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Investigating the Impact of Conceptualized Games to Mathematical Competencies

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Abstract:

This research is about the impact of conceptualized games to mathematical competencies of the Grade IV Rizal of San Juan Elementary School year 2017-2018. Its prime objective was to investigate the impact of conceptualized game to the mathematical competencies of the pupils. Another objective of the study was to find out if there is a significant difference between the test scores of the pupils before and after the intervention. The researchers used pre-experimental method of research. The population consisted of 35 student respondents from the Grade IV Rizal of San Juan Elementary School year 2017-2018. The standardized test was utilized to collect data. The findings of the study revealed that the students' pre-test is at the satisfactory level and the post-test results are at the outstanding level. There is a significant difference between the test scores before and after the intervention. Based on the findings of the study the researcher recommended that for further improvement of the mathematical competencies of the pupils, more conceptualized games should be added and used.

Key words: conceptualized games, mathematical competencies, pre-experimental, pre-test, post-test

INTRODUCTION

"Math is a tool that clarifies thinking, decision making, and understanding everyday life. We are unconsciously using math all the time."

---Bev Stem

Game is a structural form of play usually under taken for enjoyment and sometimes used as an educational tool. It is an activity wherein the pupils develop their abilities, thinking skills or anything that can actually make them active. The children have easily understood and mastered as they perform the physical skills required.

Rutherford (2015) stated that people of all ages love to play games that are fun and motivated. Games give students opportunities to explore fundamental number concepts, such as the counting sequence, one-to-one correspondence, and computation strategies. Engaging mathematical games can also encourage students to explore number combinations, place value, patterns and other important mathematical concepts. Further, they afford opportunities for students to deepen their mathematical understanding and reasoning. Games are an important tool for learning in elementary school mathematics classrooms. Playing games encourages strategic mathematical thinking as students find different strategies for solving problems and deepen their understanding of numbers. When played repeatedly, games support students' development of computational fluency.

Math is part of our everyday activities. Surviving life would be very difficult if you do not have even the most basic knowledge about math. Unfortunately, math has never been the most popular subject among students. Viewed as complicated and boring, most students cringe at the very mention of the word. To keep the students interested in math

and to encourage them to study and learn about it, experts suggest using games as a teaching and learning tool.

Mathematics needs to be mastered elementary school students to help digest the sciences in higher education (Wimbarti, 2012). The statement means that the most important thing was learning mathematics at the elementary level because it occurs early during the development of cognitive abilities in students. Early cognitive development of learners in mathematics will affect further development of mathematical thinking and mastery of subjects affecting the others.

Based on the study of Inot (2001), he found out that mathematical recreation such games can serve as a very effective way for learners of varying levels of ability. Games can be used as integral part of daily lesson as application or enrichment activities. The regular use of mathematical games in the entire year can very well serve as a means of convincing the students that mathematics can be quite exciting. Games will help the mathematics teacher teach in an exciting, meaningful and memorable manner. He then concluded that the use of mathematical games in the classroom instruction is an effective way to develop basic concepts and skills in mathematics. Any game can be used in any instructional activity as long as it is carefully analyzed and evaluated by the teacher. Appropriate use of these games would yield to better result in actual teaching and learning environment above and beyond all else, successful mathematics instruction depends upon the enthusiasm and imagination of the mathematics teacher when all is said and done, it is the teacher who counts and no instructional techniques is of value of the teacher does not play his genuine interest in the subject at hand.

Palmones (2000) revealed that the use of games was very effective in mathematics teaching-learning process. She suggested that teachers of mathematics must adopt more and

more teaching strategies that are inquiry- and problem-oriented but most of all, mastery of the learning strategy should be used in order to develop the children's ability to think, rationalize, and make proper decisions. Mathematics as a subject must be taught with more stress on the "how" and "why" of learning. This is a skill subject and it requires skills of performance by the teacher. The use of action, gestures, changing facial expressions, teaching devices or materials are techniques to facilitate learning.

Mathematical competence is the ability to develop and apply mathematical thinking in order to solve a range of problems in everyday situation. Building on a sound mastery of numeracy, the emphasis is on process and activity, as well as knowledge. Mathematical competence involves, to different degrees, the ability and willingness to use mathematical moods of thought (logical and spatial thinking) and presentation (formulas, models, constructs, graphs, charts).

Niss and Jensen (2002) argue that a mathematical competency is an “insightful readiness to act appropriately in situations which present a particular kind of mathematical challenges” since the particular nature of this insightful skill in most cases does not follow directly from the definition of the competency, it is also necessary to specify what it means to master a competency.

The main goal of this research was to improve and developed the mathematical competencies of pupils in solving math problems. Through mathematical games the pupils will be able to solve problems and apply it to common issue of everyday life.

In conducting this research, the researchers aimed to further improve the typical strategies use in teaching elementary math by implementing conceptualized games. Moreover, by these games the researchers hoped to arouse the

interest of the pupils to explore and enjoy the given subject matter.

Therefore, the current study helps the researchers to determine the impact of conceptualized games to the mathematical competencies. The researchers made sure that those 35 students of Grade IV Rizal had played the conceptualized games and take the standardized test. The researchers predicted that there is a significant difference between the test scores before and after the intervention.

