, learning objectives, assessments, and activities were created to support numeracy development. The “Develop” phase involved the creation of self-learning modules aimed at enhancing numeracy skills. The “Implement” phase consisted of the application of study buddy activities utilizing the self-learning modules. Lastly, in the “Evaluate” phase, a summative evaluation was conducted using a test questionnaire to assess the effectiveness.

Research Methodology

Research Design

Creswell J.W (2014), explained that a "pre-test post-test" design refers to a research method where data is collected from participants before an intervention or treatment is implemented (pre-test), and then again after the intervention (post-test), allowing the authors to measure any changes or effects caused by the intervention. A qualitative research approach was used in this study to determine the effect of study buddy with self-learning modules on numeracy skills of grade 3 students. The authors used single group pre-test and post- test design in order to provide a comparative description of selected grade 3 students before and after the study buddy with self-learning modules.

Research Locale

The study was conducted in Mario Z. Lanuza Elementary School, a public institution located in Barangay Buboy, Pagsanjan, Laguna for S.Y 2024 – 2025 from October to November 2024.

Population of the Study

Out of 169 total population of Grade 3 at Mario Z. Lanuza Elementary School, the authors choose a sample of (30) students to participate in the study. The sample of the study was carefully selected through purposive sampling wherein their record in EGMA results shows that almost of the students are non-numerate and low numerate.

Upon examining the Early Grade Mathematics Assessment (EGMA), the authors identified a section that shows low level of numeracy skills. This section plays a significant role for authors in assessing students' understanding and proficiency in working with numbers, which is fundamental to their overall mathematical development. By focusing on this specific section, the authors aimed to gain insights into the challenges students face in terms of their numeracy skills.

Research Instrument

The instrument that will utilize to collect data in this study is a test. Pre- test and post-test are used to administered in the data collection to measure the numeracy skills of grade 3 students before and after the implementation of study buddy with self-learning module. The pre-test and post-test include 30 items for multiple choice and 10 items fill in the blank equation for the total of 40 items. Authors also provided a validation tool for self-learning modules which used for the chosen grade that is aligned to their weekly topic. The authors also use the Canva application for the editing of the provided module.

Data Gathering Procedure

A letter of request to conduct the study was prepared. The authors constructed a test that will serve as

pre-test, validated by the Mathematics Grade 3 Master Teacher, then the test questionnaire is distributed. The researchers conduct the research in Mario Z. Lanuza Elementary School. The researchers explain to the respondents the importance of their response to the study and also clarifies some terms to the respondents so that the respondents can answer the questionnaire with full knowledge of their responsibility as the subject of the study the researchers requested the respondents to answer with all honesty. The researchers use a purposive sampling since the respondents are selected subjectively. Since the researchers' goal is to determine the level of numeracy skills of Grade 3 students before the Implementation of Study Buddy with Self-learning Module, the researchers believes that this method is the most appropriate in choosing the sample for the research.

A pre-test was given to the selected grade 3 students, the result shows that 39.66% of them got the Moderate interpretation. In line with that, the researchers create a self-learning module (SLM) that is based on the Department of Education (DepEd) curriculum. The SLM have learning objectives, discussion, activities and evaluation that is aligned to the learners' grade level. The researchers administered the used of SLM every Monday, Wednesday, and Friday, each day the learners will have two modules, through study buddy they will answer the given module together with their peers. This intervention continued for almost 5 weeks, after that, to test the effectiveness of it, they conducted a post-test examination. The researchers provided a 40 items test for the learners, it is aligned with the pre-test. After administering the test, they found out that Study Buddy with Self-learning Module is effective as the results shows that students overall mean increased in 2.75 with the interpretation of significant or moderate effect.

Statistical Treatment of Data

Mean and Standard Deviation

The authors will use the mean and standard deviation to understand the pre-test and evaluate the post-test performance the selected grade 3 learners. This allows them to compare the data before and after the intervention.

T- test

T-test is a parametric test that is used to compare means from two different categories. Also, it is an inferential statistic used to determine if there is a significant difference between the means of two groups and how they are related. A t-test's statistical significance indicates whether or not the difference between two groups' averages most likely reflects a "real" difference or effects in the population from which the groups were sampled.

The authors will use t-test to compare the mean scores of the same group before and after the implementation and given to see if there is any observed gain.

Presentation, Analysis, and Interpretation of Data

This chapter presents the results gathered and analyzed by the authors from the pre-test and post-test questionnaires answered by the selected grade 3 students of Mario Z. Lanuza Elementary School using mean,

standard deviation and t-test.

