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Enhancing Fundamental Operational Skills of Grade 4 Learners in Mathematics

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ABSTRACT

This study determined the effectiveness of utilizing comic-based learning activity sheets in enhancing the fundamental operational skills of Grade 4 learners in Mathematics. It focused on the learners' pre-test performance, least learned competencies, development and evaluation of comic-based learning activity sheets, and the difference in expert evaluations of the material. A quantitative one-group pretest design with descriptive evaluation was used. The respondents were 50 Grade 4 learners from selected elementary schools in District 5, Division of Pangasinan II, and eight evaluators composed of six Mathematics teachers, one school administrator, and one Public School District Supervisor. Data were gathered through a 13-item Mathematics pre-test and an expert evaluation checklist based on content, format, illustrations, design and layout, paper and binding, and presentation and organization. Findings showed that the learners' pre-test performance was low proficient. The least learned competencies were multiplication and division of 2- to 4-digit numbers, particularly multiplying 3- to 4-digit numbers by 1-digit numbers, multiplying 2- to 3-digit numbers by 2-digit numbers, and dividing 3- to 4-digit and 2- to 3-digit numbers. The comic-based learning activity sheets developed to address these competencies were rated highly satisfactory by the evaluators, with a grand mean of 4.92. The F-test result showed no significant difference among the evaluations of teachers, the school administrator, and the Public School District Supervisor. The study concludes that comic-based learning activity sheets may be used as supplementary teaching materials to support Grade 4 learners in developing fundamental operational skills in Mathematics.

Keywords: *comic-based learning activity sheets, fundamental operations, Grade 4 Mathematics, instructional material, learner proficiency, Mathematics education*

INTRODUCTION

Mathematics is a foundational learning area that supports problem-solving, logical thinking, decision-making, and everyday life skills. However, many learners continue to perceive Mathematics as difficult, which challenges teachers to employ instructional strategies that can make the subject more engaging and understandable. The concern is especially relevant in the Philippine context, where the 2022 Programme for International Student Assessment (PISA) results showed that Filipino learners remained below the OECD average in Mathematics. This performance gap highlights the importance of strengthening basic mathematical competencies at the elementary level.

Fundamental operational skills refer to the ability to perform the four basic arithmetic operations: addition, subtraction, multiplication, and division. These skills serve as the foundation for higher-level mathematical reasoning, multi-step problem solving, and practical numeracy. Learners who lack mastery of these operations often experience difficulty in subsequent Mathematics lessons. Therefore, instructional materials that support repeated practice, conceptual understanding, and learner interest are needed to address persistent learning gaps.

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Learning activity sheets have been used as instructional tools to reinforce learning, support independent practice, and assess mastery of specific competencies. When designed effectively, these materials can help learners engage with lessons beyond direct classroom instruction. Comic-based materials add another dimension by combining visual storytelling, characters, and contextualized problems. Prior studies suggest that comics can increase learners' interest, support comprehension, and make difficult subjects more accessible (Chu & Toh, 2020; Lopez, 2022; Saputri & Qohar, 2020; Tanala, 2023).

Anchored on the need to strengthen Mathematics learning in basic education, this study developed and evaluated comic-based learning activity sheets intended to enhance Grade 4 learners' fundamental operational skills. It specifically examined learners' pre-test performance, identified least learned competencies, developed comic-based materials for the identified learning gaps, evaluated the materials through Mathematics experts, and determined whether significant differences existed among expert evaluations.

Literature Review

Fundamental Operational Skills in Mathematics

Fundamental operations in Mathematics constitute the basic numerical processes that enable learners to solve problems involving addition, subtraction, multiplication, and division. Mastery of these skills prepares learners for more complex mathematical tasks and real-life applications. The development of these skills is consistent with the MATATAG curriculum direction, which emphasizes conceptual knowledge, strategic skills, and values formation among learners. In this study, the focus was placed on the Grade 4 competencies where learners demonstrated low proficiency in the pre-test.

Learning Activity Sheets as Instructional Support

Learning activity sheets serve as structured instructional materials that provide exercises, tasks, and opportunities for practice. They may be used for reinforcement, remediation, enrichment, and independent learning. The use of contextualized and visually engaging worksheets can help learners understand abstract concepts by presenting them in familiar and manageable forms. This is particularly important for elementary learners who benefit from concrete examples and meaningful practice.

