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Effect of Peer Tutoring On The Mathematics Performance of Grade 5 Learners In A Public Elementary School

Ricky G. Jaromay

Elementary School Principal 1, Schools Division of Eastern Samar, Philippines
ricky.jaromay@deped.gov.ph

Abstract.
This study looked into the effect of peer tutoring technique on the mathematics performance of Grade V learners in a public central elementary school in the schools division of Eastern Samar. This study tried to find out and compare the performance of Grade 5 learners exposed to peer tutoring technique and lecture-discussion strategy. The pretest-posttest quasi experimental method of research was among two groups of heterogeneous Grade V classes, subjected to one-month experimentation. A validated district-made test consisting of forty items multiple-choice test was used as the data instrument. In analyzing the data obtained from the investigation and to test the hypothesis raised prior investigation, a t-test for independent samples was employed. Mean scores were utilized to describe learners' entry knowledge before the intervention and their academic performance after the peer tutoring technique. Standard deviations were used to describe pretest and posttest scores variability. Regarding the difference in the pretest and posttest in both the experimental and comparative group, a t-test for independent samples was employed. Further analyses have illustrated that learners have almost the same mathematics performance on mathematical operations on fractions before administration of the intervention technique. This was supported by p-value lower the level of significance set at 0.5. After utilizing two varying techniques to the two groups of learners, posttest means scores revealed that there had been a significant difference in the mean scores of learners in favor of the experimental group of learners who were taught using the intervention technique. This finding was statistically supported by a p-value greater than the level of significance. From all the analyses conducted, findings rejected the hypothesis that there is no significant difference in learning gains of learners in experimental and comparison groups. The result of the study unveiled that learners exposed to peer tutoring technique noticeably achieved better than exposed to lecture-discussion strategy. Hence, it is suggested that mathematics teachers should regularly use peer tutoring techniques to improve learners' mathematics performance. Further studies in other competencies in mathematics and other disciplines should be conducted to validate the effectiveness of peer tutoring.

Keywords: Learning gain; Mathematics performance; Peer tutoring

Introduction

Teachers have always been concerned with their teaching strategies to improve the level of performance of their students. Many educational approaches are being utilized to make teaching mathematics enjoyable. Typical practice in teaching mathematics tends to be uninteresting as it does not require inquiry or a higher thought process and does not encourage cooperative learning and brainstorming (Paragas, 2009). According to McCarron, Sean and Robert (2011), teaching and learning activities have to be modified to facilitate both cognitive and social gains in both high performing and low-performing students in an individualized or positive way. One of the recognized effective methods of instruction to help students increase their academic performance compared to a group of traditional classroom environments is peer tutoring (O'Shea & O'Shea, 2010). Hott, Walker and Sahni (2012) defined peer tutoring as a flexible, peer-mediated strategy that involves students serving as academic tutors and tutees.

The author suggests that the difficulties encountered by the students in solving mathematical problems involving fractions should not be neglected because they will likely contribute to poor performance. Low performance in the Mathematics test may indicate that a problem exists. Guira (2014) opined that errors committed by the learners be identified and analyzed in their trying to solve problems. The dismal performance of grade six elementary pupils in the school year 2014 - 2015 National Achievement Test in the Philippines revealed that they are still weak in math, wherein the total MPS gained in mathematics was 64.41% which did not meet the standard criterion set by the Department of Education in terms of achievement level.

From the National Achievement Test MPS of the school year 2013 - 2014, which was 66.12%, to the school year 2014-2015 with 64.41%, there has been a decrease of 1.71% in mathematics tests. It implies that even though the institutional performance of grade six pupils in mathematics belongs to the upper average of all the grade six pupils who took the NAT 2014-2015 nationwide, it has not yet reached the national standard targeted by the DepEd (DepEd-NETRC, 2014). The current state of mathematics education at the school level is likewise validated by the low achievement scores of pupils in the National Achievement Test. In the school year 2013-2014, the Can-avid Central Elementary obtained an MPS of 70.46%, which did not meet the standard criterion. The poor performance over the years up to the present indicated that the pupils have not yet mastered the needed competencies in mathematics. In fact, have been observed by the researcher on pupils' results of the classroom-based test and national achievement test, a topic like solving mathematical operations involving fractions is deemed difficult by the pupils and constitutes the least mastered mathematics skills.

Hence, with the situation above and problem, this study attempted to determine the difference between the performance in pretest and posttest in Performing Mathematical Operations Involving Fractions with the intervention of Peer Tutoring Technique among Grade V learners at Can-avid Central Elementary School. Specifically, this study tested the difference between the learning gains in mathematics of the comparison and experimental group in performing

Mathematical Operations Involving Fractions as an indicator of its overall effectiveness.

