

# Effectiveness Of Teacher-Made Manipulative Mathematical Materials to the Test Performance Of Grade 3 Pupils In Mathematics

**REYGIE C. GARBO**

Teacher I

Western Leyte College

Master of Arts in Education

Major in Elementary Education

[reygie.garbo@deped.gov.ph](mailto:reygie.garbo@deped.gov.ph)

*Abstract* —The study evaluated the effectiveness of teacher-made manipulative mathematical materials to the test performance of the Grade 3 pupils in Mathematics. Utilizing the quasi-experimental research design employing the pre-test and post-test in Mathematics. The findings of the study were the bases for a proposed enhancement Plan. . This research is a quasi-experimental study. The researcher utilized universal Sampling in selecting the respondents of the study. Simple Percentage, Weighted Mean and t-Test of Mean Difference were the statistical tools used. Results of the study revealed a significant difference in the pre-test and post-test performances of the Grade 3pupils in Mathematics before and after the utilization of strategic intervention materials. The strategic intervention materials which are interactive, attractive, colorful and interesting motivates the pupils to learn more and achieve educational goals to improve the least mastered skills in Mathematics. Thus, the strategic intervention material is an effective learning support materials in improving the least learned skills in Mathematics. The results implied that having the weighted mean in the pre-test performance of the grade 3 learners had increased after the utilization of strategic intervention materials in the post-test. This means that there is a significant difference in the pre-test and post-test performances of the Grade 3 pupils in Mathematics before and after the utilization of teacher-made manipulative materials. This implies that the intervention was effective in improving the least learned skills in Mathematics. Therefore, integrating the identified intervention really helps the learners to improve their numeracy skills and maintain for those who were already familiar with the skills that need to be gained by them. Based on the findings of the study, in this new set of learners, the teacher's role in motivation includes, but is not limited to, creating an environment conducive to learning. The teacher's role in encouraging support of students' autonomy, relevance, and relatedness of the material increases motivation to learn. Additionally, the teacher's ability to develop students' competence, interest in subject taught, and perception of self-efficacy are all important factors that influence students' motivation to learn. One way of motivating pupils to learn is through the provision of interactive instructional materials. The strategic intervention materials which are

interactive, attractive, colorful and interesting motivates the pupils to learn more and achieve educational goals to improve the least mastered skills in Mathematics.

**Keywords — Effectiveness Teacher-made Manipulative Mathematical Materials, Performance, Grade 3 Pupils, Mathematics**

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## I. Introduction

The K-12 Mathematics made use of the objective of the “Education for All 2015” and K-12 Philippine Basic Curriculum framework as its guideline in the curriculum. The curriculum aims to have competencies necessary for the 21st century so that they will be able to produce a “functionally literate and developed Filipino”. To be able for the goals to be achieved, the K-12 curriculum of Mathematics intend to mold an individual that is ‘maka-Diyos, maka-tao, makakalikasan at makabansa’. The objective of teaching K-12 Mathematics is to develop learners’ understanding in primary knowledge on aspects of historical, geographic, political, and economics issues together with other social disciplines in order for them to put into practice the pillars of learning such as the learning to know, learning to do, learning to be and learning to live together. The curriculum gives more emphasis in the understanding of the course rather than in memorizing concepts and terminologies (DepEd, 2013).

In the Philippines, students are subjected to a reading assessment using the Philippine Informal Reading Inventory (Phil-IRI) at the start of each school year and will be re-assessed after the teacher has taught all the required learning competencies found in the Curriculum Guide (CG). In the opening of the new normal delivery of the learning competencies in each of the quarter of every level, the modular distance learning or blended type of learning is being implemented in which the teachers prepare and distribute the modules at the same time conducted or delivered the most essential learning competencies in a limited face to face where there is limited time in delivering the lessons.

Contextualized educational resources are essential for success. It is a method to make mathematics subject simple and easy for the students to understand. Contextualizing mathematics learning materials enhances effectiveness of instruction and learning. Their will be an increased interest in using contextualized learning activities. The idea itself is not new, in spite of what others may think. In reality, despite the fact that we might not fully aware of it, it appreciates the effects of contextualization when it proceeds in one way, in one situation and uses a different set behaviors in a setting. In order to better understand how it may be used in corporate teaching and learning, it explore the definition of useful information.

