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"CONE"CEPT: MATH MANIPULATIVES IN ENHANCING ADDITION SKILLS OF GRADE ONE PUPILS

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ABSTRACT

The "CONE"CEPT is rooted in the understanding that early childhood education is crucial for developing a strong foundation in Mathematics. While addition is a fundamental concept, many Grade One pupils find it challenging and often struggle to grasp the abstract nature of numbers.

With this, the researcher decided to carry out this study which is focus on "CONE"cept as Math Manipulatives in Enhancing Addition Skills of Grade One Pupils. This study aims to enhance the addition skills of Grade One pupils by making the learning process enjoyable and interactive. By incorporating hands-on activities using the ice cream cone manipulatives, teachers can guide students in understanding and applying addition as well as increased engagement and enthusiasm for learning Mathematics.

The researcher utilized a quantitative research design since we will assess the effectiveness of the use of "CONE"cept in the addition skills of Grade One pupils. Frequency, percentage, weighted mean and t-Test were used to statistically treat the data.

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Meanwhile, the respondents of this study were 24 Grade One pupils of Looc Elementary School. From pre- test MPS of 50.80 to post- test MPS of 79.60, it just implies that the learners who use "CONE"cept performed better in addition than the learners who did not use "CONE"cept. Also, there is a significant difference on the learners' addition skills after using "CONE"cept. Action plan was designed also to maximize the use of "CONE"cept. The researcher will continue to use this innovation tool and may inspire other fellow teachers to adopt this project after observing its success in increasing learning outcomes.

Keywords: *Math manipulatives, teaching, academic achievement, addition skills, elementary*

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CONTEXT AND RATIONALE

Mathematics is often considered a challenging subject, particularly for young learners who struggle with the abstract nature of numbers. Fundamental concepts such as addition can be difficult to grasp when taught using traditional methods. To excel in Mathematics, students must grasp these abstract concepts (Huan et al., 2022). Nonetheless, some students encounter difficulties in learning Mathematics, which can be influenced by the instructional techniques employed by teachers (Makhdum et al., 2023). Because of this, educators and researchers have continuously sought innovative and engaging strategies to support the development of mathematical skills in early learners. A strong foundation in numeracy is crucial, not only for academic success but also for functioning effectively in everyday life, as mathematical skills are essential in problem-solving and decision-making in today's world (Burns & Hamm, 2011; Carbonneau et al., 2013).

For Grade One pupils, addition serves as a foundation in building their mathematical abilities. However, many learners encounter difficulties in mastering this skill, often leading to frustration and disinterest. To address this challenge, educators have explored the use of manipulatives- hands-on, concrete materials that help students visualize abstract mathematical concepts. This approach aligns with the Department of Education's (DepEd) commitment to improving early literacy and numeracy through programs such as the Early Language, Literacy, and Numeracy (ELLN) Program under DepEd Order No. 12, s. 2015, which emphasizes the importance of building strong foundational skills in Kinder to Grade 3 learners.

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Despite the acknowledged importance of Mathematics in daily life and education, many young learners demonstrate poor mathematical skills and struggle particularly with addition. Traditional teaching methods often fail to engage learners meaningfully, resulting in difficulties in understanding and applying basic concepts. This gap highlights the need for effective teaching strategies and materials that make mathematical learning both enjoyable and understandable for Grade One pupils.

Golafshani (2013) emphasized that changes in teaching methodologies are needed to address the widespread issue of poor mathematical skills among students. One developing agreement in research is the effectiveness of manipulatives in Mathematics instruction. Belenky and Nokes (2009) asserted that students learn concepts and problem solve better with hands-on tools. By using manipulatives, teachers can provide students with a more meaningful learning experience, as these tools offer physical representations that students can connect to later concepts (Simon, 2022). Furthermore, manipulatives support mathematical thinking, problem-solving abilities, hands-on learning, and deeper understanding. They also contribute to creating dynamic and engaging Math lessons, directly bolstering the learning of Mathematics (Back, 2019; Tjandra, 2023). Students who are given the opportunity to utilize manipulative materials experience greater improvement in their Mathematics achievement (Shafiq et al., 2023). Battle (2007) stated that when using the manipulatives during the instructional lessons the students were excited and motivated to learn.

