

Cooperative Learning in Mathematics of Grade 7 Students of Calamba Bayside National High School

Felipe B Muncada Jr¹, Amor Arcebucho², Jeffrey Escasura³,
Criselda de Chavez⁴

^{1,2,3,4} Laguna College of Business and Arts

Abstract

This study compared the effectiveness of individual, partner and group learning in enhancing the learning of Grade 7 students in Statistics, Number Sense and Linear Equation. An action plan that can improve their performances in Mathematics was developed.

This study used the experimental research method on the 72 Grade 7 students of Calamba Bayside National High School. The statistical treatments applied were the mean, t-test and one-way Analysis of Variance (ANOVA) with Tukey's Honest Significant Difference post-hoc test.

The study revealed that in Statistics, Number Sense, and Linear Equation pre-test, the students belonged to the beginning level. In the conducted post-test in Statistics, they landed in the beginning (individual), developing (partners), and approaching proficiency (group) levels. In Number Sense and Linear Equation, they were beginners in individual, partners and group learning. There were significant differences between the pretest and posttest scores in terms of individual, partner and group learning in Statistics. There were significant differences between the Grade 7 students' pretest and posttest scores under partner learning as well as group learning in Number Sense. In Linear Equation, there were significant differences between pretest and posttest scores in Linear Equation in individual, partner and group learning. In Statistics and Number Sense, there were no significant differences among the posttest scores of the three groups of Grade 7 students in individual, partner and group learning. In Linear Equation, there was significant difference between the means of partner and group learning.

Keywords: Cooperative Learning, Individual Learning, Partner Learning, Group Learning, Mathematics Performance

1.0 Introduction

The Philippine government approved Republic Act 10533 otherwise known as Enhanced Basic Education Act of 2013, mandating the implementation of K to 12 Curriculum in all schools. The spotlight of the learning process focuses on the learners and that the choice of teaching approaches should depend on their needs, interests and skills. Section 5 specified the five pedagogical approaches which the teachers can use in their teaching namely Inquiry-based, Integrative, Constructivist, Reflective and Collaborative/Cooperative Learning.

In view of this, the researchers reflected that during their high school years, they remembered that they were exposed to cooperative learning activities in English subjects as well as Filipino, Science, Social Studies, Music, Arts, Physical Education and Health (MAPEH) and Technology and Livelihood Education (TLE) subjects but very rare or never in Mathematics. The researchers argue that during their elementary and high school years, their teachers mostly used individual learning during their Mathematics subject yet they learn math, do math and confidently love the subject.

The above-mentioned experiences pushed the researchers to focus this study in one of the five pedagogical approaches provided in RA 10533- the cooperative learning approach. The purpose of this research is to examine and compare the effect of individual and cooperative learning in promoting a deeper understanding of the Grade 7 Mathematics curriculum.

1.1 Synthesis of the Reviewed Related Literature and Studies

Agagas, Gloriana, Zimmerman and URtheMOM.com stated that self-learning strategies positively improved the Mathematics achievement of the students by becoming masters of their own learning processes. Also, ScribbledViews.wordpress.com argued that students can better understand the material if he/she exercises teaching himself/herself as compared to listening to a lecturer.

On contrary to the above-mentioned statements, John Donne, Corpuz et al. and Thefilipinoteacher.com explained that every person is a social being and his/her values, actions and beliefs are product of his community. In a classroom, Garcia, Cheng and Dailyteachingtools.com pointed out that cooperative learning is designed to encourage students to help and support their peers in a group rather than compete against them, to help them develop skills in oral communication and promote student learning, academic achievement, positive race relations and self-esteem. So Altamira and Snyder suggested that students, even the low-achieving, need to learn to work cooperatively, whether be with someone of their choice or whom they are assigned..

As innovation, Siegel and Krol et al. declared that the smaller the group, the better. That's why they focused their studies on dyads or partner learning. They concluded that the use of partner learning in the classroom produced higher performance outcomes (than alone) in Mathematics when implemented in heterogeneous groups of students — pairing of a low-ability student with a medium-ability student and a medium-ability with a high-ability student.

1.2 Objectives

This study deals with the comparative analysis of individual, partner and group learning in Mathematics of Grade 7 students of Calamba Bayside National High School, school year 2013-2014.

Specifically, it sought answers to the following objectives:

1. The pretest performance of Grade 7 students of Calamba Bayside National High School in:
 - 1.1. Statistics,
 - 1.2. Number Sense, and
 - 1.3. Linear Equation
2. The posttest performance of Grade 7 students of Calamba Bayside National High School in:
 - 2.1. Statistics,
 - 2.2. Number Sense, and
 - 2.3. Linear Equation

3. The significant differences between the pretest and posttest scores of Grade 7 students in the three chosen areas in Mathematics
4. The most effective method among individual, partner and group learning in improving the performance of the students in:
 - 2.1. Statistics,
 - 2.2. Number Sense, and
 - 2.3. Linear Equation?
5. Based on the findings, the action plan that can be developed to improve the performance of the students in Mathematics

2.0 Methodology

2.1 Participants

The respondents of this research were the 72 Grade 7 students of Calamba Bayside National High School, Palingon, Calamba City. The chosen respondents of the study were purposively chosen among students belonging to lower sections because the researchers strongly believe that they are those who need help in terms of improving performance in Mathematics. Equal number of respondents were taken from Grade 7-Gabardine and Grade 7-Silk. The total sample is composed of 72 respondents out of 96 students from the two sections.

