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Enhancing Learners' Performance in Grade 7 Mathematics Through 50-30-20 Exercise

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Abstract: Assessment exercises constitute a crucial component of the teaching and learning process, serving the purpose of gauging the degree to which learning objectives have been accomplished. This study aims to assess the mathematics performance of Grade 7 learners using the 50-30-20 exercise. Specifically, this study seeks to determine the learners' pre-test and post-test mean scores, identify significant differences between the pre-test and post-test results, evaluate learners' exercises, and propose enhanced exercises. The research employs a quasi-experimental design, with 40 Grade 7 learners in the school year 2023–2024 as participants, selected through purposive non-random sampling. Statistical data analysis involves the use of mean, standard deviation, paired *t*-test, and Cohen's D effect size. Ethical considerations were paramount, as evidenced by a letter of authorization from the school head outlining the strict adherence to voluntary participation, informed parental consent, anonymity, confidentiality, risk mitigation, results-sharing protocols, and the commitment to keeping research data confidential. The data yielded a remarkable outcome: the experimental group exhibited improvement in both the pre-test and post-test. This result substantiates the initial objective of the study, showcasing a noteworthy and favorable performance among the participants. Consequently, it suggests that a majority of the participants strongly agree that the 50-30-20 exercises contribute to enhancing their understanding and problem-solving skills, as well as their ability to grasp mathematical concepts and improve their overall performance in mathematics. Therefore, the 50-30-20 exercises not only facilitated students in understanding mathematics lessons but were also aligned with the Department of Education's development plan.

Keywords: Mathematical assessment exercises; Learners' mathematical performance; 50-30-20 exercises

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1. Introduction

Mathematics is considered an academic discipline. It is the science and study of quality, structure, space, and change [1]. Many learners find mathematics to be a challenging and complex subject, often considering it tedious and monotonous. The difficulty arises from numerous complex formulas and the need for appropriate assessments for each learner, leading to struggles in mathematics [2]. An objective examination of mathematics as an academic discipline allows for frequent, cumulative assessments.

However, the Philippines ranks among the nations with the lowest-scoring learners in the Programme for

International Learner Assessment (PISA) 2018. In mathematics, less than 20% of learners achieved the required level of proficiency, while more than 50% exhibited deficient performance [3]. Filipino students performing below PISA's lowest level of proficiency possessed more advanced mathematical knowledge than half of their global counterparts in the same age group, highlighting the need for improvement in mathematics education [4]. Learners in both public and private schools exhibited poor performance in mathematics to varying degrees, with means of 343 and 395, respectively.

The PISA test evaluates learners' mathematical proficiency by assessing their ability to comprehend, apply, and interpret mathematics across various contexts, encompassing personal experiences as well as broader and more abstract scenarios related to employment, society, and science [5]. Learners with strong mathematical reasoning skills can employ mathematical concepts, methods, facts, and tools to describe, explain, and predict events [3]. The test items cover a range of mathematical concepts, topics, and contexts, involving tasks such as conceptualizing situations numerically, applying mathematical ideas, information, and reasoning, and understanding, using, and evaluating mathematical discoveries as part of the mathematical processes. Fundamental mathematical skills supporting these processes include the ability to understand a problem situation, its tasks, and questions; present, justify, and explain a solution; translate and represent the problem and its quantities into a mathematical form; and use mathematical content knowledge and tools to solve the problem and communicate results [3,4].

Furthermore, the Department of Education (DepEd) has pledged significant reforms in response to low performance on previous exams. To elevate the standard of primary education in the Philippines, they initiated the "Sulong Edukalidad" program.

Likewise, the arithmetic and numeracy assessments involve more than just forming opinions about a learner's aptitude [6,7]. It evaluates how well the learner comprehends mathematical language, concepts, and skills and what they must do to achieve them. Additionally, there are two general kinds of math assessments: internal and external. Teachers can make decisions about their lessons using the data from internal assessments of learner performance [8].

