

Enhancing Mathematical Skills on Rational Algebraic Expressions through Contextualized Activity Sheets cum Video

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ABSTRACT: This action research examined the effectiveness of Contextualized Activity Sheets cum Video in enhancing the mathematical skills on rational algebraic expressions of Grade 8 learners of Itawes National Agricultural and Technical School Main using quasi experimental design particularly the One Group, Pretest – Posttest Design. Purposive sampling was employed in the selection of the participants. Findings of this study revealed that there is an increase in the performance of the learners as shown in the mean and standard deviation of their pretest and posttest and that there exists a significant difference between the results. Furthermore, the result reveals that there is a huge effect of the strategy in the performance of the participants as shown by Cohen's computed value. It is therefore recommended that Mathematics teachers may utilize the Contextualized Activity Sheets cum Video in teaching rational algebraic expressions to improve the performance of the learners in Mathematics, and conduct similar study in other subject areas for further validation and improvement of the Contextualized Activity Sheets cum Video. Also, to sustain the utilization and dissemination of the intervention, there must be a continuous and strong partnership and linkages with parents, teachers, stakeholders, and other DepEd officials.

KEYWORDS -Contextualized Activity Sheets, Least learned competencies, Rational Algebraic Expressions, Video

I. INTRODUCTION

Mathematics has been regarded as very essential in our daily lives because generally it has a wide range of applications in our life. One can't imagine the world without Math. However, Math is also known as the most challenging subject to learn among many students worldwide. Students find difficulty in embracing the said subject. Much more nowadays that face-to-face learning is not allowed, how could the students love more the subject? How could the teachers deliver and make their teaching enjoyable and interesting despite this pandemic?

In the "Principles & Standards for School Mathematics (PSSM)", the National Council of Teachers of Mathematics (NCTM) promotes sound teaching methods, without prescribing a one-size-fits-all approach. The NCTM wants teachers to be able to use their professional judgment in choosing teaching techniques. They favor professional development opportunities in both mathematics (content) and in effective teaching techniques (methods).

In today's educational setup where teaching and learning process totally change into new set up, teachers really have to adopt varied strategies in order to deliver quality education. DepEd Order No. 18, s. 2020 states that the

Department of Education should still be innovative and resourceful in delivering quality, accessible, relevant, and liberating education despite the public health emergency brought about by the COVID-19.

Moreover, Section 2 of Republic Act No. 10533 mandates that the State shall establish, maintain and support a complete, adequate, and integrated system of education relevant to the needs of the people, the country and society-at-large. Likewise, it is hereby declared the policy of the State that every graduate of basic education shall be an empowered individual who has learned, through a program that is rooted on sound educational principles and geared towards excellence, the foundations for learning throughout life, the competence to engage in work and be productive, the ability to coexist in fruitful harmony with local and global communities, the capability to engage in autonomous, creative, and critical thinking, and the capacity and willingness to transform others and one's self.

Subsequently, Filipino learners are also envisioned to become globally competitive and at par with students in other countries. However, many learners fail in completing relevant requirements thus getting low performances in academics, logical and abstract related skills specially on science-related disciplines (Salviejo, 2014). In 2018, Filipino students ranked last among 79 countries in reading comprehension, and second lowest in both mathematical and scientific literacy in the Programme for International Student Assessment. (Trends in International Mathematics and Science Study, 2019).

In the learning process of Mathematics, there must be a lot of practice for every lesson until the learners will master the competencies. Varied exercises and problems must be provided for the learners for them to understand the concepts taught. As Edward Thorndike's Law of Exercise states that constant repetition of a response strengthens its connection with the stimulus while less practice weakens it.

In the context of Itawes National Agricultural and Technical School, for the previous school years, observations on the performance of Grade 8 learners in Mathematics have been a problem especially on the topic Rational Algebraic Expressions. This can be evident with the interviews conducted and with the MPS of their Periodical Examination. In addition, in their scores in the pretest incorporated in their Modules and Learning Activity Sheets this time of pandemic, out of the 126 Grade 8 students, 89 or 70.6% got a passing score and the other 37 or 29.37% got low scores. Also, the Mean Percentage Score of their First Grading Examination is 51.25% which is far beyond 75% as a passing mark. Based on the item analysis done, most of the topics which were least learned were on rational algebraic expressions. It is therefore quite sad that this topic has been a difficult and boring topic to the students and they are not well motivated on it.

