

Effectiveness of Peer Tutoring on the Mathematics Performance of Fourth Year Slow-Learners

Joe Vincent B. Deluao

Abstract: This study was conducted to determine the effectiveness of peer tutoring on the mathematics performance of fourth year slow-learners. The specific questions answered were:

1. What are the pretest and posttest mean scores of the control group?
2. What are the pretest and posttest mean scores of the experimental group exposed to peer tutoring program?
3. Is there a significant difference between the pretest and posttest mean scores of the control group?
4. Is there a significant difference between the pretest and posttest mean scores of the experimental group exposed to peer tutoring?
5. Is there a significant difference in the mean gain scores between the control group and the experimental group?

This study made use of modified experimental design 10, otherwise known as the non-equivalent control group design. It involved one hundred twenty two (122) fourth year high school students of Daniel R. Aguinaldo National High School at Matina, Davao City for the School Year 2003-2004. Out of these numbers, sixty (60) students served as the experimental subjects and sixty two (62) students from other class served as the control subjects. Based on the findings of this study, the following conclusions are drawn:

1. The use of remedial instruction indicates an increase in the student's achievement.
2. The Peer Tutoring Approach as remedial instruction in the Experimental Group showed that there is no difference in the achievement result in the Control Group.

The researcher offered the following recommendations:

1. Teachers who do remediation activities in any subject may try Peer Tutoring as an alternative approach with the same outcomes as the traditional instruction approach.
2. School Administrators like the Principals and Head Teachers should allocate at least 30 minutes, three times a week meetings for remedial instruction.

Keywords: Effectiveness, Mathematics Performance, Peer Tutoring, Slow Learners

1 INTRODUCTION

1.1 Background of the Study

SCHOOL administrators, teachers, and parents have become increasingly concerned about the problems facing the children of our nation today. These problems are manifested in our schools in various areas such as decreased academic achievement, increased absenteeism, lack of interpersonal skills, and inability to think critically. A number of intervention strategies have been suggested to remedy these problems, one of which is peer and cross-age mentoring programs. Although this is certainly not a new strategy, it is periodically rediscovered and examined in classrooms throughout the world.

The objectives of the study were to find out:

1. The pretest and posttest mean scores of the control group.
2. The pretest and posttest mean scores of experimental group exposed to peer tutoring program.
3. If there is a significant difference between the pretest and posttest mean scores of the control group.

4. If there is a significant difference between the pretest and posttest mean scores of the experimental group exposed to peer tutoring ; and
5. If there is a significant difference in the mean gain scores between the control group and the experimental group.

1.2 Null Hypotheses (at 0.05 confidence level)

- H01. There is no significant difference between the pretest and the posttest mean scores of the control group.
H02. There is no significant difference between the pretest and the posttest mean scores of the experimental group; and
H03. There is no significant difference in the mean gain scores between control group and the experimental group.

1.3 Theory Base

This study is anchored on the claim from Role Theory and Gestalt Theory that tutees may respond better to their peers than to their teachers.

• Engr. Joe Vincent B. Deluao, is a faculty member of the Civil Engineering Department in the University of Southeastern Philippines, Davao City., E-mail: joedeluao@gmail.com

1.4 The Conceptual Framework of the Study

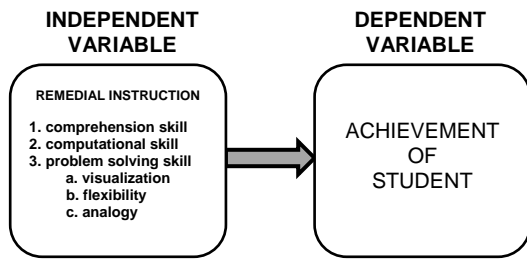


Fig. 1. The conceptual framework of the study

1.5 Significance of the Study

The study intends to develop and evaluate the peer tutoring approach in teaching Mathematics IV. There are four important considerations in applying the peer-tutoring program in mathematics for slow learners. First, it hopes to experiment the effectiveness of the peer-tutoring program. Second, this will also enhance and increase the student's interest. Third, this will develop the tutors to communicate effectively and to enhance self-esteem, academic learning efficiency, and with a sense of responsibility. Fourth, this will serve as an instrument for improving the achievement of students in the field of mathematics.

1.6 Scope and Limitation of the Study

This study is focused on the investigation of the effectiveness of peer tutoring in mathematics performance of sixty (60) fourth year senior students of Daniel R. Aguinaldo National High School for school year 2003-2004. The topics in this study are delimited to the second grading period lessons that has a time table of three months.

