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Reinforcing Students' Mathematical Skills through Cooperative Learning Strategy

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Abstract: ***Cooperative learning is an educational approach which aims to organize classroom activities into academic and social learning experiences (Gillies, 2016). There is much more to cooperative learning than merely arranging students into groups, and it has been described as "structuring positive interdependence. Students must work in groups to complete tasks collectively toward academic goals. Unlike individual learning, which can be competitive in nature, students learning cooperatively can capitalize on one another's resources and skills, asking one another for information, evaluating one another's ideas, and monitoring one another's work, (Chiu, 2008). This study aims to find out how cooperative learning through structured and unstructured grouping schemes compare in terms of their effectiveness in reinforcing students' Mathematics achievement and the difficulties encountered by the students in both structured and unstructured groups. The one-shot quasi-experimental research design specifically the pre-posttest design was employed in the study. Participants of this study were the first year students of the College of Teacher Education of Cagayan State University. Descriptive and inferential statistics like frequency count, percentage, mean and t-test for dependent and independent samples were used to interpret the data. The integration of cooperative learning strategy, either structured or unstructured grouping schemes reinforce the performance of students in Mathematics. However, cooperative learning has far better results when unstructured grouping scheme is employed among students. Since the students find difficulty on simplifying expressions with rational exponents to radicals, composition of functions, solving linear and quadratic equations and solving word problems on linear and quadratic equations; intervention measures such as modular approach in teaching, simulation activities and remedial teaching were suggested to address such difficulties and to enhance the performance of the students in Mathematics particularly in College Algebra.***

Keywords: ***cooperative learning, education, structured grouping scheme, unstructured grouping scheme***

I. INTRODUCTION

There are two ways of improving Mathematics instruction, One is to develop more efficient provisions for individual differences; another is to emphasize the personal involvement of the learners in the teaching–learning situation. Instruction involving small groups is a strategy which can be used to meet individual differences while at the same time allowing the learners to have a meaningful interaction with one another.

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There are various possible grounds for low Mathematics achievement which includes standards, curriculum, and instructional approaches and strategies. In terms of standards and curriculum for Mathematics, they have changed many times with countless innovative reforms wanting to increase Mathematics performance. In the K-12 Curriculum, Mathematics has been regarded to be more meaningful and useful to students as well as teachers because the subjects offered are well-prepared and relevant to suit the ability level of students and to the present demands of society.

The quality of education that teachers provide to students is highly dependent upon what teachers are doing in the classroom. Thus, in preparing the students of today to become successful individuals of tomorrow, Mathematics teachers need to ensure that their teaching is effective. Teachers should have the knowledge of how students learn Mathematics and how best to teach. Changing both process and content in Mathematics instruction is a continuing professional concern. Efforts should be taken now to direct the presentation Mathematics lessons away from the traditional methods to a more student-centered approach.

Studies find that the cooperative learning that is generally implemented in schools consists of unstructured group work, with little individual accountability and no group goals. Students sit together and are allowed to share ideas, but they often simply share answers rather than trying to explain ideas to each other (Emmer & Gerwels, 2002). Sharing answers without explanation has been found to inhibit, not aid, learning of Mathematics in cooperative learning contexts (Webb & Palincar, 2008). One of the main reasons why cooperative learning is expected to enhance Mathematics development is its ability to structure experiences that promote metacognition, defined as knowledge of one's own cognition. It is the process of knowing why you know something and how you know it. Combining cooperative learning with metacognition training has been shown to be an effective pedagogical strategy (Kramarski & Mevarech, 2003).

Thus, conducting a cooperative learning lesson may change the teachers' role from being the "center-stage performer to choreographer of small group activity." The teacher assists in the transition from whole class setting to small learning teams. Time is spent in helping students work together rather than presenting and demonstrating learning materials. In addition to academic learning, intergroup acceptance, peer liking patterns and self-esteem are achieved. Regardless of the approach, the learning environment for cooperative learning is characterized by democratic processes, students assuming active roles and taking responsibilities for their own learning.

As a Mathematics educator, the researcher thinks this might be a necessary approach in improving the achievement and retention rate of students in Mathematics.

The researcher had chosen this study because she wants to structure her Mathematics classroom around group work. There are many benefits to group work in a Mathematics classroom if it is implemented effectively, but this takes some practice and may depend on the students, teacher, and topics. There is a lot to be said about effective group work and it seems to be somewhat of a gray area since there is no way to be exactly sure what effective group work entails.

Grouping within the class can be done in many ways depending upon the purpose for which it is done. This study aims to find out how structured and unstructured grouping schemes compare in terms of their effectiveness in reinforcing students' Mathematics achievement.

A. Statement of the Problem

The study aimed to compare the unstructured and structured grouping schemes in Mathematics instruction in terms of their effectiveness in reinforcing the Mathematics achievement of students.

