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THE EFFECTIVENESS OF GAME-BASED INSTRUCTIONAL ACTIVITY IN ENHANCING LEARNERS PERFORMANCE TOWARDS MATHEMATICS

PAUL T. TRIBUTO
TEACHER III
Makato Integrated School
pttributo@gmail.com

ABSTRACT

This study determined the effectiveness of game-based instructional activities in enhancing the Mathematics performance of Grade 2 pupil-participants. Specifically, it examined the level of performance of the pupils based on their pre-test and post-test scores under the conventional method of modular learning and game-based instructional activities. It also determined the significant difference among these selected variables and the significant difference on the main gain to show if which are effective. This study utilized quasi-experimental research design and was conducted in Dioscoro T. Tejada Elementary School in the District of Makato. The participants consist of 20 Grade 2 pupils, 10 of which were assigned to experimental group and 10 to the control group. The instruments used were researcher-made Mathematics performance tests administered as pre-test and post-test, along with game-based instructional activities designed to enhance learning. The findings revealed that both the control and experimental groups were classified as "approaching proficiency" in pre-test, indicating comparable prior knowledge in Mathematics. In the post-test, both groups obtained an "advanced" level of performance. There is no significant difference among the

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mean performance of pupil-participant in pre-test exposed in conventional method of modular learning and to game-based instructional activity. This implies that the students in both experimental and control groups possess prior knowledge on the topic which they might have encounter in their early years in elementary. While in post-test, the mean performance of pupil-participants between the conventional method of modular learning and to game-based instructional activity differ to each other. Incorporate of game-based activities in teaching Mathematics has a positive impact on the performance of the learners. It was also found that that the learners exposed in the game-based instructional activities gain higher compared to the learners exposed in conventional method of modular leaning. The used of games in teaching Mathematics was more effective compared to conventional method of modular learning. It is recommended that the teacher may use of conventional method of modular learning methods in teaching incorporated with games to gain proficiency in numeracy as well as give opportunity to learners think creatively and critically.

Keywords: *Game-based instruction, Mathematics performance, Learner's achievement*

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INTRODUCTION

"You can discover more about a person in an hour of play than in a year of conversation."

This quote, attributed to both Plato and Richard Lingard, a professor of divinity from the 17th century, sums up what early childhood educators have known for decades. Through play children explore their world, learn by their own pace, and have ample opportunities to practice literacy and language skills. Through play children learn to navigate difficult social situations and develop problem-solving skills. We are raising the next generation of citizens, and we can raise them better through play. Quinn and Iverson argued that students "need to be engaged more and to be put at the centre of the learning experience to change from 'passive vessel' to 'active participant'" (as cited in Pannesse & Carlesi, 2007).

Based on the observation of the researcher primary pupils in Dioscoro T. Tejada Elementary School found solving mathematical problem were the most difficult skill to learn. As a teacher, we have struggled to know what educational strategies to use to increase the performance level of learners towards Mathematics. So, instead of thinking hard of what to use in motivating students, why not use games? This strategy was proposed mainly to be used game-based instructional activities to enhance learning in Mathematics.

To meet the mandate in the DepEd Order No. 12, S. 2015- Guidelines on the Early Language, Literacy and Numeracy Program: Professional Development Component. The program will develop in Filipino Children literacy and numeracy skills which will contribute to lifelong learning.

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The researcher chooses to conduct this study to find out the effects of using game-based instructional activities among the Garde 2 pupils in Dioscoro T. Tejada Elementary School and how effective the approach on their mathematics performance.

MATERIALS AND METHODS

Research Methodology

This chapter presents the research design, participants of the study, research instrument, data-gathering procedures and data analysis used in the study. The purpose of this study was the effectiveness of game-based instructional activity in enhancing learners' performance towards Mathematics in Grade Two at Dioscoro T. Tejada Elementary School, District of Makato for the School Year 2019-2020.