Anent to this, one mode of strategy where teachers can help uplift the quality of education and help arouse students' interest towards mathematics especially in today's times is the adaptation of innovative and creative ways to create new ideas for learners to appreciate and be motivated in the learning process. One among these which could help cater the problem is the use of video instructions with the aid of contextualized activity sheets. It's no secret that video is everywhere in today's world, with the average eight–18-year-old consuming 6–9 hours of digital media each day and 71% of three–18-year-olds accessing and using the internet at home*. But did you know that according to research (Kaltura 2018), 70% of educators use video in the classroom multiple times per week? With 92% of students and 83% of teachers reporting that videos have a positive impact on their classroom experiences, there's no denying that videos are being used for teaching more than ever in today's classrooms.

In the "Cognitive Theory of Multimedia Learning of Mayer", it describes how learners build mental representations of multi-media materials. The theory explains that students learn more deeply with a combination of words and pictures than with either words or pictures alone. Based on the theory, multimedia brings about meaningful learning, and meaningful learning can only be said to have been achieved if the learner can apply the knowledge of what he/she has learned in new situations. The Cognitive theory of multimedia learning presents an idea that care must be taken when designing multimedia instructions so that the multimedia elements are selected dynamically and organized to produce logical mental constructs.(Akinbadewa, Bukola Omowumi and Sofowora, Olaniyi Alaba, 2020).

Equally important, contextualized learning activity sheets, as it suggests, refers to teaching students the content in a context, i.e., embedding the concepts in meaningful activities and in a scenario that makes sense to the

students to enhance their understanding and to make the concepts more relatable. It is important to remember the skills that teachers want to teach to students, such as problem solving, analytical thinking or even dribbling a ball, do not exist in isolation; using purposeful contexts and learning activities, teachers can show students where these skills are applicable and why they should know them.

Cognizant to this, with the objective then to help learners better understand concepts on Rational Algebraic Expressions, it is in this premise where this action research “Enhancing Mathematical Skills on Rational Algebraic Expressions through Contextualized Activity Sheets cum Video” was conceptualized.

1.1. Innovation, Intervention and Strategy

“Contextualized Activity Sheets cum Video” was based on Edgar Dale’s Cone of Experience. Contextualized Activity Sheets was conceptualized and prepared by the proponent. Videos, on the other hand were downloaded directly from the different learning portals of the Department of Education and proper citations were given.

Videos downloaded on rational algebraic expressions were the basis in contextualizing activities for the said competency. There were 7 sets of contextualized activity sheets which were given to the learners. Learners were guided with the different parts. The first part was the Connecting with previous concepts, wherein learners were given activities to activate prior knowledge. Second part was Hoaning what was being connected. In here a video was given to firm up prior knowledge. Last was Assessing what has been learned through the aid of contextualized activity sheets. There was also a part where the learners write their reflection on the said activity sheets, wherein they will write what they learn and did not understand on the said competency.

Contextualized activity sheets were in the form of e-copy and hard copy alongside the video presented. It was answered by the learners in their comfortable pace as they watch the videos on the said competency. Additionally, this teacher-made Contextualized Activity Sheets were quality assured by the Master Teachers and the School Head.

On the other hand, the contextualized activity sheets cum video were given to the learners from August 23 –27 and August 30-September 10, 2021 and was accomplished from Monday to Friday (9:00 AM-10:00 AM). The video and activity sheets were sent through messenger apps, and other online platforms or via share it. Learners who don’t have any cellphones were visited by the proponent and let the students use the proponents’ laptop in watching the said videos.

During the implementation of the Contextualized Activity Sheets cum Video, the researcher sought the assistance of the parents or guardians. Outputs were sent everyday and corrections regarding the activities were discussed through messenger/phone call and were also written in the material and were given back for a better learning outcome. For the case of those who don’t have any phone, a home visitation was done to have a consistent monitoring of the said intervention.

Lastly, in the implementation of Contextualized Activity Sheets cum Video, certain precautions was followed as adhered to DepEd Memorandum No. 043 S.2020

1.2. Statement of the Problem

This research aimed to determine the effectiveness of Contextualized Activity Sheets cum Video in Enhancing Mathematical Skills on Rational Algebraic Expressions.