Table 1. *Students' Numeracy Skills before the Intervention*

Criteria	Mean	SD	Percentage Score	Interpretation
Pre-Test	19.83	7.01	39.66%	Low

Legend:

Scale	Percentage Score	Interpretation
36–50	72.00%–100%	High
21–35	42.00%–71.99%	Moderate
0–20	0.00%–41.99%	Low

Table 1 shows the numeracy skills of Grade 3 students before the implementation of the Study Buddy self-learning modules. The mean score was 19.83, with a standard deviation of 7.01, which corresponds to 39.66% of the maximum possible score. According to the interpretation scale, this falls under the "Low" category, indicating that students generally struggled with numeracy concepts prior to the intervention. The wide spread in scores, as reflected by the standard deviation, suggests variability in the students' numeracy abilities.

Table 2. *Students' Numeracy Skills after the Intervention*

Criteria	Mean	SD	Percentage Score	Interpretation
Post-Test	23.23	8.22	46.46%	Moderate

Legend:

Scale	Percentage Score	Interpretation
36–50	72.00%–100%	High
21–35	42.00%–71.99%	Moderate
0–20	0.00%–41.99%	Low

Table 2 presents the numeracy skills of students after the implementation of Study Buddy self-learning modules. The mean score increased to 23.23, with a standard deviation of 8.22, corresponding to 46.46% of the maximum possible score. This falls under the "Moderate" category based on the scale. The results suggest a noticeable improvement in students' numeracy skills after using the self-learning modules.

The increase in mean scores indicates that students were better able to grasp and apply numeracy concepts after the intervention. While this improvement is encouraging, the percentage score suggests that many students are still in the moderate range, implying that further enhancements to the intervention or supplementary support might be necessary to help students achieve a "High" level of numeracy proficiency.

Table 3. *Students Numeracy Skills before and after the Intervention*

Criteria	Mean Score	t-value	p-value	Significance Level	Effect Size (Cohen's d)	Interpretation
Pre-Test	19.83					
Post-Test	23.23	-2.75	0.0101	0.05	0.45	Significant, Moderate Effect

Table 3 demonstrates the significant difference in numeracy skills before and after the intervention. The paired t-test resulted in a t-value of -2.75 and a p-value of 0.0101, indicating that the observed improvement is statistically significant at a 0.05 level of significance.

The **Cohen's d effect size** was calculated as **0.45**, which falls into the "**moderate effect**" category. This means the intervention had a noticeable, meaningful impact on students' numeracy skills. While the increase from a mean pre-test score of **19.83 (39.66%)** to a mean post-test score of **23.23 (46.46%)** is statistically significant, the moderate effect size suggests that the intervention was beneficial but leaves room for further enhancements or supplementary support.

This table now provides both the statistical significance and the practical importance of the results, making it clear that the Study Buddy intervention improved numeracy skills in a meaningful way.

The results validate that the intervention contributed to the enhancement of students' performance. While the statistical significance and moderate effect size are promising, the gap between the percentage scores for pre-test (39.66%) and post-test (46.46%) suggests that some students may require additional interventions to achieve more substantial improvements.

Summary of Findings

The study was conducted to determine the effectiveness of study buddy with self-learning modules to enhance the numeracy skills of selected Grade 3 students of Mario Z. Lanuza Elementary School.

1. Before the intervention, students' mean numeracy score of 19.83 (39.66%) was categorized as "Low," reflecting significant challenges in mastering numeracy concepts.
2. Following the implementation, the mean score increased to 23.23 (46.46%), classified as "Moderate."
3. This improvement underscores the effectiveness of the intervention in addressing gaps in numeracy skills.

Conclusion

1. Based on the results of the pre-test, the implementation of Study Buddy with Self-learning Module can be used as an intervention to enhance the numeracy level of the students.
2. The post-test results also indicate that the implementation of Study Buddy with self-learning modules contributes to an improvement in numeracy levels of grade 3 students.
3. The study highlights that children require additional support, and the self-learning module through Study Buddy offers an alternative approach to help them enhance their numeracy skills and academic performance, particularly in Mathematics.

Recommendation

1. This implies that while the Study Buddy modules have improved foundational numeracy, additional support such as teacher-guided instruction, peer tutoring, or more personalized learning resources could further enhance students.
2. Regularly monitor student progress within the Study Buddy self-learning modules through formative assessments to identify areas where students may require further assistance, enabling timely adjustments to the intervention.
3. Consider extending the duration of the Study Buddy self-learning modules or incorporating additional sessions to allow students more time to absorb and apply the material, potentially leading to greater improvements.