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Manipulatives are pedagogical tools centered around student engagement that facilitate active problem-solving and inquiry through the hands-on exploration of physical objects designed to represent mathematical concepts (Dinsmoor, 2022). It is also defined by Horan and Carr (2018) as tangible objects that provide students with hands-on experiences, actively engaging them in the learning process while Laski et al. (2015) described manipulatives as concrete materials used to demonstrate a Mathematics concept or to support the execution of a mathematical procedure. There are various ways in which manipulatives can be utilized in the classroom. Teachers employ manipulatives during lessons to introduce, practice, or remediate mathematical concepts (Hidayah et al., 2021). These tools have been recognized as effective in enhancing students' mathematical achievement (Sari & Aydoğdu, 2020). Mathematical manipulatives typically consist of concrete objects that teachers employ in the classroom to enhance students' understanding and performance in Mathematics. Examples include commercial tools such as Algeblocks and pattern blocks (Manches & O'Malley, 2016; Jones et al., 2011) as well as teacher-made or improvised materials like paper folds, tiles, pie pieces or geoboards (McNeil & Jarvin, 2007).

The National Curriculum Council of Pakistan (2020) recommends the use of manipulatives by teachers to enhance mathematical achievement across all grade levels. Numerous studies have demonstrated that both concrete and virtual manipulatives can improve students' mathematical achievement (Bouck & Park, 2018; Hawes et al., 2022; Kabel et al., 2021; Milton et al., 2023; Simon, 2022; Ukdem & Cetin, 2022). Consequently, implementing Math manipulatives in the classroom could serve as an effective alternative to

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conventional and abstract teaching methods (Satsangi et al., 2023). More recently, Guillermo (2025) reported that Grade One pupils' attitudes and achievements improve significantly when manipulatives are integrated into Mathematics instruction, highlighting their critical role in enhancing engagement and academic performance.

The consistent findings in research suggest that manipulatives are powerful tools for fostering both engagement and achievement in Mathematics. For young learners, manipulatives provide a bridge between abstract ideas and concrete understanding, making concepts like addition easier to grasp. By integrating fun and interactive approaches, teachers can transform potentially frustrating lessons into enjoyable learning experiences. This is essential in Grade One, a formative stage where pupils build the foundational numeracy skills that will influence their future learning paths.

In light of this, the teacher designed "CONE"cept: Math Manipulatives in Enhancing Addition Skills of Grade One Pupils. This project introduces ice cream cone manipulatives as an engaging and concrete tool to support learning addition. By making the process interactive and enjoyable, the project aims to improve pupils' understanding and application of addition, boost their enthusiasm for learning Mathematics, and contribute to DepEd's broader goal of strengthening early numeracy skills.

INNOVATION, INTERVENTION, AND STRATEGY

The "CONE"cept project addresses the difficulty of Grade One pupils with abstract mathematical concepts, particularly addition. This issue is a major concern, as evidenced by

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low Mean Percentage Score in Mathematics among all subjects, with addition identified as the least mastered skill. These data from the first quarter of the S.Y. 2024-2025 clearly show a need for a new approach to address these learning gaps and improve students' foundational Math skills.

"CONE"CEPT was designed to make learning addition more fun and effective for Grade One pupils. It used a tangible, relatable tool: ice cream cone manipulatives.

Initially, ice cream cone manipulatives are introduced to the students, with teacher explaining that each cone represents a single unit and can be used to represent various quantities. Following this, teachers guide students through a series of activities using these manipulatives, progressively introducing addition concepts. Students are encouraged to visually represent addition problems using the cones; for instance, to solve 2 + 3, they would use two cones for the first number and three cones for the second, combining and counting them to find the sum. Activities are designed to foster collaboration, with students working in pairs or small groups to solve problems, encouraging peer learning and discussion. The teacher differentiates instruction to cater to diverse learning styles and abilities, providing additional support to some while challenging others with more complex problems. Finally, teachers regularly assess student understanding through observation, questioning, and informal assessments to identify areas needing further support and adjust activities accordingly. This manipulative helps students visualize and solve addition problems through hands-on, activity-based learning.