Specifically, it aimed to answer the following questions:

1. What are the scores of the participants before and after their exposure to Contextualized Activity Sheets cum Video?
2. Is there a significant difference between the pretest and post test scores of the participants after exposing them to Contextualized Activity Sheets cum Video?
3. What is the effect size of using Contextualized Activity Sheets cum Video to the participants?
4. What plan/activities should be done to sustain/improve and develop the Contextualized Activity Sheets cum Video?

II. METHODOLOGY

2.1. Research Design

The study made use of quasi-experimental design particularly One Group Pretest-Posttest Research Design as it involved only one group of struggling Grade 8 learners.

2.2. Participants of the Study/Sources of Data/Subjects of the Study

The participants of the study were the 13 Grade 8 struggling learners of Itawes National Agricultural and Technical School for the recent school year 2020-2021. Purposive sampling was used in choosing the participants. A total of 13 learners of which 8 are male and 5 female were the participants of the study.

2.3. Instrumentation

Questionnaire was used in the conduct of the study. It was a forty (40) – item multiple choice pretest/post test design prepared by the researcher. Questions that were asked in the pretest and post test were lifted from the sample questions that were suggested from the K-12 Mathematics 8 Teaching Guide and Learner's Module containing Rational Algebraic Expressions.

2.4. Data Collection Procedure

1. A permission to conduct study was requested from the School Principal.
2. Upon approval, parents were informed through a Phone Call, Meeting or Letter that their children were participants of the study. Likewise, the learners were informed through their parents that they become part of the study. Hence, parent's consent was secured from the parents to this effect.
3. Participants were asked to answer the pretest, through google form and messenger (for the case of those who have an access in the internet) and a hard copy for those who can't do otherwise.
4. Post test was given to the learners after all the contextualized activity sheets and videos were given to them. The same process was adopted during the administration of pretest.
5. The result of the pretest and posttest was recorded, analyzed, compared, interpreted to see if there is a significant difference; and if the performance of the participants improved or not.
6. Furthermore, confidentiality of the data/documents that were generated from the participants' written work outputs, and tests scores were highly ensured. All the data that were collected were solely used for the purpose of the study.
7. Authors of books, journals, publications as well as websites and from the internet which were used as references in the conduct of the study were properly acknowledged and cited.

2.5. Data Analysis

In analyzing the data gathered from the participants, the following statistical tools were utilized:

1. Mean and standard deviation was used to analyze the pretest and post test scores of the participants.
2. Paired sample t-test was used to test the significant difference between the pretest and post test scores of the participants.
3. Cohen's D was used to determine the effect size of the intervention to the group of learners using Sawilowsky parameter.
4. Thematics Analysis using SPATRES Format was used to plan the sustainability of the intervention.

III. RESULTS AND CONCLUSION

This study was carried out to determine the effectiveness of "Enhancing Mathematical Skills on Rational Algebraic Expressions through Contextualized Activity Sheets cum Video". As such, Mean, Standard Deviation, Paired Sample T-Test, Cohen's D and Thematic Analysis were the statistical tools used to ascertain the impact of the said intervention.

Table 1. Mean Pretest, Post test Scores of the Participants

Test	Mean	Standard Deviation
Pretest	8.54	2.67
Post test	18.69	5.68

Data on the table reveal that there is an increase in the post test scores of the learners and that scores are disperse to one another reflecting a heterogeneous performance among them. The intervention was able to augment the competencies of the learners after having been exposed into it. This implies that the use of Contextualized Activity Sheets cum Video has immensely increased the post test scores of the participants when compared to the results of the pretest. Moreover, the activities were likely to be engaging on the part of the learners that made their scores escalate.

Table 2. Test of Difference Between the Pretest and Posttest of the Participants

Test	Mean	Standard Deviation	t computed	critical value	p-value	level of significance	df	Statistical Inference
Pretest	8.54	2.67	-5.97	2.18	6.54E-05	0.05	12	Significant
Posttest	18.69	5.68						

It can be deduced from the table that there is a significant difference on the obtained scores of the learners after their exposure to Contextualized Activity Sheets cum Video at 0.05 level of significance. Learners achieved higher scores in the post test which reflects better performance for the learners. This implies that Contextualized Activity Sheets cum Video is a catalyst in enhancing the competency of Grade 8 learners on Rational Algebraic Expressions.

Narratives from the learners were jotted which reflects the way they were engrossed with the activities embedded in the learning intervention. Moreover, such activities were aligned to their learning styles that aided them to better comprehend the lesson with ease and precision. Nonetheless, learners enjoyed the sets of learning activities given to them which the researcher believes to be contributory to the desired improvement of post test scores.