Specifically, it sought to answer to the following questions:

1. What is the pretest and posttest scores of the students in the structured and unstructured groups?
2. Is there a significant difference between
   a. the pretest scores of students in the structured and unstructured groups?
   b. the posttest scores of students in the structured and unstructured groups?
   c. the pretest and posttest scores of students in the structured group?
   d. the pretest and posttest scores of students in the unstructured group?
3. What are the difficulties encountered by the students in both structured and unstructured groups?
4. How do the difficulties encountered by the structured group compare with the difficulties encountered by the unstructured group?
5. What intervention measures can be formulated to address the students' difficulties for both groups?

II. METHODOLOGY

A. Study Design

The quasi-experimental research design, specifically the pre-posttest design was employed, since the objective of the study was to compare the effectiveness of the unstructured and structured grouping schemes in reinforcing students' Mathematics achievement.

The following shows the design of the experiment:

Group	Pretest	Treatment	Posttest
A	O_1	X_1	O_2
B	O_3	X_2	O_4

where:

A = Structured group
B = Unstructured group
O_1 = pretest scores of the structured group
O_2 = posttest scores of the structured group
O_3 = pretest scores of the unstructured group
O_4 = posttest scores of the unstructured group
X_1 = Structured grouping scheme
X_2 = Unstructured grouping scheme

This design involves two groups, the structured and unstructured groups. The researcher identified the section assigned to the structured grouping and unstructured grouping schemes through tossing of a coin.

Moreover, both groups were given pretest and posttest. The unstructured grouping scheme was employed to the second section of first year students while the structured grouping scheme was employed to the first section of the first year students.

B. Participants and Sampling Procedure

The study was conducted at the College of Teacher Education of Cagayan State University Lal-lo Campus for the Second Semester of School Year 2015-2016.

The participants of the study were the two sections of BSE/BEE I students. The BSE/BEE I students has a total population of 164 but not all were taken as participants.

The first two sections were utilized in the study. To ensure that both groups have the same entry level, pairing scheme was done. The number of possible pairs taken based from their grade in Mathematics 11 (Basic and Contemporary Mathematics) determined the total participants in the study. The students from the two different sections with the same grade in Mathematics 11 make one pair. There were 20 pairs of students that were taken from the two sections.

C. Research Instruments

The research instruments used in this study were the teacher-made achievement test and the Mathematics activity worksheets.

The teacher-made achievement test which consists of 40-item questions intends to measure the respondents' entry knowledge on College Algebra specifically on Rational Algebraic Expressions and Radicals, Functions and Relations, Linear and Quadratic Equations, and Inequalities. The 40-item constructed achievement test was pre-tested to the third section of first year Teacher Education students for its reliability and was subjected for item analysis. Among the 40-item achievement test, there were 23 good items and 17 items were improved because some were easy items and some others were difficult items. After the item analysis, the reconstructed test was used as the pretest. A parallel set of items was constructed for the posttest of the students who were involved in the study.

Another research instrument that was developed and validated was the Mathematics activity worksheets which were utilized to compare the effectiveness of structured and unstructured grouping scheme in improving students' Mathematics achievement.

The teacher designed the activity worksheets to promote Mathematics understanding by having students practice, manipulate, reason, and solve problems. Such Mathematics activities may help students make connections across Mathematics skills and concepts. The activity worksheets include the following parts:

a. Topic/Title of the Activity – states the lessons to be learned in performing the group activity.

It covers the lessons on Rational Algebraic Expressions and Radicals, Functions and Relations, Linear and Quadratic Equations, and Inequalities.

b. Description of the Activity – it is a brief information on how the activity is performed and the specific purpose of the activity.

c. Learning Objectives – statements of learning outcomes describing what the learner should manifest after conducting the group activity.

d. Materials – list of instructional devices and materials needed in executing the group activity.

e. Procedures – steps or mechanics to be followed by the students in performing the group activity.

f. Guide Questions – thought provoking questions that assist students to learn or to reinforce the underlying concepts in the group activity.

After the appropriate design of the Mathematics activity worksheets was identified, the researcher developed the materials. The activity worksheets were patterned from the Philippine-Australia Science and Mathematics Education project of UP-ISMED, BSE and PASMEP staffs. Rational Algebraic Expressions and Radicals, Functions and Relations, Linear and Quadratic Equations, and Inequalities were the topics included in the activity worksheets.

The activity worksheets were then reproduced and the researcher sought the expertise of her colleagues in the University who were teaching the same subject to critique the activity worksheets. Other technical experts were also requested to give comments and suggestions for the improvement of the materials. Following the comments and suggestions given by the evaluators, necessary revisions was done by the researcher. The students who were not participants of the study were requested to try the activity worksheets to further validate its effectiveness.

