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EFFECTIVENESS OF 3Rs TECHNIQUE IN SUBTRACTING AND REGROUPING FRACTIONS AMONG GRADE 5 PUPILS

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ABSTRACT

Improvement of learners' numeracy skills is one of the focuses in the resumption of in-person class as this is observed as a big challenge where learners perform very low in mathematics as gleaned from the feedback of teachers. Hence, this study determined the effectiveness of **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) in enhancing the skill of the grade 5 pupils of Concepcion Elementary School in subtracting of fractions and mixed fractions with regrouping. Pretest - Posttest Experimental Research design was used in this action research. It employed total enumeration sampling technique in the form of taking the 38 grade 5 pupils who did not master the competency as participants of this study. The statistical tools used were mean, standard deviation, paired sample t-test, and Cohen's d. The results revealed that there is a significant difference in the scores of the respondents before and after the implementation of the intervention. The effect size of the intervention was huge as manifested by the result of the Cohen's d. The thematic analysis tells that the intervention is motivational, helpful and enjoyable. Therefore, it is recommended that **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) be used as additional teaching reinforcement in addressing least learned competency in mathematics particularly on subtracting of fractions and mixed fractions with regrouping. Moreover, it is recommended that the intervention will also be adopted by Mathematics teachers as this can be helpful in addressing their pupils' difficulty on subtraction of fraction with regrouping.

Keywords:*numeracy skill, challenge, focus*

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I. CONTEXT AND RATIONALE

Improvement of learners' numeracy skills is one of the focuses in the resumption of in-person class as this is observed as a big challenge where learners perform very low in mathematics as gleaned from the feedback of teachers.

Mathematics plays a big role in developing human thoughts, bringing strategic, systematic reasoning processes used in problem analysis and solving which helps people to be able to anticipate, plan, decide, and properly solve each problem in daily life, (Mingke & Alegre/2019). However, Mathematics teachers find most of their students to have low achievement level in mathematics, especially with their topic on fractions.

Fractions are widely used in the world of mathematics; however, learners find them very difficult to understand. This may be because fractions are one of the most chronically troublesome areas in mathematics for children and adults alike. Students find them difficult to learn, while teachers find them difficult to teach (Parungao, 2021).

According to Gagani (2019), learning fractions are one of the mathematics fundamentals that learners must possess; however, many learners impartially understand in applying its procedural mechanism and the essential concepts needed to implement it in making sense to quantifiable ideas entirely. Meanwhile, Namkung & Fuchs (2019) disclosed that competence with fractions is foundational to acquiring more advanced mathematical skills but this is challenging for many students and many teachers as they often experience gaps in their own fractions of knowledge.

According to Ibañez and Pentang (2021), it seems an ordinary scene in the Philippines that teacher education learners have poor conceptual understanding of and negative attitude towards fractions. They also mentioned the citation of Cantoria (2016) that the study of fractions starts as early as first grade; in spite of the regular rehearsal of this mathematical topic through secondary school level, many learners reach college without showing adequate skills in fraction. Parungao (2021) suggested in her study that teachers should discover a solution to deal with these issues in order to positively influence learners' mathematics achievement and also their attitude in dealing with fractions like the integration of

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manipulative into classroom discussions to help learners deepen their understanding about the different mathematical concepts and improve mathematical skills.

In the context of Concepcion Elementary School, performing fraction is also one of the challenges encountered by the Grade 5 pupils. As shown from the results of their summative test, out of 38 pupils, 21 garnered 74% and below on the competency "Subtract fractions and mixed fractions with regrouping M5NS-Ie-84" which is considered least mastered skill. If this will not be mastered, then the pupils may find total difficulties in performing fractions. Hence, this action research was conducted to improve the skill in subtracting fractions and mixed fractions with regrouping through the intervention called **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify).

II. PROPOSED INNOVATION, INTERVENTION AND STRATEGY

3Rs Technique (**R**ewrite, **R**ename, **R**egroup & **S**implify) is an intervention that enhanced the skills on performing subtraction of fractions and mixed fractions with regrouping of the grade 5 pupils which was done in 12 weeks upon approval of this proposal through in-person class which was held every 4:00 to 5:00 in the afternoon every Tuesday and Thursday.