1.7 Definitions of Terms Used

Effectiveness. It means producing a desired effect. In this study, it refers to a possible result of peer tutoring in enhancing the mathematical achievement of fourth year high school students at Daniel R. Aguinaldo National High School.

Mathematical Performance. In this study, measures the mathematical literacy of a fourth year high school student at Daniel R. Aguinaldo National High School to formulate, employ and interpret mathematics in a variety of contexts to describe, predict and explain phenomena, recognizing the role that mathematics plays in the world.

Peer Tutoring. Probably the simplest definition of peer tutoring comes from Damon and Phelps: "Peer tutoring is an approach in which one child instructs another child in material on which the first is an expert and the second is a novice". In this study, the students are grouped in order to share, participate and listen to the peer tutors who are selected by the researcher. The peer tutors are assigned only in the experimental group.

Slow-learners. This refers to the students who had deficiencies in grasping of ideas and fact. It is the power of understanding to solve a problem and to arrive at the conclusion. In this study, it refers to the students who need special attention or the low achiever in mathematics.

Achievement. This refers to something achieved or won by exertion and some actions carried out with courage or unusual ability. In this study, it refers to the test results given at the end of the experiments on the subject areas covered.

Mathematics IV. This refers to one of the subjects offered in the general secondary curriculum in the public and the private schools. It is a subject held daily from Monday to Friday and is given a one (1) unit credit. It refers to the subject by Department of Education (DepEd) in the fourth year level at Daniel R. Aguinaldo National High School.

Daniel R. Aguinaldo National High School. A nationally funded Secondary High School located at Santo Niño, Matina, Davao City. It is about 200 meters away from the national highway. It is the site of this study. It has more than a hundred classroom teachers, two DOST buildings, a full-pledged Principal, one Auditor, one Clerk and one Disbursing Officer. It has a population of more than six thousand students who come from Matina District and nearby districts.

Comprehension Skills. It is the mental grasping of ideas and facts or the power of understanding to solve a problem and to arrive at the conclusion. To solve a problem, it needs knowledge and understanding especially if there are computational deficiencies (concrete, pictorial and abstract). In this study, it measures the ability to form possible answer from understanding and analysis of given facts (Mosses: 1990). Furthermore, the term refers to the skills that require problem solving in mathematics IV.

Computational Skills. It is the ability to compute or solve numbers to arrive at the conclusion. It is one of the basic skills that is expected to be developed by the students. In this study, it refers to the students' performance in Mathematics IV.

Problem Solving. It is the ability to perform a satisfactory solution to a quantitative problem described in words in which the question is raised. It is a complicated field, which involves comprehension, analysis, organization and recognition in the solution of a problem. In this study, it refers to the mental ability of the students that requires ability in analogy, flexibility and visualization of facts.

Peer Tutor. A student who assists peer tutees to attain grade-level proficiency in basic mathematical skills and to learn more advanced skills by assisting with homework, assignments, providing instruction, and fostering good study habits. In this study, it refers to a specially selected student whose grade in mathematic is above 85. They are selected by the researcher to assist the predetermined tutees assigned to him.

Remedial Instruction. This refers to the teaching strategy intended to improve related study habits and skills to students

who are poor in their performance. In this study, it refers to the instructions given to the slow learners as identified in school where this study is conducted.

2 METHODOLOGY

2.1 Research Method

This study used the modified experimental design particularly Design 10, otherwise known as the non-equivalent control group design. The research involved the experimental group and control group in which the pretest and posttest were given. The experimental group used the Peer Tutoring Approach as remedial instruction while the control used the traditional teaching of remedial process. The design was commonly used to groups whose participants were naturally assembled such as that in classrooms. The assumption was that both groups were equal, but in cases where effects of extraneous variables are identified, the analysis of co-variance (ANCOVA) was used.

2.2 Selection of Respondents and Peer Tutors

- 1. Selection of the Experimental and Control Groups.** The subjects of this study were the one hundred-twenty two (122) senior students of Daniel R. Aguinaldo National High School with grades in Mathematics III ranging from 75%-79%. This was done based on Forms 137 and 138-A of the student respondents. The researcher chose the two lowest sections in the selection of the experimental and control group. The selection of the two classes, control and experimental groups, was done by tossing of a coin.
- 2. Selection of the Peer Tutors.** Peer tutors came from the special section handled by the researcher. Each of the peer tutors identified was assigned a group of tutees in the experimental class. They were briefed and given instructions by the researcher regarding their role as peer tutors. Their grades in Mathematics III ranged from 85% and above.