2.2 The Instruments

The instruments used in this study were researcher-made tests which were used as the pretest and posttest. The test questions are divided into three parts – past lesson about Number Sense, present lesson about Statistics and future topic about Linear Equation. The examinations for each content area are composed of 7 multiple choice questions and 3 problems solving and/or identification-type items. The same questions in pretest were used as posttest with changes only in the given numerical coefficients, variables and specific details.

Moreover, the researchers also created modules based on K-12 Work text in Mathematics by Oronce and Mendoza, with the guidance from their thesis adviser. The said modules were used by the respondents during the 20-minute discussion before the actual posttest. It was validated by their thesis adviser, facilitator and two other Mathematics teacher of LCBA.

2.3 Research Procedures

The questionnaires were administered separately per topic area. After a week, the researchers administered the posttest in four hours — each section within two hours. Students, as suggested and approved by the researchers' thesis adviser, were given 20 minutes to discuss a particular lesson with the use of modules and 15 minutes for answering the examination.

Male students were paired with female students during partner learning and group learning in which two males and two females were grouped together. This is to balance the gender preference in every group.

The first group who were assigned to undergo individual learning in Statistics also underwent partner learning and group learning in Number Sense and Linear Equation respectively. Accordingly, the students belonging to Groups B and C underwent partner sharing and group learning in Statistics and shall be obliged to undergo the other methods of learning in Linear Equation and Number Sense.

The data gathered through the instruments were brought together, tabulated, organized, analyzed, compared, and interpreted by the researchers. The statistical treatments applied were the mean, t-test and one-way Analysis of Variance (ANOVA) with Tukey's Honest Significant Difference post-hoc test.

3.0 Results and Discussions

3.1 Pretest Performance

3.1.1 In Statistics, the students attained a mean percentage of 64.65 and were interpreted as belonging to the **beginning** level.

3.1.2 In Number Sense, the students garnered a mean percentage of 60.14 and were interpreted as belonging to the **beginning** level.

3.1.3 In Linear Equation, the students solicited a mean percentage of 58.68 and were assessed as belonging to the **beginning** level.

3.2 Posttest Performance

3.2.1 Statistics

3.2.1.1 In terms of individual learning, the students acquired a mean percentage of 74.38 and were assessed as belonging to the **beginning** level.

3.2.1.2 In terms of partner learning, the students achieved a mean percentage of 75.63 and were evaluated as belonging to the **developing** level.

3.2.1.3 In terms of group learning, the students obtained a mean percentage of 80.42 which were interpreted as belonging to the **approaching proficiency** level.

3.2.2 Number Sense

3.2.2.1 In terms of individual learning, the students received a mean percentage of 62.08 and were assessed as belonging to the **beginning** level.

3.2.2.2 In terms of partner learning, the students got a mean percentage of 65.42 and were evaluated as belonging to the **beginning** level.

3.2.2.3 In terms of group learning, the students obtained a mean percentage of 67.08 and were assessed as belonging to the **beginning** level.

3.2.3 Linear Equation

3.2.3.1 In terms of individual learning, the students gained a mean percentage of 65.83 and were interpreted as belonging to the **beginning** level.

3.2.3.2 In terms of partner learning, the students gained a mean percentage of 62.92 and were assessed as belonging to the **beginning** level.

3.2.3.3 In terms of group learning, the students received a mean percentage of 69.79 and were evaluated as belonging to the **beginning** level.

3.3 Significant Differences between the Pretest and Posttest Scores

3.3.1 In Statistics, the t-computed values for individual, partner and group learning are 3.1935, 4.6138 and 6.1398 respectively. These are all greater than its critical value of 2.0129. In all cases, the decision is to reject the null hypothesis. Thus, there are significant differences between the pretest and posttest scores in terms of individual learning, as well as partner and group learning.

3.3.2 In Number Sense, the t-computed values are 2.3798, 2.0832 and 3.1949 which are all higher than the critical value of 2.0129 so the decision is to reject the null hypothesis. Therefore, after the students were subjected to individual learning, their posttest scores were analyzed as significantly different from their pretest scores in Number Sense. There are also significant differences between the Grade 7 students' pretest and posttest scores under partner learning as well as group learning.