Assessment can also play an important role in clearly and immediately transmitting the goals of mathematics reform [9]. Because assessment evolves alongside education, it can help teachers and students track their progress toward higher standards. More collaborative assessment practices could aid in the development of assessment practices. Positive assessment experiences shared in collaborative settings may raise awareness of the relationship between assessment conceptions and practices. Formative assessment is a type of evaluation that identifies learners' misconceptions and errors. Teachers and students can act quickly to assist students in repeating the procedure; they can conclude the data gathered during the assessment and take appropriate action. Such actions may contribute to the necessary changes in teaching and learning, or they may only provide a snapshot of students' progress over time [10].

Furthermore, according to DepEd Memorandum No. 160 s. 2012, Grade 7 students performed poorly, with a 33.45% MPS in the school year 2022–2023, which is considered poor performance. The researcher used the poor performance of Grade 7 students during the first quarter of the previous school year as one of the foundations for developing an alternative evaluation technique that will aid in increasing their concentration and motivation in mathematics learning through integration. Furthermore, the 50-30-20 exercise is a technique for improving students' mathematical performance. 50-30-20 denotes that 50% of the formative assessment comes from the current topic/lesson/competency, 30% from the most recent topic/lesson/competency, and 20% from the previous two topics/lesson/competency. This research aims to examine the performance in mathematics of Grade 7 learners using the 50-30-20 exercise to help the Department of Education's learning recovery program,

specifically to determine the learners' pre-test and post-test mean scores; determine the significant difference between the pre-test and post-test results; evaluate the learners' exercises; and propose enhanced exercises. Recommendations for developing a strategy for assessing learners' mathematical performance.

2. Literature review

2.1. Mathematics is both a subject and an academic discipline

Every citizen's life and job have benefited from and will benefit from mathematics. This is untrue, given that people still need to understand quantity and other fundamental math skills [11]. Individuals benefit from education because it gives them the essential knowledge and skills to act as productive members of society. As mathematics has become an essential discipline in the work field, it is indicated that the increase of information technologies in work practices and the response to satisfy the client's demands since every mathematical procedure at work, no matter how simple, is part of a wide range of decisions and judgments about processes or products [12].

According to the World Bank, education can also be one of the most powerful tools for reducing poverty and enhancing people's well-being. However, sufficient investments are required to build and maintain a high-quality education system [13]. Likewise, there is a need to emphasize learners' proficiency in disciplines that prepare them for the world, such as mathematics. Mathematics is a subject in every age and environment, and its importance extends beyond the classroom and the school; hence, it must be studied thoroughly and in-depth [1]. Similarly, they asserted that knowing and using various tools is necessary to comprehend mathematics comprehensively [2]. Learners can actively participate in their math studies and improve their understanding of the subject using mathematical tools. Mathematical concepts are developed, clarified, and applied using manipulative and hands-on materials.

However, a mathematics teacher needs to have a classification of problems in the educational process to choose tasks of an open type correctly [14]. In this regard, the article substantiates the classification of open problems for teaching mathematical disciplines and develops methodological guidelines for lessons that help increase students' learning motivation and academic achievement. On the other hand, low-preparation teaching methods require minor adjustments to the daily schedule and organization of the classroom [15]. They need minimum preparation on the part of the teacher while still enabling curriculum and instruction to be modified to meet the needs of the learners. Proactively changing teaching and learning includes a variety of classroom organizational, instructional, and assessment methodologies and ideas [13,16].

On the other hand, this implies that education is advantageous to everyone; it equips individuals with the knowledge and abilities they need to make constructive contributions to society. Mathematics education is accessible to people of all ages and environments. Since it has a relevance that extends beyond the classroom and the school, it is equally essential to study mathematics in depth and widely in schools.

2.2. Assessment

Assessment is one part of the teaching and learning process that aims to measure the extent to which learning objectives have been achieved. It is a decision-making process using information obtained through measuring learning outcomes [17,18]. Assessing students' mathematical knowledge is vital because students obtain essential feedback to improve their knowledge and learning [19]. In addition, assessment strategies are approaches used by teachers to evaluate learners' progress and create course content. Teachers conduct regular assessments to identify the next steps in their lessons [20]. They can provide specialized attention to learners progressing more slowly than others. With this, the teacher can change the curriculum if the class performs behind or on schedule [7,8].