The personal view of the research about Teacher-made contextualized learning materials is that link can be strengthened by using contextualized teaching and learning materials between the community and learning environment. Materials needed to provide any interaction to acquire learning must include teaching in the classroom. Teacher-made contextualized learning

Mathematical materials is a big help in teaching that connects fundamental skills by emphasizing practical application in a practical setting. Localization and indigenization are under the contextualized teaching learning materials that practice connecting curriculum-aligned learning material to regional knowledge using resources that are ready available in a given area.

There are lot of problems encountered in teaching Mathematics such as lack of interest among the learners. Contextualized teaching and learning may be a great help for teachers to deliver quality education to the learners. The topic becomes relevant and meaningful to the learners because their experiences are integrated to the lesson. This is one of the reasons why the researcher conducts this study to determine whether teacher-made contextualized Mathematical Materials improve the Mathematics performance of Grade 3 learners.

However, in the last two grading periods of implementing the blended learning, it was found out during the 3rd and 4th quarter of school year 2021-2022 that there are pupils who were not able to master the skills in Mathematics. Among the 14 skills, 5 of which were not mastered. Upon looking into the materials used to measure their performance, there are those activities which are hard for the pupils to conceptualize due to lack of materials. In line with this, the researcher being the subject teacher has thought of intervention on how he will make the learning easier. He thought of crafting manipulative Mathematical materials which will assist the pupils in working for their activities. The researcher believes that through the utilization of these materials, performance of the pupils will be improved and least learned skills will be mastered.

Most of the teacher-made manipulative materials used in teaching are found in ELLN Corner. Potential benefits of using manipulative materials include engaging multiple learning styles, increasing visual impact, improving audience focus, providing annotations and highlights, analyzing and synthesizing complexities, enriching curriculum with interdisciplinarity, increasing spontaneity and interactivity, and increasing wonder (Commonwealth of Learning, 2018). However, Ebere (2016) revealed that integrating technology in teaching can be hindered by many factors like (1) there should be constant source or alternative power supply in order to have a steady use of electricity. Irregular power supply caused damages of Information and Communication Technology (ICT) equipment; (2) ICT tools like phones, laptops, ipads, tablets and even internet network services are expensive and not easily affordable; (3) knowledge in the use of computer and other ICT facilities is a skill not learned by some teachers; (4) poor or no connection of certain places is still a reality in the region which hinder the effective use of ICTs in teaching.

With all the reasons mentioned above relating to the pupils' performance in Mathematics, the researcher used teacher-made materials as intervention material to be brought by the students and will be used at home while in the implementation of blended learning. The manipulative materials that were used are stored in a box with activities where pupils have to work on the activities provided. These teacher-made manipulative materials are new and expected to address the needs of the pupils for mastery of the lessons. Thus, it is in this premise that the researcher who is currently a Grade 3 teacher in the San Jose Elementary School of Ormoc District VII, would

like to delve into worthy research undertakings that will benefit the school he is currently teaching and that of his Graduate Program he is enrolled at.

This study evaluated the effectiveness of Teacher-made manipulative Mathematical Materials to the Performance of the Grade 3 Pupils in Mathematics subject, San Jose Central School in the Division of Ormoc City. The findings of the study were the bases for an Improvement Plan.

Specifically, it sought to answer the following questions:

1. What is the pretest performance of the Grade 3 pupils in Mathematics before the integration of the Teacher-made manipulative Mathematical Materials?
2. What is the posttest performance of the Grade 3 pupils in Mathematics after the integration of the Teacher-made manipulative Mathematical Materials?
3. Is there any significant difference on the pretest and posttest performances of the Grade 3 pupils in Mathematics before and after the integration of the Teacher-made manipulative Mathematical Materials ?
4. What improvement plan can be proposed based on the findings of the study?

Null Hypothesis:

HO: There is no significant difference in the test performances of the Grade 3 pupils before and after the integration of Teacher-made manipulative Mathematical Materials.

## II. Methodology

**Design.** This study employed the quasi-experimental research design utilizing the pre-test and post-test to evaluate the effectiveness of Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics 3 for School Year 2022-2023 during The full Face To Face Class implementation in the delivery of the most essential learning competencies in 2nd grading period in Mathematics subject. The main locale of the study was the San Jose Elementary School of Ormoc District VII, under the Schools Division of Ormoc City. In the aforementioned locale where the study was conducted, there were 30 total of learners who were also the main respondents of the study that was carefully chosen by the teacher-researcher and was enrolled in the said locale for School Year 2022-2023. The researcher-made test questions crafted and validated by the different experts of the subjects used to validate the skills or numeracy skills of the identified learners before and after the integration of the Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics 3 for School Year 2022-2023 during The full Face To Face Class implementation in the delivery of the most essential learning competencies. After the conduct of the pre-assessment to the learners, in which the main focus is to validate their