Methodology

The study made use of the experimental research design particularly, the Quasi-Experimental Design. This design was deemed appropriate considering the inapplicability of random matching or assignment of respondents in the current investigation. Two intact groups from two comparable yet similar classrooms were considered. Pairing of grades of learners from the two classrooms was done to ensure that learners have the same learning capacities. Learners assigned to the experimental group and the comparison group were given a pretest (Yb). The treatment was introduced only to the experimental group, after which the two groups were measured on dependent variable. The difference in scores or gain scores (D) in respect of pretest and posttest (Ya – Yb = D) was found for each group and the difference in scores of both the groups (De and Dc) was compared in order to ascertain whether the experimental treatment produced a significant change.

This study was conducted in Can-avid Central Elementary School, Can-avid Eastern Samar. The school caters basic education to children of school age from nearby barangays and within outside the municipality. The Grade 5 learners from Can-avid Central Elementary School for School Year 2018-2019 served as participants in this experimental investigation. Considering that this study utilized the quasi-experimental design, intact groups from two comparable classrooms were selected. The pairing of grades of the learners using their Grade 4 final grade was done to ensure homogeneity of learners assigned to both groups.

A 40-item District Mathematics Achievement Test was utilized as the research instrument. Each of the items in the test consists of four options and covers the expected competencies in Mathematical Operations in Fractions. Validity was established by subjecting the instrument to school intermediate mathematics teachers, school mathematics coordinator and district mathematics coordinator for judgement and evaluation. Constructive criticisms were incorporated in the revisions of some items. The instrument was subjected to a pilot test to Grade 5 learners who will not be involved in the study to ensure reliability. An item analysis was done to check the reliability of the test instrument. An overall result verified that the test was reliable at 0.721 reliability coefficient through Kuder Richardson Formula.

The investigation was conducted for almost one month, which started on January 8, 2019, until January 31, 2019. Before the researcher started data gathering, a letter was sent to the school's principal to seek permission to conduct the study. Upon approval, the researcher started the procedure by administering the 40-item pretest to Grade-5 pupils. Instructions via peer tutoring technique, and lecture-discussion technique was done to the experimental and comparison group. After the exposure of the experimental group to the intervention technique and upon completion of the lessons on mathematical operations on fractions, the

posttest was administered. To ensure the authenticity of the data obtained from the pre-post-test, the researcher personally administered the evaluation.

To determine the pretest, mean score of the students in both groups, the mean scores and standard deviation (SD) were utilized. This was done to describe the average entry knowledge of the learners prior to the administration of the intervention technique to the experimental group of learners as well as determine the variability of scores from the mean. The mean scores and standard deviation (SD) values were also utilized to determine the posttest mean scores of the learners in the experimental and comparison group. This was made to describe the average performance of the learners in both groups after administering the intervention technique, which was peer tutoring, and determines the variability of the scores concerning the means score. Finally, the students' learning gains in the two treatment groups were computed to determine if the peer tutoring technique is more effective than the lecture-based instruction using a one-tailed t-test for independent samples.

Results And Discussion

Pre-test Mean Scores of the Two Groups of Learners

The first set of analyses was performed to describe the mean scores of the two groups of learners prior to the implementation of the intervention technique. Table 3 shows the standard deviation and pretest mean scores of the learners in the experimental and comparison group. As can be seen in table 1, prior to the implementation of the peer tutoring technique, both groups of learners have scored almost the same in the 40-item test. This data indicates that learners from experimental and comparison groups have almost the same entry knowledge about infraction concepts. In view of scores variability, it can be gleaned that scores of the learners from the comparison group are relatively closer to the mean as compared to the data set obtained from the scores of the learners in the experimental group.

This result suggests that greater score variability is observed in the experimental group than in the comparison group though they have almost the same mean. A similar result was observed in Abuda's (2019) study regarding the comparability of the pretest result, which entails the appropriateness of the grouping mechanics employed.

Table 1. Pretest means scores of the learners in the experimental and comparison group

Group	Mean Score	Standard Deviation
Experimental	11.97	5.12
Comparison	11.63	4.94

Post-test Mean Scores of the Two Groups of Learners

The second set of analyses was done to describe the mean scores of the two groups of learners after the implementation of peer tutoring technique to the experimental group. Table 2 reveals the data on the posttest mean scores of both groups of learners after the intervention approach. The results indicate higher mean scores of the learners in the experimental group than those in the comparison group. These findings imply that higher mastery of the concepts infraction is observed in the experimental group. It further suggests that peer tutoring technique in teaching mathematics has been effective in increasing learners' academic performance.

In addition, the table shows the posttest scores variability. As can be gleaned from the table, the data set obtained from the scores of the learners in the experimental group is slightly lower than those from the comparison group. This result suggests that scores of the learners in the experimental group are closer to the mean than the scores of the learners in the comparison group. Furthermore, it indicates that the scores in the comparison group are widespread, which may have been affected by extreme scores and outliers.

Table 2. Posttest mean scores of the learners in the experimental and control group

Group	Mean Scores	Standard Deviation
Experimental	29.63	5.49
Comparison	19.10	6.54

Difference between the Pre-test Mean Scores of the Two Groups of Learners

Table 3 shows the statistical difference in the pretest mean scores of the two groups of learners. It can be viewed from the table that statistical analysis on mean difference has resulted in a p-value greater than 0.05. Hence, it can be interpreted that there is no significant difference between the mean scores of the learners in the experimental and comparison group. This result has accepted the null proposition raised prior to the investigation. In addition, results indicated that prior to exposure to the intervention technique, hence there is no significant difference in learners' entry knowledge regarding mathematical operations on fractions.

