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ANALYSIS OF THE RESULTS OF ENHANCED REGIONAL UNIFIED NUMERACY TEST (E-RUNT) IN INTEGERS: BASIS FOR MAKING INTRUCTIONAL MATERIALS

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ABSTRACT

This study aimed to assess Grade 7 students' understanding of basic integer operations at Carvasana National High School using the Enhanced Regional Unified Numeracy Test (E-RUNT) Post-test results. Using a research and development framework with comprehensive enumeration sampling, the study evaluated students' proficiency in basic operations, identifying subtraction as the least proficient. The study recommends customized teaching strategies, aligning with previous research. As a result, the Integer Instructional Infographic (3I) was developed to address deficiencies in integer operations, in line with learner-centered and inclusive education principles. Document analysis identified common challenges in integer operations. Overall, this research provides valuable insights for tailoring teaching methods and interventions to enhance students' mathematical comprehension. The 3I material is a carefully designed, evidence-based solution aimed at addressing educational gaps and promoting inclusive, relevant education.

Keywords: *Analysis, E-RUNT, Integers, Instructional Materials*

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INTRODUCTION

In mathematics, the foundational concepts of integer operations are essential, serving as a crucial prerequisite for students before delving into more advanced topics, as emphasized by Zainudin, Amin, and Fatah (2022). In a related vein, Permata, Wijayanti, and Masriyah (2018) have also emphasized that a solid grasp of numerical operations is indispensable as one of the fundamental building blocks in algebraic learning. Neglecting to comprehend these foundational concepts correctly can potentially give rise to misconceptions.

Khalid and Embong (2019) identified several sources of errors in integer operations, which include carelessness, inadequate foundational knowledge such as difficulties with basic multiplication and division of whole numbers, struggles with adapting to the concept of integers due to their familiarity with whole numbers, and confusion resulting from a surface-level understanding of rules.

Furthermore, Hernan and Sovia (2019) highlighted that slow learners tend to make four main types of errors when solving integer operation problems, encompassing comprehension errors, transformation errors, process skill errors, and encoding errors. Additionally, Zainudin, Amin, and Fatah (2022) reported that students commonly make errors in various aspects of solving integer operation problems, including reading errors, comprehension errors, transformation errors, process skill errors, and conclusion drawing errors.

To address these challenges, one effective learning approach identified by Khalid and Embong (2019) is guided discovery learning, which incorporates real-world contexts into the

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learning process. The results of this analysis are expected to provide valuable insights to mathematics teachers, enabling them to better tailor their teaching practices for slow learners, especially when dealing with integer operation problems.

Examining the mistakes made by learners in integer operations is crucial, as it helps teachers pinpoint areas requiring attention and intervention. Yet, there is limited information available regarding the effectiveness of infographics as an instructional tool for teaching students the intricacies of integer operations.

Students often hold misconceptions about integer operations, such as believing that adding two negative numbers always results in a positive number. Addressing these misconceptions is essential to help students develop a correct understanding, especially considering their diverse learning needs.

This research aimed to identify errors in integer operations, providing the foundation for the development of instructional materials for Grade 7 learners in the public schools' district of Calinog I, Schools Division of Iloilo.

MATERIALS AND METHODS

Research Methodology

This chapter presents the research design, research method, respondents of the study, sampling design, data gathering procedure, research instrument, and data analysis used in the study.

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Research Method

The research methods used in this study were purposive sampling total enumeration, Adopted Enhanced – Regional Unified Numeracy Test (E-RUNT) instrument, descriptive analysis and document analysis.

Sampling for the cases was conducted using the total enumeration method, where all members of the study population were selected as participants. In this approach, sampling units are chosen based on a specific purpose. Purposive sampling leads to biased estimates and is not statistically valid. This technique is suitable only for particular objectives (Singh & Masuku, 2014).

Descriptive analysis was used to describe the E-RUNT results in the study using descriptive statistical tools such as frequency count and percentage.

This study employed document analysis as the research method. Document analysis is a systematic process of reviewing and evaluating documents, including both printed and electronic materials (computer-based and internet-transmitted). Similar to other analytical methods in qualitative research, document analysis involves examining and interpreting data to extract meaning, gain insights, and generate empirical knowledge (Corbin & Strauss, 2008).