The above finding is in consonance with the study conducted by Rudloff & Erez (2021) that teaching and learning videos enrich the teaching by using them in face-to-face or distance learning. On the other hand they also activate the students' auditory and visual sensory channels and students, which enables them to better process and retain the learning content can.

Additionally, the use of Videos as a learning resource favors the construction of knowledge in the processes of meaning negotiation by students for mathematics teacher (Oscar, 2021) and "Contextualized learning module is useful in enhancing students' performance". (Carreon et al., n.d.)

Table 3. Test of Effect Size

Test	Mean	Effect size	Descriptive value
Pretest	8.54	2.29	Huge Effect
Posttest	18.69		

Legend: 0.01-0.19- very small effect; 0.2-0.49-small effect; 0.5-0.79- medium effect; 0.8-1.19-large effect; 1.2-2.0 very large effect; above 2.0- huge effect (Sawilowsky Perimeter)

Results of Cohen's D analysis shows that there is a huge effect of Contextualized Activity Sheets cum Video in enhancing the competency of Grade 8 learners on Rational Algebraic Expression as shown by the computed value of 2.29. This means that Contextualized Activity Sheets cum Video is effective in enhancing the

competency on Rational Algebraic Expressions. This maybe attributed to the fact that the intervention was appreciated by the learners and that activities were interesting. It implies that Contextualized Activity Sheets cum Video has sustained the eagerness of learners in hurdling the least mastered competencies.

In the study, “Interactive Video Technology as a Mode of Teaching: A Qualitative Analysis of Nursing Students’ Experiences at a Higher Education Institution in Namibia” conducted by Roderos 2018, Interactive video technology (IVT) remains one of the common modes of teaching utilised by various higher education institutions (HEIs) across the globe with an aim of catering to ever-increasing educational demands.

Table 4. Activity Plan to Improve/Develop/Sustain the Utilization of the Intervention

STRATEGIES	PROGRAMS	ACTIVITIES	TASKS	RESOURCES		Financial	Timeline
				Physical/Human	Material		
To sustain the utilization of Contextualized activity Sheets cum Video	Research Development in Enhancing the Mathematical Abilities on Rational Algebraic Expressions through Contextualized Activity Sheets cum Video	Sustain the utilization of Contextualized Activity Sheets cum Video	Develop stronger partnership/linkage with stakeholders for further dissemination and utilization of Contextualized Activity Sheets cum Video	Proponent Professor Brgy Officials HPTA GPTA Other Stakeholders	Snacks	500	November 2021
			Disseminate the findings and results of the study	Proponent Professor Dean, Graduate Study Students Municipal Officials Brgy Officials HPTA GPTA SGC	Bond Paper	250	S.Y. 2021- 2022
			Seek donations from stakeholders for continuous implementation of the intervention	Proponent	Bond Paper	500	S.Y. 2021- 2022
			Fund the reproduction of the intervention as Supplementary Learning Materials for Learners to improve their academic performance	Proponent Donors School Head	Bond Paper Black Ink Magenta Ink Cyan	250 245 275 275 245 500	S.Y. 2021- 2022

					Ink Blue Ink		
			Submit letter of Adoption to the Dean of the Graduate Study	Proponent Teachers	Printin g	250	S.Y. 2021- 2022
		Total				3,290.0 0	

IV. CONCLUSION

Based on the results and findings, the result reveals that the post tests scores of the students are higher than the pretest. A significant difference is also evident in the computed value of t and there is a huge impact of the intervention in the performance of the learners. This implies that the Contextualized Activity Sheets cum Video is an effective strategy to enhance the competency on Rational Algebraic Expressions. In addition, students were able to gain more learning experiences which were supported by their responses on the survey conducted in the implementation of the said intervention.

Subsequently, this study also encountered limitations as to its conduct. First, students don't have their cellphone for the videos to be transferred. The proponent then asked for the neighbor to get the video needed in the study. Second, there were participants who got delayed in passing their outputs in the implementation of the intervention because they don't have guardians who can assist them in their lessons. They may have parents but the problem is, these parents are not capable of giving the needed assistance since some of them did not go schooling. Also, learners who are working just to help augment the needs of the family were hard up since their time were divided. Lastly, the presence of the Covid-19 pandemic. But as long as one wants to make a difference, nothing hard could impede the implementation of such intervention to the students even the Covid.

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