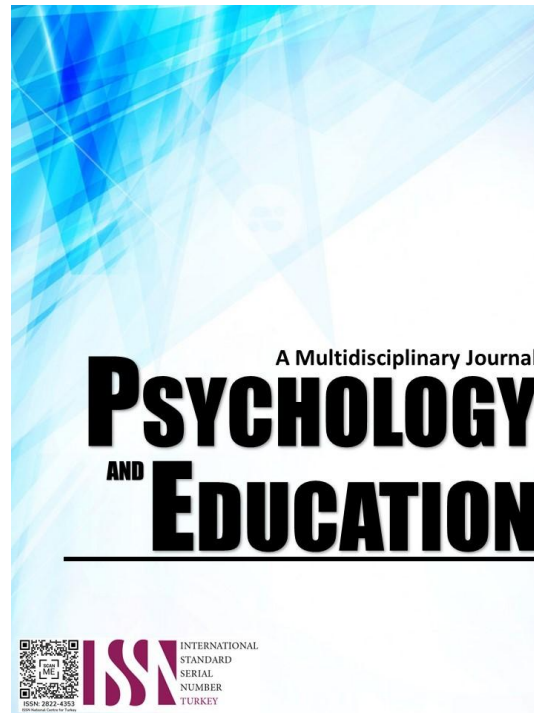


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INTERACTIVE AND MANIPULATIVE TOYS) IN
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IN MATHEMATICS 3**



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Project AGIMaT (Activity, Games, and Interactive and Manipulative Toys) in Teaching Selected Topics in Mathematics 3

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Abstract

The researchers from Calero-Lanang Elementary School conducted a study to address the problem of incomplete mastery of several concepts in Mathematics experienced by the school for about three years. To address this, they devised "Project AGIMaT," which engaged learners in selected topics in Mathematics 3 using activity, games, interactive and manipulative toys. The study utilized a descriptive comparative design involving 32 Grade 3 pupils from Calero-Lanang Elementary School, and selected topics based on the least mastered skills reported within three years. Participants were subjected to the use of AGIMaT from the second quarter up to the third quarter, and the standard Quarterly Test was used for assessment. The study found that Project AGIMaT increased the mastery in Multiplication and Division and Dissimilar Fractions, with the mean percentage of mastery increasing from 71.15% to 81.51% and from 71.45% to 83.07%, respectively.

Keywords: *mathematics, manipulatives, toys, dissimilar fractions, division, multiplication*

Introduction

It is a common observation to hear learners struggling with mathematics, particularly when numbers are being shuffled with other steps. This struggle often results in poor performance, as seen in Calero-Lanang Elementary School, where grade 3 pupils perform poorly in Mathematics, especially in multiplication and division, and dissimilar fractions. Based on the school's test results from 2016 to 2019, the school recorded low scores in these topics. However, this problem can be addressed by utilizing manipulatives and toys in teaching Mathematics.

Manipulatives and toys are tactile learning materials that learners can view and physically handle to understand, demonstrate, or model abstract concepts. According to Krueger and Sutton (2002), using manipulatives and toys can increase learners' interest in Mathematics, resulting in long-term interest and increased mathematical ability. Thus, incorporating manipulatives and toys in teaching can improve learners' mastery and retention of mathematical concepts. Mathematics is a challenging subject, as it requires learners to establish an excellent conceptual and procedural knowledge of a specific process for effective problem-solving. However, learners often experience learning difficulties due to incomplete mastery of number facts, weakness in computation, and inability to connect conceptual aspects of math, among others. This emphasizes the need for a learner to build meaningful prior knowledge to establish initial concepts and procedures.

Kolb and Kolb (2009) found that learning takes place effectively when the learner is visually, physically, intellectually, and personally involved in solving a problem where the teacher only acts as a facilitator. Ruzic and O'Connell's (2001) study also found that using concrete objects to observe, model, and internalize abstract concepts can help teach mathematics. Thus, utilizing manipulatives and toys, such as Cuisenaire rods, buttons, blocks, pattern blocks, algebra tiles, and base-ten blocks, can effectively engage learners in Mathematics.

The presence and availability of manipulatives, educational toys, and games provide a pool of instructional materials to be utilized by teachers in teaching various subjects. However, most of these manipulatives are untouched, unused, and unopened. To address this problem, the researchers devised an action plan, Project AGIMaT, that aims to improve the performance of Grade 3 pupils in Calero-Lanang Elementary School using activities, games, interactive manipulatives, and toys. In this action plan, the Grade 3 Teacher is prompted to use these materials in teaching topics tagged as least mastered, while maximizing the use of untouched, unused, and unopened materials. The study sought to determine the effect of the AGIMaT (Activity, Games, and Interactive and Manipulative Toys) in teaching the least mastered skills in Mathematics 3 at Calero-Lanang Elementary School to address the problem SY. 2019-2020. The project started in the second quarter and ended in the fourth quarter due to an unforeseen pandemic. Nonetheless, the second and third quarterly exams are recorded and utilized in this study.