Research Design

This study employed a research and development design. Research and development refer to the broad range of investigative activities conducted by educational institutions with the goal of discovering new educational products, such as curricula or learning materials, or

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developing new procedures, such as teaching or assessment methods. It can also focus on improving existing educational products or procedures (Gulzar, n.d.).

Respondents of the Study

The respondents of this study were the fifty-two (52) Grade 7 learners of Carvasana National High School who were officially enrolled during the school year 2022-2023. This study employed total enumeration sampling technique as aligned with the main response of the study to determine and identify non-numerates in the school and propose an appropriate infographic suitable to the group.

As suggested by the chosen sampling technique, the following inclusion criteria was considered as bases for determining the respondents in the study:

The respondents of the study were the enrolled learners as Grade 7 of Carsavasana National High School in school year 2023–2024 listed in the Learners' Information System (LIS).

The respondents took the Enhanced – Regional Unified Numeracy Test (E–RUNT) pre–test, mid–test and post–test documented in the Beginning of School Year (BOSY), Mid of School Year (MOSY) and End of School Year (EOSY) folders especially the E-RUNT Post–Test wherein the data collected was subject for analysis in the study.

The respondents have agreed and signed the assent form given by the researcher. Their parents have also given the consent to the researcher and signed the consent form.

Total enumeration sampling is a type of purposive sampling technique in which the researcher selects the entire population that possesses specific characteristics for

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examination. It is commonly used in surveys or studies where including the entire population in the sample is practical. In total enumeration sampling, every subject that meets the inclusion criteria is chosen until the desired sample size is reached (de Assis Lage et al., 2020).

Data Gathering Procedures

The researcher wrote a letter to the Principal of Carvasana National High School for permission to utilize the results of the Enhanced–Regional Unified Numeracy Test (E–RUNT) Post–Test of school year 2022–2023 Grade 7 learners. As soon as the School Principal confirmed the utilization of the E–RUNT data, Grand 7 E–RUNT Post–Test results was submitted for data analysis by the researcher. Quantitative and qualitative analysis was performed to measure and describe the quantitative data and determine the types of errors made by the Grade 7 learners.

After the analysis, the researcher recommended, designed, and developed an instructional material based on the type of errors made by Grade 7 learners. The developed instructional material was submitted for assessment and evaluation using the LRMDS Evaluation Rating Sheet for Print Resources by the LRMDS district coordinator.

Prior to the evaluation of the developed instructional material, a letter was sent to the office of the Public Schools District Supervisor of District of Calinog I asking permission to conduct a study. Once the researcher received a positive response from district supervisor, a copy of developed instructional material was distributed to the mathematics teachers, master teachers, and mathematics department head in the District of Calinog I together with the adapted LRMDS Evaluation Rating Sheet for Print Resources for future use.

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Research Instrument

This study utilized the result of Enhanced-Regional Unified Numeracy Test (E-RUNT) Post-Test. Based on the results of learners' answers on the operations of integers, the researcher analyzed and classified the errors as to: (1) careless errors; (2) concept errors; and (3) relevant errors.

LRMDS Evaluation Rating Sheet for Print Resources of the Department of Education was utilized to evaluate the developed infographic instructional material. The LRMDS Evaluation Rating Sheet for Print Resources is composed of four (4) parts: Factor 1 (Content); Factor 2 (Format); Factor 3 (Presentation and Organization); and Factor 4 (Accuracy and Up-to-datedness of Information). This tool was used by the inter-raters to evaluate the developed infographic instructional material.

Validity of the Research Instrument

To establish the validity of the instrument, the initial draft of the text was reviewed by the thesis adviser and then presented for face and content validation, as well as item inspection, to a panel of experts in the fields of sciences, tests and measurements, and statistics.

The panel of experts evaluated each item based on its appropriateness, relevance, clarity of language, sentence correctness, and other factors. The corrections, recommendations, and suggestions for refining the instrument were incorporated into the final draft.

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Additionally, no reliability test was conducted on the instrument. Content, face, and construct validity were considered. As mentioned, validation was performed by experts, and their suggestions were integrated before data collection.