numeracy skills of the respondents before they received the Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics 3, The researcher was identified the least learned skills and based from the identification of the least learned competencies, he was crafted the different teacher-made manipulative mathematics materials used by the teacher in the delivery of the most essential learning competencies in Mathematics for the second grading. This study is mainly focus on the results of the different tests to gather data: The pretest performance of the Grade 3 pupils before the implementation of the Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics, The Posttest performance of the Grade 3 pupils after the implementation of the Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics, as well as the significant difference of the pretest and posttest before and after the implementation o Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics in the delivery of the most essential learning competencies in teaching Mathematics for the second Grading Period. In the Quasi- experimental research design, the researcher prepared different Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics and focused on the learning competencies which are difficult to pass by the respondents. The proposed improvement plan was crafted and taken based on the findings of the study as well as on the recommendations of the teacher-researcher to help improve the study and continue to implement the best practices of the study.

**Sampling.** There are 30 who are included in the study. 14 respondents of the study were Males and 16 were Females. In gathering of data, the actual meeting of the respondents as well as the given the pretest and posttest assessment were given to the Grade 3 pupils inside the classroom. Another way of contacting them are through cell phones of their respective parents for their awareness regarding the study being conducted. The research instruments, which is a test, were distributed and administered face-to-face with consent from the Local IATF and strictly following the prescribed Health Protocol.

**Research Procedure.** The researcher prepared the research design which was very applicable to the researcher's idea in gathering the study which was the Quasi-experimental research design from the start until such time that the researcher gathered the data as well as the integration of the intervention in the delivery of the least learned competencies in Mathematics. The tools that were used by the teacher-researcher that were used in the study before, during and after the conduct of the study. The different tools prepared by the Teacher-researcher were the ff: validated Summative Test Questionnaire in Mathematics subject from the Self Learning Modules of the aforementioned subject that were focused on the different competencies in the 2<sup>nd</sup> grading period. The test questions were used before the Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics 3 were given to the pupils. After one month of the intervention which is the Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics 3, posttest was given to the grade 3 pupils with the same test questionnaire given in the pretest assessment. Prior to the preparation of all validation tools which will be used by the teacher-researcher in determining their performances before and after the

integration of the intervention together with the different Teacher-made manipulative Mathematical Materials the least learned skills in Mathematics 3 which were utilized for the identified approach in teaching, The Approval and recommendation from the Office of the Schools Division Superintendent, as well as to the Assistant Schools Division Superintendent being the Chairman of the Schools Division Research Committee through the Senior Education Program Specialist in Planning and Research. After the Approval of the Schools Division Research Committee, the Approved or endorsement letter from the body together with the approved letter of intent were forwarded to the Office of the Public School District Supervisor as well as to the office of the School principal in order to get full support on the conduct of the study as well as to get also approval from their end. The proposed title and design was submitted to the School Division Office for approval. Upon approval, the Division released endorsement to the District Office. When the research was approved by the Schools Division Office and District Office, the researcher began the process of data gathering. Validation of the instruments through the different Experts from the Schools Division Office, District Office and to the Schools where the available personnel such as the Master Teacher and in coordination with the school head were sought. Orientation of the participants was done. Answering and retrieval of the research tool followed. Tallying of results and treatment of data. Analysis and Interpretation of Data. Making of Proposed Improvement Plan.

***Ethical Issues.*** The right to conduct the study was strictly adhered through the approval of the Schools Division Superintendent of the Division, District Supervisor, and School Head. Orientation of the respondents was done using face to face modality. In the orientation, issues and concerns were addressed and consent to be included in the study were signed.

***Treatment of Data.*** The Simple Percentage was employed to evaluate the pre-test and posttest of the Grade 3 pupils in Mathematics. **t-Test of Mean Difference** was used to determine the significant difference in the pre-test and post-test performances of the Grade 3 pupils in Mathematics.