Comic-Based Materials in Mathematics Learning

Comic-based materials combine visual elements, narratives, and sequential panels to communicate ideas in an engaging manner. Chu and Toh (2020) proposed the use of comics as a framework for primary Mathematics instruction, noting that comics may help develop learner interest and motivation. Lopez (2022) found that comic-based materials support comprehension and engagement, while Tanala (2023) reported that comic-based reading materials improved Grade 6 learners' reading comprehension. In Mathematics, comic-based realistic approaches and comic-based learning media have been associated with improved understanding, critical thinking, and learner motivation (Lestari et al., 2021; Saputri & Qohar, 2020; Sipayung et al., 2023). These studies support the development of comic-based learning activity sheets as supplementary materials for addressing least learned competencies in Grade 4 Mathematics.

Theoretical and Conceptual Bases

The study was anchored on Gardner's Multiple Intelligences Theory, the Cognitive Theory of Multimedia Learning, Piaget's cognitive development theory, and Rogers' experiential learning perspective. These theories support the idea that learners understand concepts better when materials address diverse learning preferences, combine visual and verbal information, match learners' developmental level, and encourage active involvement in learning. The conceptual framework of the study also aligned with curriculum policies emphasizing contextualized learning, 21st-century skills, and the development of learner-centered instructional resources.

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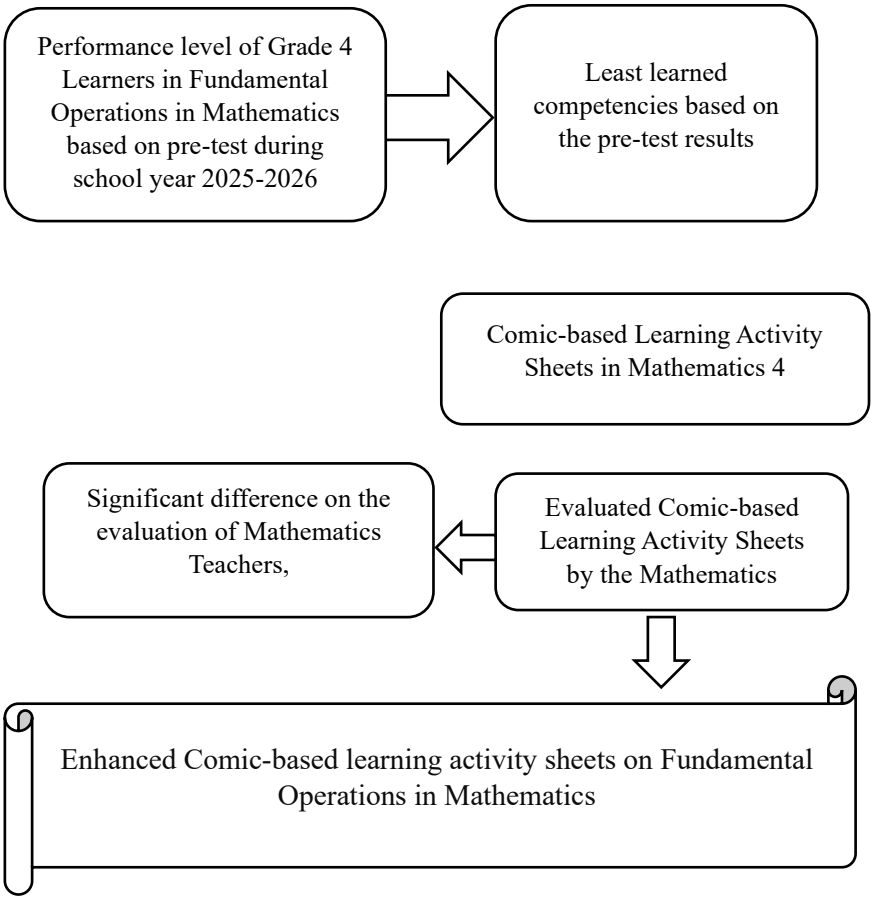

Figure 1- *Paradigm of the Study*

METHODS

Research Design

The study used a quantitative one-group pretest research methodology with descriptive evaluation. The design was appropriate because the study first assessed learners' performance in Grade 4 Mathematics to identify least learned competencies and then developed and evaluated comic-based learning activity sheets intended to address the identified learning gaps.

Research Locale

The study was conducted in selected elementary schools in District 5, Division of Pangasinan II during School Year 2025-2026.

Participants and Sampling Technique

The participants consisted of 50 Grade 4 learners and eight expert evaluators. The Grade 4 learners served as respondents for the pre-test used to determine performance level and least learned competencies. The expert evaluators consisted of six Mathematics teachers, one school administrator, and one Public School District Supervisor from District 5, Division of Pangasinan II.