References

- Alegre et al., (2020). *Academic Achievement and Peer Tutoring in Mathematics: A Comparison Between Primary and Secondary Education*. SAGE Open, 10(2), 215824402092929. Deal, B., Grove, A., 1965. General Relationship for the Thermal Oxidation of Silicon, *Journal of Applied Physics* 36, p. 3770.
- Cambridge Dictionary. (2022, January 26). *constructivist*. @CambridgeWords.
- Cambridge Dictionary. (2024, March 20). *numeracy*. @CambridgeWords.
- Catholic Education Melbourne. (2020). *01 KEY IDEAS for CONCEPTUAL DEVELOPMENT in MATHEMATICS KEY IDEAS for Conceptual Development IN MATHEMATICS 2ND EDITION* ×.
- Celemin, G. D. G. (2023). *Enhancing Numeracy Skills of Grade 3 Students Through Authentic Performance Tasks*. *Journal of Contemporary Educational Research*, 7(9), 59–66.
- Chi, C. (2023, December 6). *Philippines still lags behind world in math, reading and science PISA 2022*. Philstar.com.
- Natividad, E. (2021, May 1). *Perceived Effectiveness of Self Learning Modules in the Implementation of Modular Distance Learning in the Elementary Level*. Papers.ssrn.com.
- Hartatik, S., & Nafiah. (2020). *Numeracy Ability of Elementary School Teacher Professional Education Students in Solving Mathematical Problems*. *Education and Human Development Journal*, 5(1), 32–42.
- Hashimoto, N. (2021). *Study buddy teams: First-year cooperative learning inspired by hevruta*. In P. Clements, R. Derrah, & P. Ferguson (Eds.), *Communities of teachers & learners*. JALT.
- Kurmaniak, N. (2021). *The Development of Numeracy Skills in Children*. Retrieved from <https://study.com/academy/lesson/the-development-of-numeracy-skills-in-children.html>
- Layug et al., (2021). *Teachers' Interventions in Improving Numeracy Skills of Grade 7 Students* in Baguio City National High School, University of the Cordilleras Philippines
- Locion et al., (2022) *Through the Viewpoint of Teacher Authors: Experiences of Teachers Writing Self-Learning Modules during the Educational Paradigm Shift*. *Best Journal of Innovation in Science, Research and Development*, 1(2), 88–100.
- Mariamah et al., (2021). *Elementary School Students' Numeracy Ability in View from Gender*. *Tunas: Journal of Basic Education Research*, 1(2), 17–19.
- MERRIAM-WEBSTER. (2019). *Definition of CURRICULUM*. MerriamWebster.com.
- Mohd et al., (2023) *The Effect of Using Augmented Reality Module in Learning Geometry in Mathematics Performance among Primary Students*. *International Journal of Information and Education Technology*, 13(9), 1478–1486.
- Naufal, H. (2021). *Constructivist Learning Model in Mathematics to Improve Students' Cognitive Abilities in the Era of Independent Learning*. *National Seminar on Mathematics Education*, 2(1), 143–152
- Nshimiyimana, A., & Cartledge, P. T. (2020). *Peer-teaching at the University of Rwanda – a qualitative study based on self-determination theory*. *BMC Medical Education*, 20(1).
- Sajidan et al., (2023). *The Effectiveness of the Think-Pair-Project-Share (TP2S) Learning Model in Facilitating Collaborative Skills of Prospective Teachers in Elementary Schools*. *Pegem Journal of Education and Instruction*, 13(3), 117–124.
- Salminen, J., Khanolainen, D., Koponen, T., Torppa, M., & Lerkkanen, M.-K. (2021). *Development of Numeracy and Literacy Skills in Early Childhood—A Longitudinal Study on the Roles of Home Environment and Familial Risk for Reading and Math Difficulties*. *Frontiers in Education*, 6(725337).
- Saraswat et al., (2022) *"STUDY BUDDY-Making Learning Easy," 4th International Conference on Advances in Computing, Communication Control and Networking*.

Souri, S., & Ashqar, H. (2021). *Constructivism emphasizes active learning*. Design modules with engaging activities that go beyond rote memorization.

Souri, S., & Ashqar, H. (2021). *Using a problem-solving approach to enhance students' mathematical thinking in a technology-rich classroom*. International Journal of Technology in Education and Science, 5(4), 347-358.

UNICEF. (2023). *SDG Goal 4: Quality Education*. UNICEF DATA.