2.3 Procedure of the Study

The steps which were observed in conducting this investigation involved the following:

1. Permission and approval of the experimentation from the proper authorities.
2. Selection of the experimental and control groups.
3. Selection of the peer tutors.
4. Construction and validation of the pretest and posttest questionnaires in Mathematics IV.

2.4 Research Instrument

The instrument used in this study was a researcher-made test designed to measure comprehension skills, computation skills and problem solving skills. The test was a multiple choice type with five response options in every item except item III of every problem which require students to apply computational procedures to find the correct answer. The items were edited, refined and written after getting comments/suggestions from

high school mathematics teachers. The instrument was then printed.

2.5 Validation of Instrument

In an effort to control all sources of invalidity, the following steps were taken:

1. The experimental class was monitored by the researcher itself during tutorial session.
2. The experimental groups were chosen based on their grades in Mathematics III (75%-79%). The same thing was done to the control group.
3. The pretest was given to the experimental and control groups before the peer-tutoring program started.
4. The researcher met the experimental group three times a week, outside the regular class schedule to monitor only the peer tutors' performance.
5. The researcher met the peer tutors three times a week to assess the progress of their tutees.

Finally, after three months of study, both the experimental and control groups were given the posttest. The mathematics teachers taught the experimental and control classes in the usual way. Students in the experimental class were allowed and encouraged to ask help from their tutors in problem solving assignments. No peer tutors were assigned to help students from the control classes and peer tutors are not allowed to answer assignments of their tutees.

3 RESULTS AND DISCUSSION

Table 1: Population Retention Rate of the Control Group and Experimental Group

Group	Number of Students		Percentage
	At the Start	At the End	
Control Group	62	62	100%
Experimental Group	60	60	100%
Total	122	122	100%

Table 1 shows the population retention rates of the control and experimental groups. There were sixty-two (62) students in the control group and sixty (60) in the experimental group or a total of one hundred twenty-two (122) respondents. Within the period of experiment, the number of respondents in the control and experimental groups were intact.

Table 2: Pretest and Posttest Mean Scores and Standard Deviation of the Control Group

	Pretest	Posttest	Mean Difference	95% Confidence Interval		Descriptive Equivalent
				z-test tabular	z-test computed	
Mean	10.42	27.45	17.03	1.645	19.96	Significant
Standard Deviation	4.907	4.590				

Table 2 presents the pretest and posttest mean scores of the control group. The pretest mean score was 10.42 with a standard deviation of 4.907 and the posttest mean was 27.45 with a standard deviation of 4.59. The number of respondents were 62. The degree of freedom (df) of the control group was obtained using the formula $N-1$, thus, $62-1 = 61$. In as much as the df is not directly found in the table of z-distribution, the researcher made use of interpolation process which was mathematical in nature.

With the aid of the z-test for dependent sample at 0.05 level of confidence, computed z-value was 18.551 which is greater than the tabular value of 1.645. Hence, the decision is to reject the null hypothesis 1. This means that there is a significant difference between the pretest and posttest mean scores of the control group. This signifies that peer tutoring has something to do with the improvement of the students' achievement in Mathematics IV.

Table 3: Pretest and Posttest Mean Scores and Standard Deviation of the Experimental Group

	Pretest	Posttest	Mean Difference	95% Confidence Interval		Descriptive Equivalent
				z-test tabular	z-test computed	
Mean	9.43	27.90	18.47	1.645	23.63	Significant
Standard Deviation	4.168	4.391				

Table 3 shows the pretest and posttest mean scores of the experimental group. The pretest mean score of the experimental group was 9.43 with a standard deviation of 4.168 while the posttest mean score was 27.90 with a standard deviation of 4.391. The mean difference of the pretest and posttest was 18.47. This implies that after three months of experimentation with the peer tutoring program, the experimental group increased their mean scores compared with that of the control group. The total number of respondents was sixty, hence degree of freedom (df) was fifty-nine. Since df is not found in the table, interpolation was used.

Using z-test for dependent sample at 0.05 level of significance, the computed z-value for the experimental group was 22.945, which is greater than the tabular value of 1.645. Hence, the decision was to reject the null hypothesis. This means that there is a significant difference between the pretest and posttest mean scores of the experimental group which was exposed to tutorial sessions in Mathematics IV.