METHOD

This study utilized the pre-experimental method of research to determine if the conceptualized games can improve the mathematical competencies of the pupils of the identified elementary school. The study focused on the treatment, procedure, or program which is intentionally introduced to observe a result. The pre-experimental design was utilized to detect if a given treatment can produce positive results under ideal conditions.

One group pre-test and post-test design was employed to 35 pupils. The benefit of this design is the inclusion of a pre-test to determine base line scores of the respondents. After the pre-test, the researchers apply the conceptualized games. After the intervention, the post-test was conducted.

This study used a teacher made test to determine the mathematical competencies of the pupils before and after the intervention of conceptualized games in mathematics.

A teacher made test was developed to determine the performance of the pupils in four fundamental operations. The test contains 20 multiple choice items based on the table of specification assessing the competencies of the pupils in four fundamental operations. The content and phase validation was done by the expert in the field of Mathematics.

RESULTS

Pre-test

The researchers gave the pre-test to the respondents to determine the baseline scores of the respondents about the four fundamental operations. When the respondents taking their pre-test, they are frequently asking questions about the problem or the test.

Table 2: Descriptive ratings of the Pre-test of Grade IV Rizal prior to the application of the Conceptualized Math Games.

Numerical Rating	Description	Frequency	Percent
17-20	Outstanding	2	5.7
13-16	Very Satisfactory	6	17.1
9-12	Satisfactory	18	51.4
5-8	Fairly Satisfactory	8	22.9
0-4	Did not meet Expectation	1	2.9
Total		35	100.0

Intervention

After the pre-test, the researchers apply the three different types of games, such as the An Eye-Opening Addition, An Eye-Opening Subtraction, Fingers and lastly the Shady Division. During the intervention, the respondents are actively participating on the said games. They are eagerly to answer the problems to solve. The respondents enjoyed at the same time they learned.

Table 3: Descriptive Ratings of Pre-test and Post-test of Grade IV Rizal pupils

	Mean	N	Std. Deviation	Description
Pair 1 Pre-Test	10.514	35	3.17501	Satisfactory
Post-Test	16.2857	35	3.24102	Outstanding

Post-test

The researchers gave the post-test after the intervention to the respondents to determine the effectiveness of Conceptualized games to the mathematical competencies of the pupils. During the post-test, the respondents had an easy way on how to answer some items on the test and because of the games they become competent in solving the four fundamentals operations.

Table 4: Descriptive Ratings of the Post-test of Grade IV Rizal after the Intervention of Conceptualized Math Games.

Numerical Rating	Description	Frequency	Percent
17-20	Outstanding	16	45.7
13-16	Very Outstanding	15	42.9
9-12	Satisfactory	4	11.4
Total		35	100.0

Table 5: Significant Difference between the test scores before and after the Intervention.

	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Pre-test – Post-test	-5.77143	3.56524	-9.577	34	.000

DISCUSSION

Table 2 showed the result of the pre-test of the 35 pupils prior to the application of the conceptualized games. As shown on the table, more than half of the students or 18 of them got a satisfactory score of 9 to 12; 8 students or 22.9 percent got a fairly satisfactory score of 5 to 8; 6 students or 17.1 percent got a very satisfactory score of 13 to 16; 2 students or 5.7 percent got an outstanding score of 17-20; and lastly, 1 student or 2.9 percent did not meet expectations.

Learning mathematics presents various challenges for many children. Mathematics is often associated as a difficult

and tedious subject to learn (Sedig. 2008). As the result of pre-test of the pupils before the intervention showed that they struggle on applying the knowledge they acquire because they had a hard time in solving problems.

Table 3 shows the pre-test and post-test results of the pupils. The pre-test result of the pupils before the application of conceptualized games is at the satisfactory level with the mean of 10.5143.

The post-test result of the pupils after the intervention is at the outstanding level with the mean of 16.2857.

As Kitty Rutherford (2015) stated people of all ages love to play games that are fun and motivated. The result of the pre-test and post-test of the students shows that using a conceptualized math games is a very effective way for learners to enhance their mathematical competencies.

Table 4 showed the results of the post-test of the 35 pupils after the intervention of conceptualized games. As shown on the table, 16 students or 45.7 percent got an outstanding score of 17 to 20; 15 of them or 42.9 percent got a very satisfactory score of 13 to 16; and 4 students or 11.4 percent got a satisfactory score of 9 to 12.

Palmones (2000) revealed that the use of games was very effective in mathematics teaching-learning process. As the result of post-test of the pupils after the intervention of conceptualized games showed that the pupils enhanced their abilities in solving math problems. Games also help them to be more competent and motivate in learning math.

Table 5 shows the significant difference between test scores before and after the intervention. The table presents the pupils pre-test and post-test with the p-value of 0.000 which is less than 0.05 which implies that there is a significant difference between the test scores of pupils before and after the intervention.

On the study of Inot (2001), he found out that mathematical recreation such games can serve a very effective way for learners of varying levels of ability. As shown on the table there is a significant difference between the test scores of the pupils' before and after the intervention. The scores of the pupils on the post-test increases after the application of the games.

In conclusion, the result of the study presents that the pre-test result of the pupils before the application of conceptualized games is at the satisfactory level. The post-test result of the pupils after the intervention is at the outstanding level. Therefore, there is a significant difference between the test scores before and after the intervention. Based on the findings of the study, the researchers recommended that for further development of the mathematical competencies of the pupils, more conceptualized games should be added and used as instructional tool.

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