In addition, a straightforward explanation for the age-related improvement in memory performance stated that learning capacity increases with age [21]. The brain is comparable to a computer with a certain number of short-term memory slots. Memory development refers to how well individuals store and retrieve knowledge as they age. The Enhanced Basic Education Act of 2013 (Republic Act No. 10533), however, as stated in DepEd Order No. 8, Series 2015, and DepEd endorsed the included Policy Guidelines on Classroom Evaluation for the K-12 Basic Education Program [22]. The evolution of learning in the classroom and school depends on classroom assessment. It informs learners, parents, and guardians about their development [20,23]. Based on DepEd Order No. 55, Series 2016, DepEd approved the attached guidelines on the National Assessment of Learner Learning for the K-12 Basic Education Program; they stated that national evaluation of learner learning is an essential component of DepEd's assessment structure [16]. Opening active, engaging communication channels improves learning. Learning is evaluated based on outcomes, function, and self-evaluation [24].

On the other hand, it implies that assessment and evaluation of students' knowledge would be beneficial for teachers so they may proceed to the next level of their lessons, determine the slow learners and the gaps between these learners and one another, and inform the students, parents, and guardians about their development. Further, making remedial classes for slow learners more enjoyable for teachers and learners could aid learners in understanding essential ideas for the next level. Similar to this, learners must be aware of prerequisite material to comprehend what they must comprehend to succeed in a new mathematics course.

2.3. Assessment in mathematics

In the PISA 2018 exam, learners' ability to construct, apply, and understand mathematics in various contexts – including familiar personal experiences and more generic and abstract contexts of employment, society, and science – was used to determine their proficiency in the subject. Proficient learners in mathematics can describe, explain, and predict phenomena using mathematical concepts, methods, facts, and tools [3]. The test items covered different mathematical techniques, topics, and contexts. The mathematical processes involved conceptualizing problems, applying mathematical ideas, information, and reasoning, and interpreting, using, and evaluating mathematical findings [4]. These mathematical operations were supported by basic mathematical skills, such as the capacity to comprehend a problem situation, its tasks, and questions; to present, justify, and explain a solution; to translate and represent the problem and its quantities into a mathematical form; and to use mathematical content knowledge and tools to solve the problem and communicate results [10,25].

On the other hand, without the required conditions, such as finances, qualified teachers, and advantageous laws, the spiral development technique causes more harm than good. The spiral has been broken because of broad learner promotion, which is imposed subtly by the government [21]. Promoting learners without the requisite remedial sessions to catch up and master the content contradicts the promise of the spiral progression approach. Making slow learners' restorative sessions more engaging to teachers and learners may help learners understand essential ideas for the next level. Learners should take a real-world problem or scenario, dig out the arithmetic, and present it as a mathematical problem to answer. If young learners cannot correctly add and multiply, they will be unable to add fractions or identify common denominators. Secondary learners can only understand how to graph a linear function if they can graph a collection of coordinates on the Cartesian plane [16,21,26]. The idea is that assessment is about improvement to be a predictor of assessment practices to enhance teaching and identify students' learning needs [8]. Furthermore, the mean percentage score in mathematics on the National Achievement Test fell below expectations [27]. The COVID-19 epidemic, which affects teachers and learners, can be blamed for the underachievement of the learners in mathematics. To understand what they need to understand to succeed in a new mathematics course, learners must be aware of prerequisite topics.

On the other hand, this implies that numeracy is still one of the issues and challenges that the education sector faces. Despite calls from many reports, research, and mathematics organizations to contextualize mathematics, many schools continue to present mathematics as abstract, decontextualized problems. Therefore, one of the challenges is to come up with strategies and methods for getting the students involved in authentic, real-world numeracy assignments and activities. As previously mentioned, one of the keys to being numerate is the ability to take a real-world problem or scenario, dig out the arithmetic, and present it as a mathematical problem to answer. This suggests that either the actual world is brought into the math classroom, or there is a need to take the students outside to conduct some mathematical studies.

3. Research methods

3.1. Research design

The researcher employed a quasi-experimental design to demonstrate causality or the effect of an independent variable on the dependent variable, since the researcher evaluates the efficacy of treatment, quasi-experimental studies are beneficial. In addition, the researcher cannot create groups in advance for the experiment, the researcher must assign individuals to groups, but not at random [6].