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Table 1. *Distribution of Respondents*

Respondent Group	Frequency	Percentage
Grade 4 learners - Male	20	40%
Grade 4 learners - Female	30	60%
Total Grade 4 learners	50	100%
Mathematics teachers	6	75% of evaluators
School administrator	1	12.5% of evaluators
Public School District Supervisor	1	12.5% of evaluators
Total evaluators	8	100%

Research Instrument

Two instruments were used: a 13-item Mathematics pre-test and an evaluation checklist for the comic-based learning activity sheets. The pre-test was used to determine the performance level of the learners and identify least learned competencies in Mathematics 4. The evaluation checklist measured the quality of the comic-based learning activity sheets based on content, format, illustrations, design and layout, paper and binding, and presentation and organization using a five-point scale ranging from unsatisfactory to highly satisfactory.

Data Gathering Procedure

The researcher prepared the necessary communications and secured permission from concerned authorities. Parental consent was also obtained for the learner participants. A 13-item pre-test adapted from regional materials was administered to Grade 4 learners to identify their performance level and least learned competencies. Based on the results, comic-based learning activity sheets were developed to address the identified competencies. The developed materials were evaluated by Mathematics experts, and their comments and recommendations were incorporated to enhance the final learning activity sheets.

Data Analysis

The study used frequency, percentage, mean, mean percentage score, and descriptive equivalents to interpret pre-test performance and least learned competencies. The weighted mean was used to determine the experts' evaluation of the comic-based learning activity sheets. An F-test was used to determine whether there was a significant difference among the evaluations of the mathematics teachers, school administrator, and Public School District Supervisor.

Ethical Consideration

The study observed institutional permissions and parental consent before data collection. Learner responses and expert evaluations were used only for academic and research purposes. The identities of participants were treated with confidentiality, and the study used the results only to develop and improve instructional materials for Grade 4 Mathematics.

RESULTS AND DISCUSSION

Level of Performance of Grade 4 Learners in Fundamental Operations

The learners' pre-test results showed that the overall performance level of Grade 4 learners in fundamental operations was low proficient. This finding indicates that the learners had not yet developed sufficient mastery of the target competencies in Mathematics 4. The low performance level supports the need for supplementary materials that can provide additional practice and increase learner motivation.

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Table 2. *Summary of Learners' Pre-Test Performance Level*

Descriptive Equivalent	Frequency	Percentage
Emerging (Low Proficient)	21	42.00%
Developing (Nearly Proficient)	20	40.00%
Emerging (Not Proficient)	7	14.00%
Transitioning (High Proficient)	2	4.00%

The distribution of the learners' scores shows that many learners were in the developing, low proficient, or not proficient levels. This suggests that fundamental operations remained difficult for the learners, particularly where multi-digit multiplication and division were required. The finding is consistent with the rationale of the study that Mathematics teachers need engaging and learner-friendly materials to address gaps in basic numeracy.

Least Learned Competencies in Grade 4 Mathematics

Item analysis identified the least learned competencies in Grade 4 Mathematics. Four competencies obtained a descriptive equivalent of not proficient, all involving multiplication and division of multi-digit numbers. These results indicate that learners experienced greater difficulty when the tasks required regrouping, multi-digit processes, and procedural fluency.

Table 3. *Least Learned Competencies in Grade 4 Mathematics*

Most Essential Learning Competency	Percentage of Correct Response	Descriptive Equivalent
Estimate the sum and difference of two 5- to 6-digit numbers by rounding the addends to the nearest large place value	25.45%	Emerging (Low Proficient)
Add numbers with sums up to 1,000,000 and subtract numbers where both numbers are less than 1,000,000, with and without regrouping	28.48%	Emerging (Low Proficient)
Multiply two numbers with and without regrouping a 3- to 4-digit number by a 1-digit number	12.80%	Emerging (Not Proficient)
Multiply two numbers with and without regrouping 2- to 3-digit numbers by 2-digit numbers, with products up to 1,000,000	16.56%	Emerging (Not Proficient)
Divide two numbers with and without regrouping 3- to 4-digit numbers by 1-digit numbers	9.58%	Emerging (Not Proficient)
Divide two numbers with and without regrouping 2- to 3-digit numbers by 2-digit numbers	7.13%	Emerging (Not Proficient)

The weakest competencies were concentrated in multiplication and division. Because these operations require sequential reasoning, recall of basic facts, and accuracy in procedure, learners may benefit from materials that present steps visually and contextually. Comic-based activity sheets can provide this support by embedding mathematical procedures in illustrated and narrative situations that encourage practice without making learning appear purely mechanical.