### III. Results and Discussion

**Table 1**  
**Pre-Test Performance Of Grade 3 Pupils In Mathematics**

Score Range	Description	PRETEST	
		Frequency	%
17-20	Excellent	0	0
13-16	Very Good	0	0
9-12	Good	9	30
5-8	Fair	21	70
1-4	Poor	0	0
Total		30	100
Weighted Mean		7.90	Fair

Table 1 presents the pre-test performance of Grade 3 pupils in Mathematics before the integration of the Teacher-made manipulative Mathematical Materials. This results provided by the respondents which are the Grade 3 learners are purely based from their different numeracy skills that they have learned from the past learning competencies that they have experience during the delivery of the lessons or topics. Based from the results given, it was revealed that in the scores ranging from 17-20 and considered as the highest level of performance, the excellent level, it was revealed that there were none from the learners gained in this highest level which is the same scenario from the second to the highest level of performance which was reflected from the report having scores ranging from 13-16 and it was considered as very good level of performance. On the other hand, from the good level of performance, it was revealed on the table that among the 30 Grade 3 pupils, there were 9 total of respondents or it has an equivalent percentage of 30 percent while in the fair level of performance with the scores ranging from 5-8, it has an equivalent percentage of 70 percent. Lastly, in the poor level of performance with the set of scores ranging from 1-4, there were also none from the respondents belong in this level.

The results in table 1 implies that the identified respondents based from their results did not really meet the required mastery level and mastery the skills were bot attained. This implies that the skills previously learned by the pupils were not retained or remembered by them hence their scores are low. Learning the lessons most especially in Mathematics in times of pandemic was hard knowing that most of the pupils can hardly read and understand the passages given. It is a sad quite reality that pupils find Mathematics as a difficult subject. Primarily, it deals with numbers, shapes and problems. The contents are highly objective in nature that it should be taught in an exact and comprehensive way.

**Table 2**  
**Post-Test Performance of Grade 3 Pupils in Mathematics**

Score Range	Description	POST-TEST	
		Frequency	%
17-20	Excellent	30	100
13-16	Very Good	0	0
9-12	Good	0	0
5-8	Fair	0	0
1-4	Poor	0	0
Total		30	100
Weighted Mean		18.90	Excellent

Table 12 presents the posttest performance of Grade 3 pupils in Mathematics after the integration of the Teacher-made manipulative Mathematical Materials. This results provided by the respondents which are the Grade 3 learners are based from the different learnings that they have learned based from the 4 months of the delivery of the learning competencies that were set by the teacher-researcher. During the delivery of the most essential learning competencies in Mathematics, the researcher prepared the timelines in order for him to be guided on what to evaluate the different numeracy skills that they have learned from the different learning competencies that they have experience during the delivery of the lessons or topics. Based from the results given, it was revealed that in the scores ranging from 17-20 and considered as the highest level of performance, the excellent level, it was revealed that there all of the learners experienced the intervention and tested after the given time gained the highest level of performances. This level of performances was the aimed of every teacher to their learners specially to the development of the different numeracy skills of the learners. Meanwhile, on the second to the highest level of performance which was reflected from the report having scores ranging from 13-16 and it was considered as very good level of performance. As well as from the good level of performance, it was revealed on the table that among the 30 Grade 3 pupils, there were none total of respondents or it has an equivalent percentage of 0 percent while in the fair level of performance with the scores ranging from 5-8, it has an equivalent percentage of 70 percent and in the poor level of performance with the set of scores ranging from 1-4, there were also none from the respondents belong in this level.

The results in table 2 which was focused on the posttest performances of the grade 3 learners after the integration of the Teacher-made manipulative Mathematical Materials implies that the identified respondents based from their results were really mastered the different learning competencies given or delivered by the teacher and the objectives of the study were really reached the mastery level and mastery the skills of the grade 3 respondents. Learning the lessons most especially in Mathematics in times of pandemic was hard knowing that most of the pupils can



hardly read and understand the passages given. It is a sad quite reality that pupils find Mathematics as a difficult subject. Primarily, it deals with numbers, shapes and problems. The contents are highly objective in nature that it should be taught in an exact and comprehensive way. This means that after the utilization of teacher-made manipulative mathematical materials, the performance of the pupils increased. Moreover, utilizing the teacher-made manipulative mathematical learning materials provided by the researcher is really a learner-centered whereby allowing them to explore their knowledge through the activities provided in the materials and expound their horizon in dealing with the different level of developing their skills. Furthermore, the skills previously learned by the pupils were improved and improved considering that the result in the pretest was improved in the posttest.