When conducting a quasi-experiment, contrary to "true" experiments in which treatment allocation is decided randomly, the dependent variables are observed in the experimental and control groups before the intervention [6,28]. The selection of the experimental and control groups lacked randomization. The 50-30-20 exercise was thereafter presented to the experimental group. An evaluation of the intervention's effectiveness was then conducted with both groups using a post-test.

3.2. Study respondents and sampling method

In addition, 40 Grade VII learners from one of the sections in the Grade 7 level, totaling 298 learners, participated in it.

The researcher viewed purposive sampling as a non-random sample strategy. Finding examples, people, or groups most suited to aiding the researcher in answering the study question was the primary objective of purposive sampling. To find people in the population who were likely to have particular traits or experiences, the researcher set out to identify them. The researcher could then choose the people or situations relevant to the study, narrowing the sample size [29]. Purposive sampling worked best when a researcher wished to focus intently on relatively small samples.

3.3. Instrument

As the instrument for this experimental study, the researcher used an adapted survey questionnaire to measure the 50-30-20 exercise materials and a standardized pretest-posttest design. Some mathematics experts, including Master Teachers and the Education Program Supervisor of the Schools Division Office of Sta Rosa City, validated the content of this instrument. Additionally, a reliability test using Cronbach's Alpha for the survey questionnaire and Kuder-Richardson-20 (KR-20) was utilized since the data consisted of binary items. To assess the internal consistency of the instrument, the KR-20 value turned out to be 0.84; since this was good, it indicated that all items in the pretest-posttest instrument did not need to be revised or rejected.

On the other hand, the item difficulty index was administered to measure the proportion of respondents who answered correctly. The result of 50 out of 50 item questions showed that the level of difficulty is average, indicating that all respondents feel that the items were neither very easy nor very hard. Moreover, the item discrimination index was administered to measure how adequately an item separates or discriminates between

high and low scores on an entire test. The result of 44 out of 50 items in the pretest-posttest instrument, which ranged from 0.30 to 0.70, indicated that the items were very good and did not need to be reviewed or discarded; however, 6 out of 50 items in the test needed to be revised, as the results of those items did not meet the indication of being good items. Hence, the researcher revised the six items, and the results ranged from 0.30 to 0.70, indicating that the six items were very good.

On the other hand, the contents were the lessons and topics in real numbers under the first quarter period with the six most essential learning competencies: (1) Describes principal roots and tells whether they are rational or irrational; (2) Determines between what two integers the square root of a number is; (3) Estimates the square root of a whole number to the nearest hundredth; (4) Plots irrational numbers (up to square roots) on a number line; (5) Illustrates the different subsets of real numbers; (6) Arranges real numbers in increasing or decreasing order. Likewise, a teacher-made formative test by the researcher aligned to the most learning competencies and the budget of work (BOW).

3.4. Data collection

The results of the first quarter of Mathematics 7 in the academic year 2022–2023 were used to conduct a needs analysis by the researcher. It displayed a mean percentage score of 33.45%, indicating that learners in Grade 7 performed poorly. However, since Grade 8 learners were in Grade 7 during the previous school year, the researcher decided to undertake the same examination there to see if the issue persisted in 2023–2024. He discovered a mean percentage score of 28.45%, indicating poor performance, and concluded that the issue still exists in this academic year.

With this information and its interpretation, the researcher presented the 50-30-20 exercise modeled after many businessmen's financial budgeting techniques. This is a strategy for assessing learners' mathematical performance in which 50 represents 50% of the formative assessment coming from the teacher's current topic/session, 30% from the most recent topic/lesson, and 20% from the previous lesson. Moreover, it aimed to examine the mathematical performance of Grade 7 Learners using the 50-30-20 exercise, specifically to determine the learners' pre-test and post-test mean scores; determine the significant difference between the pre-test and post-test results; evaluate learners' exercises; and propose enhanced exercises.

Additionally, the researcher received official approval to carry out the study from the principal of Sinalhan Integrated High School. He also spoke with the principal about the specifics and procedures of the administration. In the first quarter of the school year 2023–2024, the study was given to learners in Grade 7. Further, the researcher developed a pretest-posttest instrument to measure the academic performance of the participants, and it underwent a series of validations by some experts in the field of mathematics and a language expert. After the validation of the instrument, it underwent a reliability test to measure the internal consistency and relationship of each item to one another. The researcher pilot-tested the instrument with non-participants of grade 7 students, and the results showed very good items in the discrimination index and average items in the difficulty index. Also, Kuder-Richardson-20 (KR-20) was administered and revealed that all items were good.