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By connecting Math to a familiar and appealing object, the project aims to improve addition skills of Grade One pupils. It also seeks to increase their engagement and enthusiasm for learning Mathematics. This "CONE"CEPT aims to create a positive, interactive learning environment that fosters essential addition skills and a love for the subject.

As a result of this innovation, the researcher found out that there was increase in the test scores of pupils right after the use of "CONE"cept. The addition skills of the respondents have improved. This proved that the innovation strategy applied by the teacher has been proven to be effective. Therefore, it is deemed necessary to sustain the full implementation of "CONE"cept.

ACTION RESEARCH QUESTIONS

This study is primarily focused on "CONE"cept: Math Manipulatives in Enhancing Addition Skills of Grade One Pupils.

Specifically, this study sought to answer the following questions:

1. What is the pupils' test scores before and after using "CONE"cept?
2. Is there a significant improvement in the addition skills of pupils after using "CONE"cept?
3. What action plan may be designed to further maximize the benefits of using "CONE"cept as Math manipulative in enhancing addition skills of pupils in Mathematics?

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ACTION RESEARCH METHODS

This research paper assessed "CONE"cept: Math Manipulatives in Enhancing Addition Skills of Grade One Pupils for the academic year 2024-2025.

Participants and/or other Sources of Data and Information.

This action research employed the 24 Grade One pupils from Looc Elementary School.

Data Gathering Methods.

The study will begin with a pre-test to assess the addition skills of the participants. The innovation tool, "CONE"cept will then be used for a designated period.

Following this, a post-test will be administered to measure the pupils' improvement in addition skills. For quantitative approach, administration of self- made Pre- test and Post-test was done before and after the use of the project that will help the researcher measure the baseline and assess any improvements among Grade One pupils. After the data has been gathered, tabulation and analysis are applied using the determined data analyzing tool to determine the outcomes of the study. Attendance and participation records was also kept by the researcher to monitor their involvement, work and progress which can be reviewed to assess changes in learning and teaching. This has been used to have a clear picture of an action plan which will surely maximize the use of "CONE"cept.

The purpose of this quantitative research is to understand how the use of manipulatives can increase addition skills in Mathematics in Looc Elementary School.

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The research design will show how students achieve while learning with hands-on tools in the mathematics classroom and their attitudes towards Mathematics. Students need motivation to grasp and execute different mathematical concepts as well as create conceptual knowledge for future endeavors. Brown (2006) claims that manipulatives are not just fillers for class time; they are the keys to making the connection from abstract to concrete understanding in everyday situations. That is why manipulatives are important to use to increase the ability of students' academic achievement.

Picciotto (1993) implies that manipulatives are an extraordinary tool to help reach weaker students, but that is not their only purpose. When students are able to visually see a mathematical concept in action, a deeper level of comprehension occurs; this will then allow the low academic achievers and high-level achievers to feel motivated to learn.

Ethical Consideration

Ethical considerations were ensured throughout the conduct of this study. The participants were given informed consent. They were also asked to volunteer for the study understanding all the rights of withdrawal and refusal. During the implementation of "CONE"cept, the researcher asked the consent and approval of the parents and guardians to use the images and photos of their child to be posted on the researcher's personal account. This is done to recognize pupils' outputs and for documentation purposes only.

The researcher used statistical treatments such as:

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1. **Frequency.** It is defined as the arrangement of data shows the frequency of different values or group of values of variables. In statistics, it refers to the number of occurrences of statistical result.
2. **Percentage.** This was used to determine the percentage distribution of the respondent in a particular item. It is particularly useful method of expressing a relative frequency distribution, survey responses, scores and other data which can be presented by a table, bar graphs and pie graphs.
3. **Weighted Mean.** This was used to quantify the data on the improvement in test scores using "CONE"cept.
4. **t-Test.** This was used to determine if there was a significant difference in the learners' addition skills before and after using "CONE"cept.