This **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) was anchored on the theory of Cognitive Psychology Approach where cognitive and metacognitive strategies enhance learning and improve performance as stressed by Mingke & Alegre (2019) in their study where pupils need to apply reasoning strategies of goal and sequences of mental operation in order to learn and solve word problems. It also involved games. Galsim and Garin (2018) cited that effective teachers use techniques that have each learner working on tasks that engage and challenge them to achieve their personal best and they suggested that teachers should use games in teaching Mathematics.

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May 2024
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Hence, the figure below shows the process of the intervention:

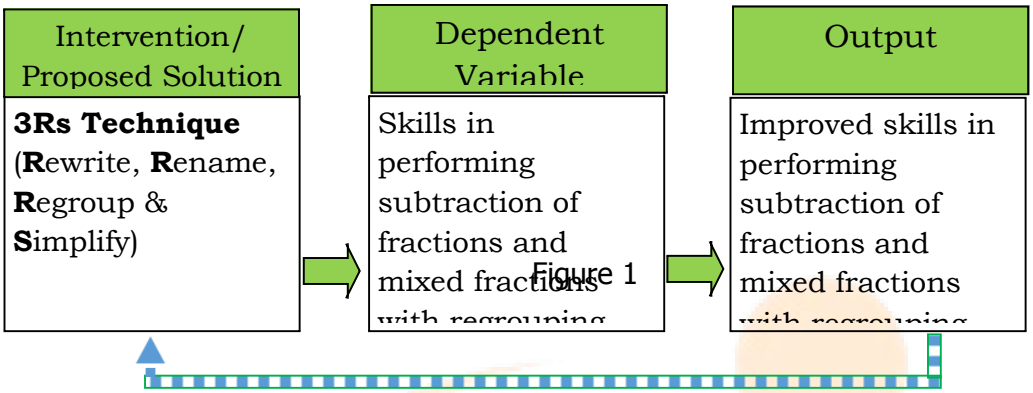

Figure 1

As shown in Figure 1, the intervention or proposed solution in this action research is called **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) to improve the dependent variable or problem which is the skills in subtracting fractions and mixed fractions with regrouping and the expected output is the mastery of the said competency.

3Rs Technique started with **Rewrite** activity where the fractions were rewritten vertically to be easier to look for the least common denominator, then **Rename** them to make them have similar denominator, **Regroup** and solve or subtract, then **Simplify**. When the pupils remember these **3Rs,** they were able to remember the steps in subtracting fraction and mixed fraction with regrouping. **3Rs Technique** also involved games using playing cards. There were two players or two groups, the fraction cards were shuffled. Both players draw one card. The player who gets the lowest fraction subtract the fraction from the opponent and give the correct answer. As they play, they are able to master the operation.

The materials of this intervention were quality assured first by the School Quality Team before its utilization.

Monitoring was done by the proponent and the School Monitoring Team to ensure the proper use of the intervention and to address issues and concerns that may arise.

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III. ACTION RESEARCH QUESTIONS

This action research attempted to test the effectiveness of using **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) in enhancing the skills on performing subtraction of fractions and mixed fractions with regrouping of the grade 5 pupils of Concepcion Elementary School.

More specifically, this sought to provide answers to the following problems:

1. What are the pre-test and post-test mean scores of the pupils before and after **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) was utilized?
2. Is there a significant difference of the mean scores before and after the **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) was conducted to the grade 5 pupils?
3. What is the effect size of **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify in enhancing the skills in subtracting fractions and mixed fractions with regrouping of the grade 5 pupils?
4. What plan of action can be done to enhance the intervention based from their experiences on its utilization?

IV. ACTION RESEARCH METHODS

This study used the Pretest - Posttest Experimental Research Design to find the effectiveness of **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify)**.** According to Zach (2020), pretest-posttest design is an experiment in which measurement are taken on individuals both before and after they are involved in some treatment.

a. Participants and/or other Sources of Data and Information

The study was conducted to the Grade 5 pupils of Concepcion Elementary School from Nov. 2022 to May 2023 employing purposive sampling technique in the form of taking the 38 Grade 5 pupils who did not master the competency as participants of this study.

b. Data Gathering Method

The research used primary data specifically the mean scores to be taken in the pretest

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May 2024
Available online at https://www.instabrightgazette.com

and posttest before and after the conduct of the intervention.

After the quality assurance of the instruments of the intervention, pre-test was administered in in-person class. The test papers and answer sheets were retrieved, checked and scores were recorded by the proponent. After the pre-test, **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) were employed to the pupils to enhance their skills in performing subtraction of fractions and mixed fractions with regrouping. After the implementation of the intervention, parallel test was given to the same number of pupils to find out if there is significant change in their scores. Interview was also conducted to the pupils about their experiences on their utilization of the intervention.