Furthermore, the researcher viewed purposive sampling as a non-random sample strategy. Purposive sampling selected the situations, people, or groups that would best aid the researcher in answering the research topic. This allowed the researcher to choose the people or situations that were relevant to the study, concentrating on a small sample [29].

Likewise, the comparison group used a standard formative assessment, while the experimental group used the 50-30-20 exercise approach that was in line with the Curriculum and Learning Management Division (CLMD) Region 4a Budget of Work. Accordingly, a 50-item pretest-posttest instrument was given to the two

groups of learners. The mean scores from the pre-test, formative test, and post-test were encoded, tabulated, and interpreted.

3.5. Data analysis

The collected data underwent presentation, interpretation, and analysis through various statistical methods. Initially, a reliability test (Kuder-Richardson 20, Difficulty Index, and Discrimination Index) was conducted to assess the instrument's internal consistency for both the pre-test and post-test. Subsequently, a comparison of the pre-test, formative test, and post-test results of both participant groups was carried out using mean and standard deviation.

In exploring the distribution of the data, Shapiro-Wilk's normality test was employed to verify whether the sample data originated from a population with a normally distributed population. This test examined the degree to which the sample data fits a normal distribution.

To identify significant differences between the learners' pre-test and post-test mean scores in both the experimental and comparison groups, paired t-test analysis was applied. Additionally, Cohen's D effect size was utilized for comparing the experimental and comparison groups, offering a standardized representation of the difference between the two means.

3.6. Ethical considerations

The school head sent a letter of authorization to the researcher, outlining the strict application of the study's voluntary participation, informed parental consent letter, anonymity, confidentiality, risk of damage, and results-sharing requirements. The research was done with Grade 7 learners in the 2023–2024 academic year.

The moral guidelines were developed for the study period, constantly preserving the dignity and well-being of the learners. The learners approved the researcher's approval to use their real names in the research report, and the study's research data were kept confidential at all times.

4. Results and discussions

4.1. Performance of students in pre-test and post-test

Assessing learners' mathematical performance is an important part of determining whether a teaching strategy is appropriate and effective. Pre-test and post-test scores were used to identify the performance of students in the experimental group before and after the intervention in this study. The study's goal is to examine the mathematical performance of Grade 7 students, specifically the pre-test and post-test performance results for the 50-30-20 exercise.

Table 1. Pre-test and post-test results

Test	Mean	Standard deviation
Pre-test	17.47	3.074
Post-test	20.50	3.979

The results showed that the post-test had a higher mean score of 20.50 than the pre-test, which indicates that the experimental group performed well during the experimental period. This finding supported Brown's claim about assessment and improvement as a predictor of assessment practices to improve teaching and identify learners' needs in each competency of mathematics [8]. Furthermore, it implies that the learners were

able to comprehend a problem situation, its tasks, and questions to justify and explain a solution when using this mathematical content knowledge and tools to solve specified problems [3,25].

The table indicated that in the pre-test, 47.5% of the participants scored below the mean, 22.5% scored within the mean, and 30% scored above the mean. This finding aligns with the OECD study, which reported that Filipino children's academic performance ranked among the lowest in PISA 2018 [3]. In mathematics, less than 20% of learners displayed the required proficiency level (Level 2), with over 50% performing below Level 1.

However, the noteworthy post-test results revealed that 17.5% of the participants scored below the mean, 44% scored within the mean, and 38.5% scored above the mean. This outcome supports Suurtamm *et al*.'s study [20], suggesting that through regular exercises and assessments, teachers can identify the next steps in their lessons and strategize approaches to address the individual learning needs of each student. These regular exercises and assessments enable specialized attention for learners progressing more slowly than their peers.

The outcomes of both the pre-test and post-test revealed positive performance among learner participants, as evidenced by a higher mean score in the post-test compared to the pre-test. Additionally, to enhance comprehension and success in new mathematics lessons and topics, learner-participants were regularly apprised of prerequisite themes in each class. This approach not only makes restorative discussions more engaging for both teachers and students but also aids slow learners in understanding key concepts for the next level.