DISCUSSION OF RESULTS AND REFLECTION

This study explored the use of "CONE"cept. The outcomes of the study are presented here with. Discussion of the findings can be explained in detail as follows:

1. **Pupils' Addition Skills Before and After exposure to "CONE"cept**

Table 1
Pupils' Addition Skills Before and After Using "CONE"cept

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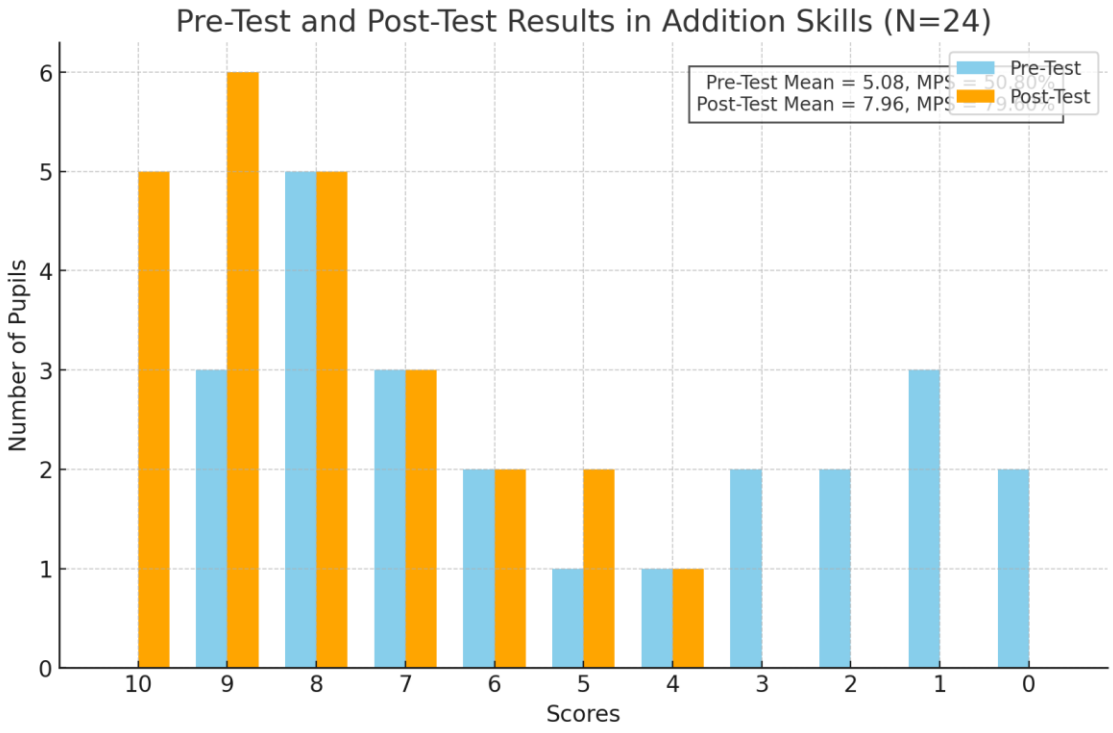

As can be gleaned on the table 1, the data shows that pupils' pre-test scores were distributed across a wider range, from 0 to 10. The highest frequency of scores was 3 pupils scoring 9 and 7, and 5 pupils scoring 8. The mean pre-test score was 5.08, corresponding to a Mean Percentage Score (MPS) of 50.8%. This stresses the fact that they need to enhance their addition skills.

However, after the researcher has used "CONE"cept, the learners' post-test scores show a clear shift towards higher performance. The highest frequency was 6 pupils scoring a perfect 10, and 5 pupils scoring 8. There were no scores below 4. The mean post-test score improved to 7.96, with an MPS of 79.6%. This represents an increase of 2.88 points and a

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28.8% rise in the mean percentage score. The data clearly indicates that the manipulative used by the teacher between the pre-test and post-test was effective in improving the pupils' addition skills.

Research has shown that the integration of manipulatives in Mathematics instruction enhances student engagement, understanding, and overall academic performance (Carbonneau et al., 2021; Makkonen & Olinghouse, 2022).

For Grade One pupils, who are generally in the early stages of mathematical learning, the use of manipulatives can be particularly impactful. This age group is characterized by a need for concrete experiences to build their foundational skills in mathematics. The National Council of Teachers of Mathematics (NCTM) advocates for the use of manipulatives as a core component of effective mathematics instruction, emphasizing that such tools can foster a more interactive and engaging learning environment (National Council of Teachers of Mathematics, 2020).