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Development of Comic-Based Learning Activity Sheets

Based on the least learned competencies, the comic-based learning activity sheets were developed to focus on multiplying and dividing 2- to 4-digit numbers by a 1-digit number. The materials used graphics, illustrations, and structured activities intended to catch learners' attention while guiding them through fundamental operations. This aligns with multimedia and experiential learning perspectives, which emphasize that learners benefit from visual, contextualized, and active engagement with learning tasks.

Expert Evaluation of the Comic-Based Learning Activity Sheets

The comic-based learning activity sheets were evaluated by Mathematics teachers, a school administrator, and a Public School District Supervisor using criteria prescribed by the Department of Education. The overall evaluation was highly satisfactory, with a grand mean of 4.92. All criteria were rated highly satisfactory, indicating that the material was acceptable in terms of content, format, illustrations, design and layout, paper and binding, and presentation and organization.

Table 4. *Evaluation of the Comic-Based Learning Activity Sheets*

Criteria	Teachers	School Administrator	PSDS	Mean	Descriptive Equivalent
Content	4.80	5.00	4.60	4.80	Highly Satisfactory
Format	4.50	5.00	5.00	4.83	Highly Satisfactory
Illustrations	5.00	5.00	5.00	5.00	Highly Satisfactory
Design and Layout	5.00	5.00	5.00	5.00	Highly Satisfactory
Paper and Binding	4.75	5.00	5.00	4.92	Highly Satisfactory
Presentation and Organization	5.00	5.00	4.80	4.93	Highly Satisfactory
Grand Mean	4.84	5.00	4.90	4.92	Highly Satisfactory

The high evaluation of the material suggests that the expert evaluators considered the comic-based learning activity sheets suitable and useful for Grade 4 learners. The perfect mean scores in illustrations and design and layout show that the visual and aesthetic features of the material were regarded as strong. These findings support previous studies which emphasized the value of comics in increasing learner interest and making Mathematics concepts more accessible (Chu & Toh, 2020; Saputri & Qohar, 2020).

Significant Difference Among Expert Evaluations

The F-test result showed no significant difference among the evaluations of the mathematics teachers, school administrator, and Public School District Supervisor. The computed F-value of 0.46324 was lower than the tabular value of 6.70 at the 0.01 level of confidence. Therefore, the null hypothesis was accepted. This means that the three evaluator groups had consistent ratings of the comic-based learning activity sheets.

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Table 5. *Difference Among Expert Evaluations of the Comic-Based Learning Activity Sheets*

Evaluator Group	Mean Evaluation	F-test Result	Tabular Value	Interpretation
Mathematics Teachers	4.84	0.46324	df 2,13 (.01) = 6.70	Not Significant
School Administrator	5.00	0.46324	df 2,13 (.01) = 6.70	Not Significant
Public School District Supervisor	4.90	0.46324	df 2,13 (.01) = 6.70	Not Significant

The absence of significant differences strengthens the acceptability of the developed material because the highly satisfactory rating did not come from only one evaluator group. The teachers, administrator, and supervisor shared a similar judgment that the material was appropriate for classroom use. Based on the insights, comments, and suggestions of the experts, the comic-based learning activity sheets were enhanced and prepared for implementation.

CONCLUSION

The study concludes that the selected Grade 4 learners in District 5, Division of Pangasinan II were low proficient in fundamental operational skills in Mathematics. Their least learned competencies were concentrated in multiplication and division, particularly involving multi-digit numbers and regrouping. The developed comic-based learning activity sheets addressed these least learned competencies and were evaluated by Mathematics experts as highly satisfactory, with a grand mean of 4.92. Since there was no significant difference among the evaluations of teachers, the school administrator, and the Public School District Supervisor, the material was consistently judged as acceptable and useful. Therefore, the proposed comic-based learning activity sheets may be used as supplementary teaching material to support Grade 4 learners in Mathematics.

Recommendations

The evaluated comic-based learning activity sheets may be used as teaching materials for Grade 4 Mathematics, particularly in addressing learners' difficulties in fundamental operations. Teachers may integrate the materials in remediation, reinforcement, and independent practice activities. Learners should also be encouraged to develop positive attitudes toward Mathematics by engaging in enjoyable and meaningful activities. Schools may conduct regular assessment of least mastered skills in Mathematics every quarter to monitor learner performance and guide intervention planning. Mathematics teachers are encouraged to develop similar comic-based learning activity sheets not only in Mathematics but also in other learning areas where learner motivation and comprehension need support. Future researchers may conduct similar studies involving larger samples, additional grade levels, or post-test implementation to further validate the effectiveness of comic-based materials in improving learner performance.

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