Regarding content-related evidence of validity, as suggested by Fraenkel and Wallen (2003), the content and format of the instrument must align with the definitions of variables and the sample of the subjects to be measured.

This process also aids in validating the items in the questionnaire. The comments, corrections, and suggestions provided by the panel of validators were taken into account in the final draft.

Research ethical considerations were addressed in the content and structure of the instrument.

Data Analyses

The research instrument was reproduced depending on the number of respondents in the study.

The researchers gathered the instruments. The collected data was consolidated, tabulated, analyzed, and interpreted using Statistical Package for the Social Sciences (SPSS) software. After the systematic statistical interpretation of data, the researchers draw conclusion and offer recommendations.

Document Analysis. This was used to identify and analyze the errors in the basic operation of integers committed by the respondents as based on the E–RUNT Post– Test papers from the test administrators.

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Descriptive Analysis. Descriptive statistical tools were utilized to analyze the result of the study.

Statistical Tools

The following statistical tools were used in the statistical treatment, analysis and interpretation of data:

Frequency Count. This was used to determine the frequency of types errors made by Grade 7 learners in operation of integers and the number of numerates and non - numerates.

Percentage. This was used to quantify the ratio of numerates and non–numerates as based on the E–RUNT Post– Test result.

Mean Score. This was used to determine average scores of the participants on four basic operations of integers and as a whole.

Mean Percentage Scores. This was also measured to average percentage score of the respondents.

Standard Deviation. This was used to show the spread of raw scores and percentage scores to the mean.

RESULTS AND DISCUSSIONS

The study was conducted to determine the Errors of Grade 7 Learners in the Basic Operations of Integers: Basis for the Development of an Instructional Infographic (3I) at Carvasana National High School, District of Calinog I, during School Year 2022–2023.

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The research utilized research and development design, employing descriptive analysis and document analysis based on the Enhanced Regional Unified Numeracy Test (E-RUNT) Post-Test.

The participants of the study were the Grade 7 learners of Carvasana National High School, whose E-RUNT Post-Test documents served as the primary data source.

The research instrument used was the E-RUNT Post-Test, and data were analyzed using frequency count, percentage, mean, standard deviation and document analysis was also used.

The following are the findings of the study:

The results of the E-RUNT Post-Test show that most Grade 7 learners are still non-numerate, even though many fall within the Nearly Proficient level. This indicates that while students may have partial understanding of integer concepts, their skills are not yet strong enough for independent and accurate problem solving. Only learners in the Proficient and Highly Proficient groups demonstrated true mastery.

In addition, learners were confident when working with two positive integers, but their performance declined once negative integers were involved. Combining a positive and a negative number caused noticeable confusion, while adding two negative integers created the greatest difficulty. This suggests that learners have not yet internalized how negative values interact in addition.

In subtraction, students showed some competence with basic positive-integer subtraction. However, they struggled significantly whenever negative numbers appeared—

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especially when integers had opposite signs. Subtracting negative numbers, whether from a positive or another negative, revealed major gaps in understanding, making subtraction the most challenging operation overall.

In multiplication, learners displayed partial mastery, particularly when integers had the same sign. But when signs differed, many students became unsure of the correct rule to apply. This inconsistency shows that their grasp of multiplication involving negative integers remains unstable.

In division, a similar pattern was observed. Students managed division better when integers shared the same sign, but difficulties increased when dealing with opposite signs. This suggests that learners have not fully connected the relationship between multiplication and division in terms of sign rules.

Conclusion

In the light of the findings and insights derived from the study, it is concluded that Grade 7 learners of Carvasana National High School struggle significantly with the basic operations of integers, particularly in tasks involving negative integers.

A major cause of errors across the four operations is the misunderstanding of sign rules, especially when integers have opposite signs. Subtraction produced the highest overall difficulty, while addition was only easy when both numbers were positive.

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These findings highlight the need for an instructional infographic material (3I) that provides: clear visual models, simplified rule representations, graduated practice activities, and remedial reinforcement aligned with the most frequent student errors.

The development and use of such material is expected to improve learners' conceptual understanding, build procedural fluency, and enhance numeracy proficiency in integer operations.

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