**Table 3**  
**Test of Difference Between the Scores in the Pre-Test and**  
**Post-Test of Grade 3 Pupils in Mathematics**

Aspects	Test Scores		Computed T	Critical T	Decision	Interpretation
Grade 3 in Mathematics	Pre	7.90	4.642	0.932	Reject H <sub>o</sub>	Significant
	Post	18.90				

Table 3 presents the test of difference between the scores in the pre-test and post-test of Grade 3 pupils in Mathematics before and after the integration of the Teacher-made manipulative Mathematical Materials in the delivery of the most essential learning competencies in the 2<sup>nd</sup> grading period based from the timelines given which was prepared for 4 week's time or 1 month of the implementation. Based from the results given, the pretest performance of the Grade 3 pupils before they experienced the chosen intervention which was the Teacher-made manipulative Mathematical Materials has an equivalent frequency of 7.90 which was found out that it has a lower value compared to the posttest performance having the equivalent value of 18.90. Based from the results given in table 3, It was revealed on the table that the computed value of t is equal to 4.642 is greater than the critical value of t which is equal to 0.932, So the hypothesis which states that there is no significant difference between the pretest and posttest performance before and after the integration of the Teacher-made manipulative Mathematical Materials in the delivery of the most essential learning competencies in mathematics is rejected.

The results implied that having the weighted mean in the pre-test performance of the grade 3 learners had increased after the utilization of strategic intervention materials in the post-test. This means that there is a significant difference in the pre-test and post-test performances of the Grade 3 pupils in Mathematics before and after the utilization of teacher-made manipulative materials. This implies that the intervention was effective in improving the least learned skills in Mathematics. Therefore, integrating the identified intervention really helps the learners to improve their numeracy skills and maintain for those who were already familiar with the skills that need to

be gained by them. Based on the findings of the study, in this new set of learners, the teacher's role in motivation includes, but is not limited to, creating an environment conducive to learning. The teacher's role in encouraging support of students' autonomy, relevance, and relatedness of the material increases motivation to learn. Additionally, the teacher's ability to develop students' competence, interest in subject taught, and perception of self-efficacy are all important factors that influence students' motivation to learn. One way of motivating pupils to learn is through the provision of interactive instructional materials. The strategic intervention materials which are interactive, attractive, colorful and interesting motivates the pupils to learn more and achieve educational goals to improve the least mastered skills in Mathematics.

#### **IV. Conclusion**

Results of the study revealed a significant difference in the pre-test and post-test performances of the Grade 3pupils in Mathematics before and after the utilization of teacher-made Mathematical materials. The strategic intervention materials which are interactive, attractive, colorful and interesting motivates the pupils to learn more and achieve educational goals to improve the least mastered skills in Mathematics. Thus, teacher-made manipulative material is an effective learning support materials in improving the least learned skills in Mathematics.

#### **V. Recommendations**

1. The proposed improvement plan formulated should be utilized;
2. Teachers should try themselves to formulate strategic intervention materials as supplementary materials to improve the least learned skills in Mathematics;
3. Teachers should motivates the pupils to attentively work on their activities in Mathematics and never ignore the subject for this will help them achieve educational goals;
4. Teachers should motivate the pupils to improve their interest in learning the lessons in Mathematics;
5. Teachers should carefully plan the activities to be given to the pupils during their lessons in Mathematics;
6. Teachers should prepare activities which will boast their interest in learning the subject;
7. School Heads should assist their teachers in the teaching-learning process through the provision of materials for the construction of learning materials for the pupils;
8. School heads should provide the teachers with appropriate technical assistance for the pupils to have increase their learning interest in Mathematics;
9. School Heads should assist the teachers in motivating the parents to assist them;

10. School Heads assist the teachers in the crafting of strategic intervention materials;
11. School heads should require the teachers to submit their strategic intervention materials for quality assurance; and
12. Future researchers should replicate this study to include different locale and include different variables aside from the mentioned in this study.

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### AUTHOR’S PROFILE



#### **MR. REYGIE C. GARBO**

The author is Mr. Reygie C. Garbo. On July 30, 1993, he was born in Ormoc District Hospital, Ormoc City, Leyte. He’s presently residing in Brgy. San Jose, Ormoc City, Leyte. He finished his elementary education at San Jose Elementary School, Brgy. San Jose, Ormoc City, Leyte in the year 2000-2006 and continued his quest for education and was able to finish his secondary education at San Jose National High School, Ormoc City, Leyte in the year 2006-2010. He enrolled and finished his Bachelor in Elementary Education at Western Leyte College, Inc. – Ormoc City Campus in the years 2010-2015. He took up a Master of Arts in Education major in Elementary Education with complete academic requirements at Western Leyte College of Ormoc City, Inc.

He had been teaching for almost seven years and was a teacher at San Jose Elementary School. He was at San Jose Elementary School for 6 years, handling Grade 6 for 3 years, and now he is teaching as Grade III Adviser. He also attended a series of webinars/seminars and training to increase his professional growth as a teacher.