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Mathematics Proficiency of Grade 3 Pupils of Multi-Grade Schools of Aritao 2 District: Basis for Developing Contextualized Learning Resources

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Index Terms:

contextualized learning resources, Mathematics proficiency, multi-grade class/school

Abstract. This study measured the mathematics proficiency of grade 3 pupils of multi-grade schools of Aritao 2 district: basis for developing contextualized learning resources, school year 2024-2025. It utilized quantitative research design. Descriptive method was also used together with developmental research method. This study was conducted at Aritao 2 Respondent schools included Anayo Elementary School with 4 males and 8 females with a total of 12; Yaway Elementary School with 7 males and 5 females with a total of 12; and Tabueng Elementary School with 5 males and 1 females with a total of 6. The respondents had overall total of 30. The schools are offering multi-grades in the district. They cater combination classes in catering the learners' needs in the municipality of Aritao, Nueva Vizcaya. The summative test which assessed the mathematical proficiency of the grade 3 multi-grade pupils is based on the first quarter's Most Essential Learning Competencies. The study found that respondents demonstrate a generally high level of mathematical skill, with the majority achieving "very satisfactory" performance along the eleven competencies. These least mastered competencies like estimating the sum of 3 to 4-digit add-ends using appropriate strategies; adding 3-4 digit numbers up to three add-ends with sums up to 10000 without and with regrouping; solving routine and non-routine problems involving addition of whole numbers with sum of 10000 including money using appropriate problem solving strategies and tools; subtracting 3 to 4 digit numbers without and with regrouping; and estimating the difference of two numbers with three to four digits were the basis of developing contextualized learning resources tailored for Grade 3 pupils in multigrade schools address their specific learning needs.

Introduction

The ability to solve mathematical issues successfully in daily life is aided by mathematics proficiency. It enables people to efficiently put on and utilize knowledge in Mathematics in everyday scenarios. Furthermore, it is advantageous for the pupils to possess strong mathematics learning competencies. Learning competencies are the knowledge, comprehension, skills, and attitudes that students need to demonstrate in every lesson and/or learning activity, according to the Department of Education (DepED). Students need these attributes in order to expand their knowledge base, cognitive processes, and variety of talents. Thus, these are the subjects that students need to understand in order to develop lifetime learning, gain the skills necessary for their next grade level, and apply it in a meaningful way.

There are significant problems with student performance, particularly in mathematics, based on the latest findings from the Programme for International Student Assessment (PISA) and the 2022 Trends in International Mathematics and Science Study (TIMSS) for the Philippines. Filipino pupils aged 15 had an average arithmetic score of 355 points in the 2022 PISA cycle, which was significantly lower than the OECD average of 472 points. Compared to the average of 69% in OECD nations, just 16% of Filipino pupils achieved at least Level 2 competency in mathematics. Philippines ranked 76th on mathematics, 77th in reading, and 79th in science out of the 81 participating countries (OECD, 2023).

According to earlier international tests (PISA, TIMSS, and SEA-PLM), the Philippines performed poorly in terms of mathematical competency. According to the De Vera (2021) report, the Philippines' kids outperformed almost every other participating nation, with over 80 percent of them performing below the minimal standards of proficiency required for their particular grades. Furthermore, Roces stated that the 2018–2019 NAT scores were far below the desired mean of 75%, indicating a worsening of the Philippine education system. In light of this, it is thought that teachers are crucial in helping students refine their learning, and any gaps in understanding can be linked to the teachers' expertise in the subject matter. To effectively teach a particular area, teachers need to know a lot more than their students do. While pedagogy is crucial, it cannot make up for ignorance.

With these, it is essential to evaluate pupils' mathematical proficiency in order to determine whether or not they mastered the competencies needed. This means that pupils must be able to communicate their grasp of the subject matter.

In order to improve the mathematics proficiency particularly for multigrade class, the development of contextualized learning resources is needed to be used in order to aid teaching using teaching aids and exercises that relate mathematical ideas to actual circumstances, regional customs, or the students' immediate surroundings. By connecting abstract ideas with real-world applications and well-known situations, this method seeks to give mathematics a greater sense of purpose, relevance, and interest for students (Felipe, 2025; Dela Cruz, 2022, as quoted in Felipe, 2025). Mathematical competency is a multifaceted term that includes conceptual understanding, procedural fluency, strategic competence, adaptive thinking, and a positive outlook in addition to procedural skills and rote memory.

According to recent studies, children must be proficient in mathematics in order to meet the demands of contemporary society, particularly given the speed at which information and technology are changing (Helsa et al., 2024). Students who are proficient are able to think critically, logically, and creatively—skills that are essential for solving problems both inside and outside of the classroom.