Table 3. Test of difference between the pretest means scores of the learners in the experimental and comparison group

Group	Mean Score	p-value	Decision	Interpretation
Experimental	11.97	.057	Retain Ho	Not significant
Comparison	11.63			

Difference between the posttest mean scores of the two groups of learners

The next set of data answered the inferential objective of the investigation to find out the significant difference in the posttest-mean scores of the learners in the experimental and comparison group. The t-test on independent samples revealed a p-value (.000) lower than the level of significance set at 0.05. This result indicated a significant difference in the posttest-mean scores of the learners in the two groups. Hence, rejecting the null proposition earlier advanced. Findings illustrate that learners in the experimental group have performed better after exposure to peer tutoring techniques than those exposed to traditional teaching methods. It further demonstrates that peer tutoring is an effective instructional technique, particularly in teaching fractions to Grade V learners.

Table 4. Test of difference between the posttest mean scores of the learners in the experimental and comparison group

Group	Mean Score	p-value	Decision	Interpretation
Experimental	26.93	.000	Reject Ho	Significant
Comparison	19.10			

Difference in the learning gains of the two groups of learners

To ascertain if the intervention administered to the learners under the experimental group was effective as compared to the traditional approach, the mean learning gains from the scores obtained by the learners in both groups were computed. Table 7 shows the average learning gains of the learners in both groups. As can be seen from the data, the learners from the experimental group obviously obtained higher average learning gain than the learners in the comparison group. The latter achieved a 10.2 percent learning gain difference against the comparison group. This result manifests that both groups performed better after administering both types of intervention; however, it is also evident that the intervention provided to the experimental group yielded better results. From this note, it can be said that the intervention given to the experimental group is effective when compared with the traditional approach. Likewise, learners in the experimental group have higher learning gains than those in the comparison group. It can be implied that learners exposed to peer tutoring have scored higher than those exposed to the traditional method.

In addition, data reveal a p-value lower than the level of significance at 0.05. This illustrates a significant difference between the average learning gains of the learners in the experimental and comparison group. Result suggests that peer tutoring has significantly raised learners' academic performance than the traditional teaching strategy and is an effective teaching technique particularly in delivering lessons in mathematical operations on fractions. From these findings, the null hypothesis is rejected. Similarly, the findings are aligned to the conclusions made by Abuda, Balazo, Orque, Cabili and Maestre (2019) highlighting the use of an innovative SIM-based instruction and its counterpart in

teaching frequently least mastered competencies in the subject, General Mathematics that paves the way in developing mathematical competencies among 11th grade learners.

Table 5. Test of significant difference between the learning gains of the learners in the experimental and comparison group

Group	Average Learning Gains	p-value	Decision	Interpretation
Experimental	17.67	.000	Reject Ho	Significant
Comparison	7.47			

Results of the investigation accorded Cuseo (2001), Drapper (2004), and Kalkowki (1995) when the posited benefits of peer tutoring, which includes the academic and cognitive gains like it positively affect mathematics performance and improves reading achievement for students of all levels.

By large, this study suggested that peer tutoring as a technique to traditional lecture-based instruction effectively raises learners' academic performance in mathematics. Results have illustrated that using the technique above in teaching could be an alternative way to deliver lessons in mathematics that will yield positive academic performance.

Conclusions And Recommendations

Based on the salient finding of the study, the researcher concluded that the pretest mean scores of the Grade V learners assigned to experimental and comparison groups are almost the same before the administration of the intervention technique. The two groups of learners have comparable entry and background knowledge on lessons involving mathematical operation on fractions. There was an increase in the posttest mean scores of the learners in both the experimental and comparison groups. A much higher post-test score was recorded by the learners in the experimental group than those in the comparison group, indicating a difference in the learners' academic performance. Furthermore, there was no significant difference between the pretest mean scores of the learners in the experimental and comparison groups, which illustrated that both groups of learners knew the same thing about mathematical operations on fractions before the recitation of the lessons with varying techniques respective to the group, while a significant difference exists between the posttest mean scores of the learners in the experimental and comparison groups. A significant increase in the learners' academic performance in favor to those who were exposed to peer tutoring technique. Also, there was a significant difference between the learning gains of the two groups of learners. Based on the empirical data obtained, peer tutoring has a significant and positive impact on Grade V learners, particularly in raising their academic performance. Further, findings imply that peer tutoring is an effective instructional technique concerning the subject matter.

From the salient findings and conclusions, the researcher recommends that the peer tutoring technique be tried to deliver instruction for other mathematics concepts in other disciplines to further feedback on its effectiveness. Peer tutoring as an instructional technique should be employed along with emerging technology-based modalities such as Zoom or Google Meet. Finally, teachers should explore other teaching techniques and strategies that may positively impact students' academic performance in Mathematics class.**

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