Methodology

The study employed a descriptive comparative design to identify problems, form judgments, and develop theories (Gray et al., 2013). The study participants consisted of 32 Grade 3 students from Calero-Lanang Elementary School who were chosen through convenience sampling during the 2019-2020 school year. AGIMaT was utilized to teach topics classified as the least mastered skills based on previous archives, with topics exhibiting mastery levels below 75% chosen for inclusion. Standard Quarterly Tests were administered by DepEd Tayo Morong District to gather data for Project Agimat, which was then compared to previous school year test results from 2016-2017, 2017-2018, and 2018-2019.

Given that the data was obtained from two groups with differing sample sizes, a two-sample t-test was utilized. This test is used to compare the means or percentages of two samples when the standard deviation is known and is frequently used to assess whether a new process or treatment is better than an existing one (Snedecor and Cochran, 1989), making it a suitable tool for this study. The study was conducted from August 2019 to January 2020, only covering the second and third quarters.

Results and Discussion

Level of Mastery of the Selected Topics in Mathematics 3

Table 1. *Level of Mastery of the Selected Topics in Mathematics 3*

Topics	S. Y. 2016-	S. Y. 2017-	S. Y. 2018-
	2017	2018	2019
	Mastery (%)	Mastery (%)	Mastery (%)
Multiplication and Division	69.98	71.55	73.18
Dissimilar Fractions	70.21	70.87	73.26

Table 1 displays the level of mastery of the selected topics in Mathematics 3. The data indicates that the Grade 3 pupils in Calero-Lanang Elementary School encountered challenges in topics concerning

Multiplication and Division, with mastery levels below 75%. The results also suggest that pupils encountered the greatest difficulties in topics related to Multiplication and Division and Dissimilar Fractions.

Mean Level of Mastery in Project AGIMaT vs Previous School Years

Table 2. *Mean Level of Mastery in Project AGIMaT vs Previous School Years*

Topics	Mean of the Previous School Years (%)	Mastery of Learners in Project AGIMaT (%)
Multiplication and Division	71.57	81.51
Dissimilar Fractions	71.45	83.07

Table 2 presents the level of mastery in the selected topics in Mathematics 3, along with the mean of the previous school years for comparison. The results indicate an increase in the mean percentage of mastery in the current school year compared to the previous years. Specifically, the topics Multiplication and Division, with a mean percentage of 71.57% in the previous years, increased to 81.51% in the current year. The topic of Dissimilar Fractions, with a mean percentage of 71.45% in the previous years, increased to 83.07% in the current year. These findings suggest an improvement in the level of mastery of the Grade 3 pupils who participated in Project AGIMaT.

Two-Sample T-test on Project AGIMaT compared to the Previous School Years

Table 3. *Two-Sample T-test on Project AGIMaT Compared to the Previous School Years*

Topics	Mean	SD	P-value	Significance Level
Previous 3 School Years	71.51	0.0849	-	
School Year 2019-2020	82.29	1.10	0.046	0.05
P-value < 0.05 – there is a significant effect				

Table 3 presents a statistically significant P-value of 0.046, which is below the accepted level of significance of 0.05. This indicates that there was a significant impact on the level of mastery in the selected topics of Grade 3 pupils who participated in Project AGIMaT, when compared to the academic years 2016-2017, 2017-2018, and 2018-2019. This outcome further substantiates the conclusion made by Ruzic and O'Connell (2001) that incorporating

manipulatives, toys, and other tangible objects aligned with mathematical concepts enhances educational outcomes.

Conclusion

Based on the findings of this study, the study found that: (1) Grade 3 pupils in Calero-Lanang Elementary School encountered difficulties in mastering topics related to Multiplication and Division and Dissimilar Fractions in Mathematics 3. The mastery levels in these topics were found to be below 75%, indicating a need for further improvement in the teaching methods and strategies used for these topics. (2) There was an improvement in the level of mastery of Grade 3 pupils who participated in Project AGIMaT. This improvement is indicated by the increase in the mean percentage of mastery in the current school year compared to the previous school years, particularly in the topics of Multiplication and Division, and Dissimilar Fractions. Therefore, it can be inferred that Project AGIMaT positively impacted the learning outcomes of the Grade 3 pupils in Mathematics 3 as suggested by Kolb & Kolb (2009). (3) There was a statistically significant improvement in the level of mastery of the selected topics in Mathematics 3 for Grade 3 pupils who participated in Project AGIMaT. This improvement was compared to the previous three academic years as indicated by the significant P-value of 0.046. Using manipulatives, toys, and tangible objects in line with mathematical concepts, as suggested by Ruzic and O'Connell (2001), seems to have contributed to this improvement in educational outcomes.

Based on the result of the study, researchers recommend the following: (1) For the topics of Multiplication and Division and Dissimilar Fractions in Mathematics 3, it is recommended to explore and employ teaching methods and strategies appropriate

for the pupils' learning styles and abilities. (2) To sustain and further improve the positive impact of Project AGIMaT on the learning outcomes of Grade 3 pupils in Mathematics 3, it is recommended to continue using the program and regularly evaluate its effectiveness. (3) In line with the findings of Ruzic and O'Connell (2001), it is recommended to incorporate manipulatives, toys, and other tangible objects aligned with mathematical concepts in teaching Mathematics 3 topics to enhance the learning outcomes of Grade 3 pupils. (4) Do a follow-up study on the effectiveness of Project AGIMaT through a complete experimental setup.

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