Meanwhile, typically, competence is linked to very expert performance, as well clear connection on realm of education between student performance and a instructor's professional ability. There exist two different interpretations of educational competency. From an intellectual perspective, competency is viewed as a mental framework that supports particular actions. From the perspective of operations, competency appears to encompass a wide choice of extreme behaviors as well as talents indicating the capacity in handling complicated, erratic circumstances. This operational definition encompasses metacognition, knowledge, abilities, attitudes, and deliberate and purposeful decision-making is necessary for strategic thinking (Cabalo & Cabalo, 2019).

The gaps of the study include the fact that the majority of the references list mathematics performance, with comparatively few researches examining competency levels as the foundation for creating contextualized learning resources.

Further, in Aritao II district, the researcher observed in the school district that teachers are employing teaching materials and literature as supplied and produced by the division. Teachers are furthermore involved in ongoing professional development instruction. However, in spite of this, mathematics as a subject remained challenging to learn. The pupils in the district have low performance in mathematics.

To address this issue, the researcher thought to measure the mathematics proficiency of Grade 3 pupils of multi-grade schools of Aritao district. The result would be the basis of the researcher as one way to offer educational resources that are contextualized which can be used by educators when instructing math and this can also be used by the learners to improve their competency level. Considering that, utilizing contextualized ideas would also motivate the pupils to participate in the lessons.

Therefore, the research aims to measure mathematics proficiency of grade 3 learners of multi-grade schools of Aritao 2 district. Hence, the results of the study can the basis in developing contextualized learning resources.
Thus, the present investigation is suggested.

Research Questions

The study aimed to measure the level of competencies in Mathematics of the Grade 3 multi-grade pupils of Aritao 2 District as basis for developing contextualized Learning Activity Sheets for the School Year 2023-2024.
The study's specific goals were as follows:

1. What is the respondents' level of mathematics proficiency?
2. What contextualized learning resource were developed based on the results of the study using the K to 12 Curriculum Framework and contextualization framework for Grade 3 Mathematics?

Assumptions of the Study

The research intended to assess the mathematics proficiency of Grade 3 pupils of multi-grade schools of Aritao 2 District as basis for developing contextualized learning resources for the school year 2024-2025.

Specifically, these were the objectives of the study:
1. To assess the respondents' level of mathematics proficiency.
2. To develop contextualized learning resource were developed based on the results of the study using the K to 12 Curriculum Framework and contextualization framework for Grade 3 Mathematics.

Methodology

The quantitative research approach was used in this investigation. It emphasizes objective measurements and statistical, mathematical, or numerical analysis of data collected through polls, surveys, and questionnaires, or by using computer techniques to alter statistical data that already exists. It is an examination of a social or human problem that is based on testing a theory consisting of variables, measured with statistics, and statistically assessed to determine the accuracy of the theory's prediction generalizations. An introduction, literature and theory, methods, results, and comments are all included in the final written report, which follows a set structure. People who do this kind of research make assumptions about how to test hypotheses deductively, include precautions against bias, take alternative or counterfactual explanations into consideration, and be able to generalize and replicate the results, just as qualitative researchers (Kharback, 2023). Main goals in quantitative research methods are control, objectivity, and accurate measurement. In terms of methodology, these strategies rely on deductive designs intended to either support or contradict particular ideas and hypotheses.

Explanatory research that looks at connections, linkages, and causal interactions most frequently employs quantitative methods (Patricia, 2022).

Additionally, a descriptive technique was employed to characterize the respondents' mathematical skill. Descriptive study aims to accurately and systematically describe a population, situation, or phenomenon. It can answer questions about what, where, when, and how, but not why. A descriptive research design can use a variety of research methods to investigate one or more variables (Combes, 2023).

Results and Discussion

This chapter presents the study's findings. The presentation begins with an explanation of the problem and proceeds to identify the data management methods, the results and their discussion, tables, and pertinent supporting papers in order to organize the study's findings.

Score Range	Level	Frequency	Percentage
25 – 30	Outstanding	5	16.67
19 – 24	Very Satisfactory	20	66.67
13 – 18	Satisfactory	5	16.67
7 – 12	Fairly Satisfactory	0	
0 – 6	Did not Meet Expectation	0	
		Mean	22.07
		Qualitative Description	Very Satisfactory

Table No. 1. Respondents' Level of Mathematics Proficiency

With a mean score of 22.07, which is classified as "very satisfactory," the respondents' overall high level of mathematical competency suggests that the Grade 3 pupils of multigrade schools of Aritao 2 district have a solid grasp of the subject. This implies that the pupils are probably successfully interacting with mathematical ideas and are performing far above the minimal competency levels.