3.3.3 In Linear Equation, the t-computed values for individual, partner and group learning are 5.1267, 2.1653 and 4.8487 respectively. The computed values are greater than the critical value of 2.0129 so the decision in all cases is to reject the null hypothesis. Therefore, there are significant differences between pretest and posttest scores in Linear Equation after the students were subjected to learn individually, share knowledge with a partner and collaborate in a group with four members.

3.4. Most Effective Method

3.4.1 In Statistics, the one-way ANOVA generated a p-value of 0.126 for Statistics. Since p-computed value is greater than 0.05 level of significance, the decision is to accept the null hypothesis. It means that there are no significant differences among the posttest scores of the three groups of Grade 7 students who underwent individual, partner and group learning.

3.4.2 In Number Sense, the one-way ANOVA computed a p-value of 0.118 for Number Sense. Since p-computed value is less than 0.05 level of significance, the decision is to reject the null hypothesis. It indicates that the results are not significant. Hence, there are no significant differences among the posttest scores of the three groups of Grade 7 students who underwent individual, partner and group learning.

3.4.3 In Linear Equation, the one-way ANOVA generated a p-value of 0.004 for Linear Equation. Since p-computed value is less than 0.05 level of significance used in this study, the decision then is to reject the null hypothesis. It implies that at least one mean in individual, partner and group learning is significantly different from another. Post hoc analysis showed that there are no significant differences among the means of individual and partner learning; and partner and group learning. Furthermore, there is significant difference between the means of partner and group learning.

3.5. There is a need to develop an action plan that focuses on enhancing the performance of students in Mathematics through individual, partner and group learning.

4.0 Conclusions and Directions for Future Use

1. Grade 7 students of CBNHS still lack the skills, knowledge and expertise in Statistics; have poor retention of concepts regarding Number Sense; and lack of knowledge and familiarity about Linear Equation. Therefore, mathematics teachers should provide more drills and exercises to improve student's mastery of mathematical skills. The concepts and important terms must be inculcated to the students clearly before problem solving activities follow.

2. The students belonging to lower sections have the ability to understand topics with themselves alone. When the students are subjected to individual learning, they tend to develop a sense of responsibility about their own learning that could lead to better understanding of concepts. The collaboration between two students helped each other to acquire better learning about certain Statistics. Also, the collaboration among the four students in a group through sharing helped the students to acquire better understanding and learning Statistics. After undergoing individual, partner and group learning in Number Sense and Linear Equation, the students still lack retention of the lesson.

3. Individual, partner and group learning are effective methods in improving the performance of the students in Statistics, Number Sense and Linear Equation. Therefore, the researchers are strongly recommending to teachers to include the use of individual learning, partner learning and group learning in their teaching methods.

4. None among individual, partner and group learning in Statistics and Number Sense is more effective than the other. Means are not just the indicator that one method is more effective over the other. ANOVA uses standard deviation, difference between and within two means to come up with its analysis. Moreover, in Linear Equation, group learning is more effective than partner learning; none between individual and group learning; and individual and partner learning are more effective than another. Hence, the researchers are recommending the teachers to use alternately and appropriately individual, partner and group learning as their teaching methods. In Linear Equation, group learning is fitted for the students to absorb the lesson.

BIBLIOGRAPHY

1. Books
2. Bilbao, P.P., Corpuz, B.B, Llagas, A.T., Salandanan, G.G, The Teaching Profession, Quezon City: Lorimar Publishing Co Inc., 2006.
3. Garcia, Carlito D. Principles and Strategies of Teaching, Mandaluyong: Books Atbp. Publishing Corp., 2005.
4. Journal, Magazines & Periodicals
5. Siegel, C.. Implementing a research-based model of cooperative learning. The Journal of Educational Research, 98(6), 339-349. 2005
6. Unpublished Materials
7. Agagas, Rowena Imelda M., Effect of Self-Regulated Learning Strategies on Mathematics Achievement and Self-Regulation. Master's Thesis, Philippine Normal University, 2010
8. Cheng, Hua, A Case Study of Cooperative Learning in Mathematics: Middle School Course Design Journal of Mathematics Education, Vol. 4, No. 1, pp. 75-88, June 2011
9. Gloriana, Rodrigo J., Self-Regulated Learning Strategies, Attitude Towards Mathematics and Achievement of High School Students in Intermediate Algebra, Master's Thesis, Philippines Normal University, 2011
10. Snyder, Sandra S., Cooperative Learning Groups in the Middle School
11. Mathematics Classroom, Math in the Middle Institute. University of
12. Nebraska-Lincoln, 2006
13. Zimmerman, B. J. Darr, Charles, Fisher, Jonathan, Self-Regulated Learning in the Mathematics Class, NZARE Conference, Turning the Kaleidoscope, Wellington, 24-26 November, 2004

WEBSITES

1. ScribbledViews – www.ScribbledViews.wordpress.com
2. URtheMOM.com – www.URtheMOM.com
3. Thefilipinoteacher.com – www.thefilipinoteacher.com
4. Dailyteachingtools.com – www.dailyteachingtools.com