Research Design

This study used quasi-experimental design of research. This was used to determine if pupil-participants' performance in Mathematics exposed to the conventional method of learning and to the game-based instructional activities differ significantly. In this design, the two groups received different treatments were compared on all other variables which might be related to performance on the dependent variables. A quasi-experiment is an empirical interventional study used to estimate the causal impact of an intervention on target population without random assignment. Quasi-experimental research shares similarities with the traditional experimental design or randomized controlled trial, but it specifically lacks the element of random assignment to treatment or control.

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Participants of the Study

The study was conducted among the Grade 2 pupils enrolled in the School Year 2020-2021 at Dioscoro T. Tejada Elementary School. This study involved 20 pupils selected using purposive method from a total of 32. The group was divided into two groups, 10 for the experimental and 10 for the control group. The researchers ranked them from highest to lowest according to their first and second periodic grades. This was done to determine the match-pair between the experimental and controlled groups to ensure that the respondents are more or less equivalent in their mathematical capacity.

Research Instrument

The instruments used on this study was the researcher-made mathematics performance test and game-based instructional activities. The MPT, validated by experts, consisted of 20 multiple-choice items on fractions and was used as the pre-test and post-test to measures learners' Mathematics performance. The game-based instructional activities served as the intervention for the experimental group, utilizing online and offline fraction games aligned with Grade 2 Mathematics competencies to enhance learners' engagement and understanding.

Data Gathering Procedures

The data gathering procedure have three stages. First, was the pre-experimental stage; second, was the experimental stage; and the third, was the post experimental stage.

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Pre-Experimental Stage

Prior to the conduct of experiment, the researcher wrote a letter to the Schools Division Superintendent asking permission to conduct this study in Dioscoro T. Tejada Elementary School, in the District of Makato. With the approved letter, the researcher again wrote a letter to the Public Schools District Supervisor and School Head to allow the researcher to use the Grade 2 pupils in the experiment. With the approved permit, the researcher requested a meeting virtually with the parents of the respondents to explain the procedure of the study and the schedule of online test. Before the start of the experiment, the researcher secured parents` permit to allow their children to participate in conducting this study.

The researcher then requested a meeting with the School Head and other teachers to explain the objectives of the said study, observing proper health protocol, so that they became aware of the experiment that had been conducted and asked their cooperation and help when the researcher needed it.

Experimental Stage

Based on the virtual scheduled date and time the researcher conducted the pretest to both experimental and controlled group. After the pre-test, the researcher distributed the modules based on the scheduled to both experimental and control groups. For every session, the researcher sent to the experimental group, the module, the module activities plus the games and discussed the features and how to play the games, while the control group will only focus on the module and module activities

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Post Experimental Stage

After introducing the game-based instructional activities and the modular-based instruction, the researcher administered the post-test to both experimental and control groups in virtually. The raw scores obtained by each participant in the pre-test and post-test were tallied and tabulated and compared to found out the difference on the level of academic performance of Grade 2 pupils who received game-based instructional activities and who received the modular-based instruction alone.

Data Analyses

The data gathered in this study were treated using the frequency counts, percentages and weighted means to determine their level of performance of Grade 2 pupils after the intervention. To compare the performance of the experimental and control groups, t-test was used.

All the data were processed using the IBM Statistical Package for Social Sciences (SPSS) software version 23. The decision to reject or accept the null hypotheses was based on the p value generated. If the p value is less than 0.05, the null hypothesis will be rejected. If a p-value is greater than 0.05, the null hypothesis will be accepted.

For scoring purposes, the researcher adopted the corresponding description based on the following level of proficiency stipulated in DepEd Order No. 31, s. 2012 under assessment and rating of learning outcomes.

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RESULTS AND DISCUSSIONS

The following are the findings of the study:

Based on the problem identifies by the study, the following are the key findings:

It reveals that the results of the pre-intervention performance among Grade 2 learners exposed the conventional method of modular learning obtained an approaching proficient level of proficiency and the same result was obtained in the pre-intervention performance among Grade 2 learners exposed to game-based instructional activity.

The results of the post-intervention performance among Grade 2 learners exposed to conventional method of modular learning obtained an advanced level of proficiency and the same result was obtained in the post-intervention performance among Grade 2 learners exposed to game-based instructional activity.