This perspective is consistent with studies on models for measuring mathematical proficiency, which stress the value of leveling proficiency in order to better comprehend pupils' skills. For instance, based on test results and skills, Junpeng et al. (2021) created a mathematical proficiency evaluation model that divides pupils into several stages, from irrelevant or non-responsive to prolonged or strategic pondering.

Additionally, the distribution of scores shows that 20 students, or 66.67% of the respondents, scored between 19 and 24, which is in the "very satisfactory" range. Five students, or 16.67%, scored between 25 and 30, which is referred to as "outstanding," suggesting a high degree of mathematical competency.

Five Grade 3 pupils of multigrade schools of Aritao 2 district, or 16.67% of the total, had scores ranging from 13 to 18, which are categorized as "satisfactory," indicating adequate but improvable proficiency.

This distribution suggests that while a smaller group of children may benefit from focused support to reach higher proficiency levels, the majority of pupil have good basic knowledge and skills in mathematics, with a considerable proportion attaining brilliance.

Junpeng et al. (2021) provide support for this perspective by highlighting the significance of classifying mathematical proficiency into discrete levels in order to better understand student capabilities and guide teaching tactics. Effective measuring models, according to their research, can distinguish between levels like "simple skills and concepts," "basic memory and replication," and "strategic/extended thinking," which are consistent with the qualitative descriptions the findings employed.

Competency No.	**Competency**	**Frequency of Error**	**Percentage**	**Frequency of Correct Answers**	**Percentage**	Remarks
1	Visualizing numbers up to 10 000 with emphasis on numbers 1001 – 10 000.	2	6.67	28	93.33	Mastered
2	Giving the place value and value of a digit in a number up to 10 000.	1	3.33	29	96.67	Mastered
3	Reading and writing numbers up to 10 000 in symbols and in words.	5	16.67	25	83.33	Mastered
4	Rounding off numbers to the nearest tens, hundreds and thousands.	6	20.00	24	80.00	Mastered
5	Comparing numbers up to 10 000 using Relation symbols.	3	10.00	27	90.00	Mastered
6	Ordering numbers up to 10 000 in increasing order	8	26.67	22	73.33	Mastered
7	Identifying ordinal numbers from 1st to 100th.	5	16.67	25	83.33	Mastered
8	Recognizing coins and bills up to PhP1000	5	16.67	25	83.33	Mastered
9	Reading and writing money in symbols and in words through PhP100 in peso and in centavos	2	6.67	28	83.33	Mastered
10	Comparing values of different denominations of coins and bills through PhP 1000 using relation symbols	5	16.67	25	83.33	Mastered
11	Estimating the sum of 3 to 4-digit add-ends using appropriate strategies.	9	30.00	21	70.00	Least Mastered
12	Adding mentally with multiples of hundreds using appropriate strategies	8	26.67	22	73.33	Mastered
13	Adding 3-4 digit numbers up to three add-ends with sums up to 10 000 without and with regrouping.	11	36.67	19	63.33	Least Mastered
14	Solving routine and non- routine problems involving addition of whole numbers with sum of 10 000 including money using appropriate problem solving strategies and tools	14	46.67	16	53.33	Least Mastered
15	Subtracting 3 to 4 digit numbers without and with regrouping	12	40.00	18	60.00	Least Mastered
16	Estimating the difference of two numbers with three to four digits.	12	40.00	18	60.00	Least Mastered

Table No. 2. Item Analysis (Number of Students 30)

Table 2 shows the item analysis of the summative test or proficiency test of the respondents which was consist of 16 competencies where 11 appeared to be mastered by the respondents. The mastered competencies included the following: visualizing numbers up to 10 000 with emphasis on numbers 1001 – 10 000; giving the place value and value of a digit in a number up to 10 000; reading and writing numbers up to 10 000 in symbols and in words; rounding off numbers to the nearest tens, hundreds and thousands; comparing numbers up to 10 000 using relation symbols; ordering numbers up to 10 000 in increasing order; identifying ordinal numbers from 1st to 100th; recognizing coins and bills up to php1000; reading and writing money in symbols and in words through php100 in peso and in centavos; comparing values of different denominations of coins and bills through Php 1000 using relation symbols; and adding mentally with multiples of hundreds using appropriate strategies.