Moreover, when students are guided by teachers who are knowledgeable about the use of manipulatives, their attitudes toward Mathematics improves when using concrete materials according to Clements (2000).

These results are an important indicator that if educators use manipulatives when teaching addition, then students would successfully internalize addition concepts thus demonstrating significant student growth. They also prove that the use of manipulatives when teaching addition is more effective than teaching addition using the paper pencil style of

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teaching the concepts. Looking at the assessment, as a whole, it explains that this innovation truly helped teachers in enhancing addition skills of pupils.

2. **Significant Difference in the Addition Skills Before and After Using "CONE"cept**

Table 2

Significant Difference in the Addition Skills Before and After Using "CONE"cept

	Mean	Std. Deviation	Critical Value	t-Statistics	Decision (Reject/ Accept Ho)	Verbal Interpretation
Treatment 1(Before)	5.08	3.295	2.069	5.17	Reject Ho	There is a significant difference.
Treatment2 (After)	7.96	2.01				

n = 24 α= 95%

As shown in Table 2 indicated that there is statistically significant difference before and after using "CONE"cept. Since the computed test statistics of 5.17 is greater than the critical value of 2.069 at 95% level of significance, the researcher has to reject the null hypothesis that there is no significant difference on the learners' academic achievement before and after "CONE"cept has been applied. It could be that learners became more motivated in learning Mathematics. This only means that using "CONE"cept is an effective strategy to enhance addition skills of Grade One pupils in Mathematics.

3. **Plan of Action to Maximize the Use of "CONE"cept**

Table 3

Plan of Action to Maximize the Use of "CONE"cept

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In order to maximize the use of "CONE"cept, an action plan is designed by the researcher. It includes the objectives, activities, person's involved, time frames as well as success indicator.

Objective	**Activity**	**Person's Involved**	**Time Frame**	**Success Indicator**
1. To conduct teachers, parents, and pupils orientation program about the implementation of "CONE"cept.	1. Create a poster about the implementation of "CONE"cept to be posted in group chat or Facebook. 2. Have a discussion on how to use "CONE"cept. 3. Conduct meeting.	Researcher, School head, teachers, pupils, parents	Second week of August, 2024	The partici pants of the program will be enlightened about the importance of using "CONE"cept
2. To gather proper data from pupils' scores	1. Create test/activities involving addition 2. Prepare a class record for proper recording of outputs.	Researcher, School head, pupils parents	Year Round	Pupils' outputs were properly organized, implemen ted, and recorded on the class record.
3. To evaluate the implementation of "CONE"cept for improve ment	1. Invite focal person so that this innovation can also be appreciated and assessed its effectivity. 2. Gather the M & E team for feedbacking.	Researcher, School head, teachers	Last week of its impleme nta tion	"CONE"cept has been improved based on the feedback gathered from the M & E team.

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ACTION PLAN

This research paper analyzed "CONE"cept as Math Manipulatives in Enhancing Addition Skills of Grade One Pupils for the academic year 2024-2025.

To ensure the success of the study, the researcher prepared a work plan and timeline. The said work plan was presented in a table. For each activity, there is corresponding objective which guide in the preparation of the activity, the persons involved, and success indicator.

Objective	Activity	Persons' Involved	Time Frame	Success Indicator
1.Obtain approval to conduct the study	Write a letter of request.	School head, researcher	First week of August, 2024	Request letter signed by the school head
2. Seek an informed consent	Present and discuss the study in the meeting.	Parents, pupils, researcher	Second week of August, 2024	Parents agreed as indicated in the minutes of the meeting.
3. Conduct "CONE"cept	a. Orient the pupils and parents the importance of this activity b. Carry-out the activity	Researcher, Grade One pupils	Last week of August 2024-February 2025	The plan was implemented.

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FINANCIAL REPORT

Below was the list of the expenses for the entire research conducted by the researcher:

Date	Particulars/ Description	Receipt/ Invoice No.	Amount (PhP)	Category
August, 2024	Photocopy of Pre- Test Questionnaire		144	Reproduction
August, 2024	Sintra board, illustration board, string, laminating film, ink		2780	Supplies/ Materials
February, 2025	Tokens for Participants		1000	Tokens
Total			3924	