Below is the table schedule for the data gathering activities:

Table 1: Schedule of Data Gathering Activities

Data Gathering Activities	Date and Time	Person Involve
1. Development of the tool (manipulative materials and learning activity sheets)	Nov. 14-18, 2022	Proponent
2. Seek approval of the proposal	January, 2023	Proponent Research Committee
3. Validation of Research Tools	Feb. 6-17, 2023	Expert Teacher
4. Revision of the Instruments	Feb. 20-24, 2023	Proponent
5. Conduct of the pre-test	Feb. 28, 2023	Proponent Pupils
6. Implementation of the Intervention	March to April, 2023	Proponent Pupils
7. Conduct of the post-test	May 8, 2023	Proponent Pupils Parents
8. Interview with the select respondents	May 15, 2023	Proponent Pupils Parents

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May 2024
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c. Ethical Issue

To ensure the observance of ethical standards, the proponent followed a number of guidelines in research which are ethically sound. Initially the researcher obtained a formal approval to conduct the study from the District Quality Assurance Team and Schools Division Office. The researcher also got consent from parents and made it known to them that the participation of their children is indeed voluntary. All provisions were made to offer anonymity and confidentiality to all participants in this study.

d. Plan for Data Analysis

The data gathered from the pre and post tests were statistically treated using the following:

1) Mean and Standard Deviation were computed to describe the overall level of mastery of the pupils. This answered problem number 1 in the research question;
2) Paired t-test was used to determine the significant difference of the scores before and after the implementation of the intervention which answered Question Number 2;
3) Eta^2 using Cohen's d was used to evaluate the effect size of **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) in enhancing skills in subtracting fraction and mixed fraction with regrouping of the grade 5 pupils which answered question number 3; and
4) Thematic analysis was used to describe the experiences of the pupils as basis in crafting the plan of action for the enhancement of the intervention which answered question 4.

V. DISCUSSIONS OF RESULTS AND REFLECTION

The following presentations show the tables and textual presentations of the data gathered in this action research.

Table 1. The Pretest and Posttest Mean Scores of the Grade 5 Pupils before and after the utilization of **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify)

INSTABRIGHT e-GAZETTE
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Volume V, Issue IV
May 2024
Available online at https://www.instabrightgazette.com

Test	N	SD	M	Descriptor
Pretest	38	4.14	12.0	Very Low Mastery
Posttest	38	5.15	33.5	High Mastery

As shown in the table, the mean score of the grade 5 pupils during the pretest is 12.0 with SD of 4.14 which is described as "very low mastery" while in the posttest, after their utilization of the intervention, they obtained a mean of 33.5 and SD of 5.15 described as "high". This shows an improvement level of the pupils from pretest to posttest in subtraction of fractions and mixed fractions with regrouping after utilizing **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify). Result corroborates with the suggestion of Parungao (2021) that teachers should discover a solution for students in dealing with fractions like the integration of manipulative into classroom discussions to help students deepen their understanding about the different mathematical concepts and improve mathematical skills.

Table 2: Paired Sample t-Test on the Significant Difference between the Pretest and Posttest Mean Scores of the Respondents

Test	N	df	t-value	p-value 0.05	Significant Difference
Pretest - Posttest	38	37	-27.1	.001	Significant

The table presents the results of the Paired sample t-test on the significant difference on the pretest and posttest scores of the grade 5 pupils displaying a t-value of -27.1 with p-value of 0.001, lower that 0.05 p-value which is interpreted as significant. This result advocates that **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) is effective in increasing the level of mastery of the Grade 5 learners in enhancing the skills in subtracting of fractions and mixed fractions with regrouping. Result supports the claim of Mingke & Alegre (2019) on the

INSTABRIGHT e-GAZETTE
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Volume V, Issue IV
May 2024
Available online at https://www.instabrightgazette.com

effectiveness of Cognitive Psychology Approach where pupils need to apply reasoning strategies of goal and sequences of mental operation in order to learn and solve word problems.