As asserted by David and Reyes [16], Pagaran *et al*. [21], and Patey [26], students may struggle with tasks such as adding fractions or recognizing common denominators if they lack proficiency in basic multiplication and addition. Therefore, learners must be aware of essential topics to comprehend the material and succeed in new mathematics lessons and topics.

Table 2. Test of significant difference between the pre-test and post-test

P-value	Computed value	Decision on H_0	Verbal interpretation	Cohen's D	Effect size
0.000**	-3.702	Reject H_0	Significant	0.852	Large

**Highly significant at 0.05 level. Wilcoxon signed-rank test. Cohen's D: 0.20 (Small); 0.50 (Medium); 0.80 (Large).

The table disclosed a noteworthy finding, indicating a significant difference between the pre-test and post-test scores of learner participants. This outcome was substantiated by Cohen's D effect size, which suggested a substantial effect. The implementation of the 50-30-20 exercise not only enhanced student engagement but also provided teachers with the means to strategize and guide their lessons, tailoring goals for individual students.

Moreover, this remarkable outcome aligns with the findings of Suurtamm *et al*. as well as Reimann and Sandler [20,23], supporting their claim that the progression of learning in the classroom and school hinges on classroom exercises and assessments. Additionally, the results are consistent with the studies of Cerbito and Menéndez *et al*. [6,7], which emphasized that numeracy assessments gauge students' understanding of mathematical language, concepts, and skills, highlighting what is necessary for outstanding performance and recognizing the importance of prerequisites. Such insights can lead to essential adjustments in teaching and learning methodologies or simply depict the developmental trajectory of students over time [10].

Similarly, the findings demonstrate that the 50-30-20 exercises effectively support students in generating, applying, and understanding mathematical operations rooted in fundamental mathematical skills. These skills encompass the capacity to recognize a problem situation, formulate a solution, justify, and explain it, translate the problem and its quantities into a mathematical form, and apply mathematical tools and content knowledge to solve problems and communicate outcomes [3,25]. The Department of Education concurs with the research findings, emphasizing that for students to progress to the next lesson and grasp the content, they must

comprehend the prerequisites for each topic [27].

4.2. Evaluation of learners' exercise

Equally vital alongside students' test scores for evaluating their performance in mathematics concerning the implementation of 50-30-20 exercises is their perception of this numeracy enhancement strategy. Learner participants evaluate how the mentioned exercises improved their understanding and problem-solving skills, aiding them in grasping mathematical concepts. This evaluation is conducted through a ten-item survey questionnaire, and the mean of their responses is calculated and verbally interpreted.

Table 3. Learner's performance self-evaluation results

Research Statement	Mean	Standard deviation	Verbal interpretation
1. The 50-30-20 exercise has significantly improved my understanding of mathematical concepts.	3.70	0.464	SA
2. I find the 50-30-20 exercise highly engaging and interactive.	3.70	0.464	SA
3. The 50-30-20 exercise has substantially enhanced my problem-solving skills in mathematics.	3.70	0.464	SA
4. I prefer the 50-30-20 exercise over conventional methods for learning mathematics.	3.55	0.504	SA
5. The 50-30-20 exercise has improved my confidence in my mathematical abilities.	3.58	0.501	SA
6. I believe that the 50-30-20 exercise is effective in promoting active learning and participation.	3.48	0.506	SA
7. The 50-30-20 exercise has made me more interested in studying mathematics.	3.53	0.506	SA
8. I have found the 50-30-20 exercise helpful in developing my teamwork and collaboration skills.	3.65	0.483	SA
9. The 50-30-20 exercise has positively affected my academic performance in mathematics.	3.67	0.474	SA
10. The 50-30-20 exercise should be integrated more widely into mathematics education.	3.67	0.474	SA
Overall Mean	3.80	0.405	SA

Scores: 3.26–4.00 Strongly agree (SA); 2.51–3.25 Agree (A); 1.76–2.50 Disagree (D); 1.00–1.75 Strongly disagree (SD).

Assessing the performance of the learners in mathematics is a crucial part of determining whether a teaching strategy is appropriate and effective. Relative to this study, the performances of the students in the experimental group before and after the intervention were identified through pre-test and post-test scores. The study aims to examine the performance of Grade 7 learners in mathematics, specifically to determine the pre-test and post-test performance results for the 50-30-20 exercise.