Table 4: Pretest Result of the Control Group and Experimental Group as to the Area of Indicators

Area	Number of Items	Mean Score	
		Control Group	Experimental Group
Comprehension Skills	15	6.11	5.65
Computation Skills	15	3.31	3.32
Problem Solving Skills	20	0.97	0.42
Overall	50	3.46	3.13

Table 4 shows the pretest result of the control and experimental groups. The control group mean scores were 6.11 for the comprehension skills; 3.31 for computational skills and 0.97 for the problem solving skills with an overall mean of 3.46. The experimental group mean scores were 5.65 for the comprehension skills; 3.32 for the computational skills and 0.42 for the problem solving skills with an overall mean of 3.13. This implies that both the control and experimental groups did not vary.

Table 5: Posttest Result of the Control Group and Experimental Group as to the Area of Indicators

Area	Number of Items	Mean Score	
		Control Group	Experimental Group

Comprehension Skills	15	12.63	11.63
Computation Skills	15	9.56	9.10
Problem Solving Skills	20	5.24	7.17
Overall	50	9.14	9.30

Table 5 shows the posttest result of the control and experimental groups. The control group mean scores were: 12.63 for comprehension skills, 9.56 for computation skills and

5.24 for problem solving skills with an overall result of 9.14. For the experimental group mean scores: 11.63 for comprehension skills, 9.10 for computation skills and 7.17 for problem solving skills with an overall result of 9.30. The difference of the mean scores was 0.16 and shows that the use of peer tutoring program did not vary to traditional remedial instruction approach. Hence, both groups are comparable in the improvement of the students' achievement in Mathematics IV.

Table 6: Pretest and Posttest Mean Difference and Standard Deviation of the Control Group and Experimental Group

	Mean Difference		Mean Difference	Computed Z-Value	Descriptive Equivalent
	Control Group	Experimental Group			
Mean	17.03	18.47	1.44	1.179	Not Significant
Standard Deviation	7.229	6.234			

Table 6 shows the pretest and posttest mean gain scores between the control and experimental groups at 0.05 level of confidence with $df = 121$. The mean difference between the pretest and posttest was 17.03 of the control group with a standard deviation of 7.229 while the experimental group had a mean difference of 18.47 between the pretest and posttest with a standard deviation of 6.234. The mean gain difference of the pretest and posttest between the control and experimental groups was 1.44 in favor of the experimental group.

Using z-test at 0.05 level of confidence, the computed value is 1.179 which is below the tabular value of 1.645. Hence, the null hypothesis is accepted. This means that there is no difference in the mean gain scores between the control and experimental groups. It shows that peer tutoring program was effective as traditional remedial instruction.

4 CONCLUSIONS

1. The use of remedial instruction indicates an increase in the student's achievement.
2. The Peer Tutoring Approach as remedial instruction in the Experimental Group showed that there is no difference in the achievement result in the Control Group.

5 RECOMMENDATIONS

1. Teachers who do remediation activities in any subject can use Peer Tutoring as an alternative approach/replacement with the traditional remedial instruction approach as this study revealed.
2. School Administrators like Principals and Head Teachers should allocate at least 30 minutes, three times a week meetings for remedial instruction.
3. Remedial instruction should be treated as one subject load instead of requiring teachers to do remediation without financial or administrative support.

4. A follow-up study is recommended using Peer Tutoring as remedial instruction for other subjects and other year levels.

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Author Profile

Engr. Joe Vincent B. Deluao is an Instructor of Civil Engineering in the University of Southeastern Philippines (USEP), a state university in Barrio Obrero, Davao City,

Philippines. He obtained his B.S in Civil Engineering from the University of Mindanao, earned 18 units in Education and is also a Licensed Professional Teacher and a Registered Nurse. He obtained his Master of Arts in Teaching Mathematics at the University of Southeastern Philippines in 2004 with an average of 1.133 (99%). He previously taught Mathematics at the Daniel R. Aguinaldo National High School located in Matina, Davao City for 12 years. He is the sole author of the book entitled "Advanced Algebra and Trigonometry" which was copyrighted last December 1, 2016. Engr. Deluao has three (3) upcoming books to be published: Differential Calculus, Integral Calculus and Probability respectively. He is planning to pursue a Doctor of Philosophy in Civil Engineering, Mathematics or Education, and is married to Ronelia M. Pragados, whom they have one daughter, Trixy Collen.

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