Table 3. The Effect Size of the **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify)

n	t-value	Cohen's d	Remarks
38	-27.1	4.40	Large Effect

Table 3 shows the effect size of **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) as it generated a Cohen's d of 4.40 which signifies not just large but huge effect, thus the intervention made huge effect in improving the mastery level of the Grade 5 Learners in subtracting of fractions and mixed fractions with regrouping. Result agrees with the citation of Galsim and Garin (2018) that teachers should use games in teaching Mathematics.

RQ 4: What plan of action can be done to enhance the intervention based from their experiences on its utilization?

Based from the results of the interview from the pupils regarding the utilization of the intervention, the following themes were concluded: 1) Motivational. The activities motivated them to learn how to subtract fraction and mixed fraction because of the games they played. 2) Helpful. The 3Rs Technique reminded them on the steps to do in order to subtract fraction. 3) Enjoyable. They enjoyed doing the activities while enhancing their skill in subtracting fraction. Hence, the plan of action that will be done to improve the intervention is to enhance the materials so that the pupils will be more motivated to master the skill in subtracting fraction and mixed fraction and more games will be prepared to make them enjoy more in learning the competency.

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May 2024
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CONCLUSION & RECOMMENDATION

Based on the abovementioned findings of the study, the following conclusions and recommendation were drawn.

1. The performance of the grade 5 pupils in subtracting fractions and mixed fractions with regrouping as shown in the pretest was very low however when they were exposed to the utilization of the intervention **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify), their performance became high which shows improvement of mastery. Hence, it is recommended that this intervention be sustained in addressing a least learned competency such as this subtraction of fractions and mixed fractions with regrouping.
2. There is a significant difference between the pretest and posttest scores of the grade 5 pupils which tells that **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) is effective in improving the skills in subtracting of fractions and mixed fractions with regrouping of the learners. It can be suggested that the intervention's materials be improved to gain more improvement in the performance of the pupils in addressing their least learned competency in fraction.
3. **3Rs Technique** (**R**ewrite, **R**ename, **R**egroup & **S**implify) has a huge effect in the performance of the grade 5 pupils in subtraction of fractions and mixed fractions with regrouping. This recommends the utilization of the intervention to improve the said skill.

VI. Plans for Dissemination and Utilization

Results of the study will be beneficial to the improvement of learning outcomes in the school particularly on the subject Mathematics, hence this will be disseminated through various activities such as:

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Volume V, Issue IV
May 2024
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Activities for utilization and Dissemination	Timeframe	Resources Needed
1. School's LAC Sessions	Dec, 2022	Manuscript of completion & materials
2. School and District Convergence	As scheduled	Powerpoint presentation and flyers
3. Division /Regional/National International Research Conference	As scheduled	Powerpoint presentation and flyers
4. Journal Publication	As scheduled	Manuscript in AIMRAD
5. Research Meetings, Trainings, Foras	As scheduled	Powerpoint presentation and flyers

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Volume V, Issue IV
May 2024
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VII. Financial Report

Activity	Item Description/ Particular/Needs	Cost	Total Amount
1. Development of the tool (manipulative materials, LAS etc)	Bondpaper Ink black Ink colored Folder Fastener	250 250 500 10 50	250 250 500 50 50
2. Request for the approval of the proposal	Travel Allowance		500
3. Validation of Research Tools			
4. Revision of the Instruments	Bondpaper Folder Fastener	250 10 50	250 50 50
7. Conduct of the pre-test	Photocopy of test papers	10	180
8. Implementation of the Intervention	Travel allowance		1000
9. Conduct of the post-test	Photocopy of test papers	10	180
10. Interview with the select respondents	Travel allowance		1000
11. Conduct of data analysis			
12. Finalization of research manuscript	Bondpaper Ink black Ink colored Folder Fastener	250 250 500 10 50	250 250 500 50 50
13. Approval of Research	Travel allowance		500
14. Binding of Research	Bookbind	200	2000
		Total	7910.00
		Source of Fund	Personal

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Stat using Jamovi

Paired Samples T-Test

Paired Samples T-Test

			statistic	df	p		Effect Size
B	A	Student's t	27.1	37.0	< .001	Cohen's d	4.40

Note. H_a $\mu_{\text{Measure 1 - Measure 2}} \neq 0$

Normality Test (Shapiro-Wilk)

			W	p
B	-	A	0.966	0.287

Note. A low p-value suggests a violation of the assumption of normality

Descriptives

	N	Mean	Median	SD	SE
B	38	33.5	33.0	5.15	0.835
A	38	13.0	12.0	4.14	0.671

Legend

A is the Pretest

B is the Posttest