Furthermore, these results support the assertions of Panadero *et al*. [30], who claimed that self-assessment has a positive impact on academic achievement, self-regulation, and motivation to learn. Additionally, self-assessment can enhance students' commitment to and autonomy in learning [30]. It involves students reflecting on the quality of their work, assessing the extent to which it aligns with explicit goals or standards, and making adjustments accordingly.

According to the results, self-assessment implies a process of decision-making based on data gathered

from assessing learning outcomes [17]. Teachers conduct regular assessments to determine the next steps in their lessons, with the support of Suurtamm *et al*. [20]. Balagtas *et al*. asserted that learning is evaluated based on outcomes, function, and self-evaluation, and teachers use self-assessment strategies to evaluate learners' progress [24]. Therefore, self-evaluation tends to have a favorable impact on student's academic performance since it gives students control over their learning process and assessment criteria.

5. Conclusions

Based on the findings of this study, the researcher's conclusions are generated:

(1) The participants' pre-test mean score was 17.47, with a standard deviation of 3.074 and a mean percentage score of 34.95. This suggested that the participants had a low mastery level in mathematical performance before the intervention, in accordance with DepEd Memorandum No. 160 s. 2012. Additionally, 47.5% of the respondents scored below the mean, 22.5% scored within the mean, and 30% scored above the mean. In contrast, the participants' post-test mean score was 20.50, with a standard deviation of 3.979 and a mean percentage score of 41.00. This indicated that the participants achieved an average mastery level based on the aforementioned memorandum. The positive results demonstrated that in the post-test, 17.5% of the respondents scored below the mean, 44% scored within the mean, and 38.5% scored above the mean. Therefore, the intervention using the 50-30-20 exercise had a significantly positive impact on the mathematical performance of the participants.

(2) To compare the two means of this study, data analysis using the Wilcoxon signed-rank test indicated a significant difference between the participants' pre-test and post-test mean scores, with a probability value of 0.000. The result validated the initial objective and showcased the participants' noteworthy and favorable performance, which was further supported by the results of the effect size measured by Cohen's D.

(3) The participants' perceptions were assessed through self-evaluation, enabling the researcher to identify gaps in the research and understand how this study contributed to enhancing their mathematical performance. Based on the results, a significant majority of the participants strongly agreed that the 50-30-20 exercises improved their understanding and problem-solving skills, along with their ability to grasp mathematical concepts and enhance their overall mathematical performance.

(4) Exercises 50–30–20 assisted students in understanding mathematics lessons 7 and offered guidance for the regional education development plan 2023–2028, emphasizing the acquisition of numeracy standards and the application of 21st-century skills to various real-life situations. This approach to exercises also evaluated learning outcomes for students in underprivileged circumstances and at each significant stage of transition. Furthermore, the researchers proposed that this technique be implemented across the entire school as one of the teaching-learning strategies to address the existing numeracy deficit and enhance the quality of education.

6. Recommendations

Mirroring the conclusions of this study here were the recommendations and/or suggestions of the researcher.

(1) Students may use this as a learning strategy to understand the present lessons based on the previous lessons they had, to improve their performance in mathematics and other subjects.

(2) Mathematics teachers may keep track of the student's progression by using 50-30-20 exercises to continuously diagnose the mathematical skills and performance of the students alongside the

improvement of every student and the strategy itself, and therefore accommodate those needs within the classroom.

(3) The Mathematics Education Program Supervisor may consider this study to strategize teaching mathematics to 21st-century learners as it aligns with the SDO Sta Rosa City Division Education Development Plan 2023-2028 in the numeracy program Math TRAIL (Teacher Relevant Activities in Improving Learning); Tayo ng Magbilang.

(4) Researchers may explore more about the study and may use it as one of the references in conducting more studies related to 50-30-20 exercises; likewise, this can be an edge for new researchers in verifying existing knowledge.

(5) Further study may be conducted since the scope of this study covered only the selected competencies in the first quarter period of Mathematics 7 and for Grade 7 learners only at a certain school.

Disclosure statement

The author declares no conflict of interest.

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