According to the results, the Grade 3 pupils of multigrade schools of Aritao 2 district have incurred 11 mastered competencies in foundational mathematics - with an emphasis on number sense, place value, and fundamental arithmetic operations - were revealed by the summative test's item analysis. These results align with current research on classroom assessment design and psychometric validation.

Additionally, this suggests that the respondents were proficient in recognizing ordinal numbers (1st–100th), handling currency (recognition, symbolic representation, and comparison), applying place value understanding, rounding numbers to the nearest tens, hundreds, and thousands, and visualizing, reading, writing, and comparing numbers up to 10,000. This test's design was probably influenced by Garcia et al. (2025) emphasis on use of item response theory (IRT) and classical test theory (CTT) studies to evaluate item difficulty as well as discrimination in teacher-made summative assessments. For the majority of items in their analysis, there was congruence between CTT and IRT recommendations, especially in tests that focused on place value and number operations.

The findings about elementary children' knowledge of core mathematics competencies are supported by a recent study by Biason (2022). Biason discovered that, out of the nine curriculum areas examined in a comprehensive evaluation of Grade 6 students, whole numbers—which include visualization, place value, and value of numbers—were the most mastered competencies. According to the study, students learn and comprehend whole number visualizations, their place value, and the number's value far better. This is particularly true for the competencies that were found to be mastered in your proficiency test (e.g., visualizing numbers up to 10,000, giving place value, as well as reading/ Putting numbers in words and symbols).

Other competencies such as ratio, proportion, and percent were found to be approaching to mastery, while more advanced topics like fractions and measurement were notably less mastered. this trend supports the finding that fundamental arithmetic and number sense are usually learned before more complicated mathematical ideas.

Meanwhile, The following five mathematical competencies are not mastered by the respondents: estimating the sum of three to four-digit add-ends using appropriate strategies; adding three to four-digit numbers up to three addends with sums up to 10,000 without and with regrouping; solving routine and non-routine problems involving the addition of whole numbers with sums up to 10,000 including money using appropriate problem-solving strategies and tools; subtracting three to four-digit numbers without and with regrouping; and estimating the difference between two three to four-digit numbers.
The finding means that the least mastered mathematics competencies were identified such as estimating sums and differences of 3- to 4-digit numbers, solving routine and non-routine addition problems (including with money), and subtracting 3- to 4-digit numbers with or without regrouping-reflect broader challenges in students' conceptual understanding and strategic flexibility in multi-digit arithmetic.

Hence, contextualized learning resource is developed to enhance Mathematical proficiency of Grade 3 learners of multigrade schools of Aritao 2 district. These contextualized learning resource would help the pupils improve their least mastered skills mentioned above.

Conclusion and Recommendations

The study's findings lead to the following conclusions:

1. Based on their mean score and distribution, the Grade 3 respondents demonstrate a generally high level of mathematical skill, with the majority achieving very satisfactory performance along visualizing numbers up to 10000 with emphasis on numbers 001-10000; giving the place value and value of a digit in a number up to 10000; reading and writing numbers up to 10000 in symbols and in words; rounding off numbers to the nearest tens, hundreds and thousands; comparing numbers up to 10000 using relation symbols; ordering numbers up to 10000 in increasing ordinal numbers from 1st to 100th;

recognizing coins and bills up to PhP100; reading and writing money in symbols and in words through PhP100 in peso and in centavos; comparing values of different denominations of coins and bills through PhP 1000 using relation symbols; and adding mentally with multiples of hundreds using appropriate strategies. However, the following competencies were the least mastered: estimating the sum of 3 to 4-digit add-ends using appropriate strategies; adding 3-4 digit numbers up to three add-ends with sums up to 10000 without and with regrouping; solving routine and non-routine problems involving addition of whole numbers with sum of 10000 including money using appropriate problem solving strategies and tools; subtracting 3 to 4 digit numbers without and with regrouping; and estimating the difference of two numbers with three to four digits. Even though a sizable percentage showed "outstanding" performance, item analysis revealed areas for growth, highlighting particular competencies that call for specialized instructional support to guarantee mastery for all students. In addition to this, learners' challenges with mathematics can be divided into four categories: cognitive, affective/emotional, instructional, and environmental.

2. The creation of contextualized educational materials designed for Grade 3 pupils on multigrade schools of Aritao 2 district addresses their specific learning needs. By focusing on real-life contexts and aligning with the skills identified as least mastered through proficiency tests, this resource is expected to effectively enhance the pupils' mathematical proficiency and foster deeper understanding.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study; all data used were obtained from previously published sources as cited in the reference list.

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Appendices

No appendices are attached to this study.