No significant difference existed in the pre-test between learners exposed in the conventional method of modular learning and to game-based instructional activities resulting to accept the hypothesis. The result of this study is similar to the study of Noreen, R., & Rana, A.M.K. (2019) it was found that there were no significant differences between the performance of pupils when taught with activity-based teaching and traditional method of teaching. Same result was found in the study of Rondina, Janneth & Roble, Dennis. (2019) that the mean of the experimental and control group during pre-test were almost identical.

There was a significant difference in the performance level the post-test between the two groups resulting to reject the hypothesis. According to Hansen, Joe B. (2000) the performance of students was affected by different factors like, learning place, race, gender,

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age, etc. The result of this study was similar also to the study of Noreen, R., & Rana, A.M.K. (2019) that there was a significant difference between the mean performance score of experimental and control group in post-test. Same result was found in the study of Taclay (2013) that reveals student exposed in the mathematical games achieve higher scores compared to students who were exposed to traditional method.

The mathematics performance in the pre-test and post-test of learners exposed in the conventional method differ significantly which was lower than the level of significance. Therefore, hypothesis was rejected. The result of this study is different from the result of study by Noreen, R., & Rana, A.M.K. (2019), because based on their study the result in the pre-test and post-test of learners through traditional method of teaching remain the same result.

There was a significant difference occurred in the pre-test and post-test of learners exposed in game-based instructional activities resulting reject the hypothesis. According to Franklin, Peat & Lewis (2003), when students work cooperatively on a gaming activity, "games foster group cooperation and typically create a high level of student involvement that makes them useful tools for effective teaching" (p. 82). The result of this study was also similar to Lee (2009) that reveals that students enhance their performance in understanding of representation of fractions by means of playing games.

There is highly significant difference existed in the main gain of both learners exposed in convention methods of learning and game-based instructional activities resulting to reject the hypothesis. It was also found that the game-based instructional activities are more

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effective compared to conventional method of modular learning based on the main gain scores of both groups. Activities in learning are various tools used by individuals who take part in learning environments to materialize abstract concepts and carry out teaching in a more effective way (Gürbüz, Çatlıoğlu, Birgin, & Erdem, 2010). This was also supported by the results of the study of Abonyi, Maduagwuna & Ugama (2014) on the effect of mathematical games on student's achievement in quadratic expressions revealed that the mathematical game approach is superior and has a higher gain compared to the conventional method.

Conclusion

After a consideration of the findings and insights, the researcher has arrived at the following recommendations that could helped develop the performance level of the learners in Mathematics.

Since that both groups of the Grade 2 pupils increased their score performance in the post-test and to meet the mandate in the DepEd Order No. 12, S. 2015- Guidelines on the Early Language, Literacy and Numeracy Program: Professional Development Component. That the program will develop in Filipino Children Literacy and Numeracy Skills which will contribute to lifelong learning it suggests using conventional method of modular learning methods in teaching incorporated with games. Learning via the used of game-based instructional activities method to gain proficiency in numeracy as well as give opportunity to learners think creatively and critically.

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It is also encouraged that teachers may apply the game-based instructional activity in teaching mathematics because due to some research it was found out to be effective because it can help learners develop their thinking skills in solving mathematical problems as well as in other subjects.

Furthermore, it is suggested that teachers may be trained for conducting activities in different subjects. Appropriate game-based activities may be used at appropriate time. Game-based activities according to content may be planned by the teachers at the start of academic session. Refresher courses and workshops may be arranged on regular basis for Mathematics teachers to update their knowledge. It would not only be helpful for teachers to refresh their knowledge but also helpful for new teachers.

Schools should support as a central part of teacher's work, engagement in sustained efforts to improve their mathematical instruction. This support requires the provision of time and resources.

Parents must be informed about the performance of their pupils and encouraged them to help and guide on their studies in the new normal teaching and learning process. Since that they are the responsible for the improvement of their performance.

Further research may use other subjects to know the effectiveness of game-based instructional activities and be done with enough time, other variables and respondents.

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