D. Data Gathering Procedure

The following were the steps done in the conduct of the study:

1. A letter was forwarded to the Associate Dean of the College of Teacher Education, Cagayan State University, Lal-lo Campus to request permission for the conduct of the study.
2. The researcher also asked the consent of the first two sections of BSE/BEE 1 students to be the respondents of the study. Two first year classes of CSU Lal-lo, College of Teacher Education comprised the participants. The two classes were randomly assigned to the two treatments, namely, unstructured and structured grouping schemes.

   In the class where structured grouping scheme was employed, the composition of groups was determined first before the start of the study. These groups remain intact all throughout the conduct of the study. In the structured grouping scheme, participants were ranked according to their average grade in Mathematics 11. Then, they were assigned to the different groups so that groups' mean grade were more or less the same from group to group. Thus, each group has its share of high-ranking and low-ranking students. For the first session, the two highest ranking students of each group were assigned as the leader and the secretary. For the succeeding lessons, the members who attained the highest scores in the formative tests acted as leaders and secretaries. In the class who were subjected to the unstructured grouping scheme, the students were asked to name four classmates whom they would like to work with. The lists will become the basis for subdividing the class into small groups. The group leader and secretary were chosen by the members of a group.
3. At the start of the second semester SY 2015-2016, the two classes were taught until they were ready for the study of Rational Algebraic Expressions and Radicals, Functions and Relations, Linear and Quadratic Equations, and Inequalities. Then the pretest was administered for the first time.
4. The same lessons were taught to the two classes. The researcher taught the structured group at 10:00 AM to 11:00 AM and the unstructured group at 11:00 AM to 12:00 Noon every Monday, Thursday and Friday. In contrast to the traditional teacher-centered approach, a greater part of each teaching/learning session was spent by the students in small groups that worked independently during the group activity periods. A member acted as the leader of the group. The members shared their learning on the topic/lesson discussed by the teacher for the day and they performed the activities in the activity sheets. A group secretary prepared a report on the group's solutions and answers to the problems. The other members of the group acted as time keeper and encourager. The teacher would discuss/interact with the various groups when needed. This is why the teacher prepared activities and discussion guides which became a regular part of the instructional program.
5. When both classes finished the lesson on Rational Algebraic Expressions and Radicals, Functions and Relations, Linear and Quadratic Equations, and Inequalities, the achievement test was again administered.
6. Item analysis was employed to the posttest results to determine the difficulties encountered by the students in the group activities.
7. At the end of the experiment, the scores of the two classes in the Achievement tests were compared using the t-test.

E. Data Analysis

The data were gathered, tallied, analyzed and interpreted according to the objectives of the study. Descriptive and inferential statistics like frequency count, percentage, mean and t-test were used to interpret the data. More specifically, the data were treated using the following:

Frequency count. This was used to present the students' scores in the pretest and posttest. The results of the pretest and posttest of the students in both groups were checked and tabulated to compare their performance. To interpret the raw scores of the students in both groups on the pre and post tests, the following arbitrary scale were used:

Table I. Arbitrary scale to interpret the raw scores of students in the pretest and posttest

SCORES	DESCRIPTIVE VALUE
33 – 40	Excellent
25 – 32	Very Satisfactory
17 – 24	Satisfactory
9 – 16	Fairly Satisfactory
0 – 8	Poor

Mean. This was used to determine the average of the in the pretest and posttest of both the unstructured and structured groups.

t-test for dependent samples. It was used to compare the difference between the pretest and posttest scores of the students in the two groups.

t-test for independent samples. This was used to compare the mean difference of the pretest and posttest scores of the unstructured and structured grouping classes.

All hypotheses were tested at 0.01 level.

III. RESULTS AND DISCUSSION

A. Pretest and Posttest Scores of Students in College Algebra

As indicated in Table II, with respect to the pretest scores, majority of the students from the structured and unstructured groups have fairly satisfactory performance which comprise 75% of the participants in each group.

The table further reveals that the structured and unstructured groups had mean pretest scores of 10.80 and 11.20, respectively. The mean ratings indicate that both groups had a fairly satisfactory Mathematics performance before the conduct of the study; although the unstructured group's mean score is higher than the structured group's overall mean score. The result shows that the competency level of first year students in College Algebra is low. This finding implies that students have not adequately learned the basic mathematical skills during their high school.

On the other hand, based on the posttest scores, the table also shows that majority or 70% of the students from the structured group had satisfactory performance. Whereas, in the unstructured group, majority or 60% of the respondents had very satisfactory performance.

Furthermore, the table shows that the structured group and unstructured group obtained mean scores of 20.65 and 24.30, respectively, both of which reflect a satisfactory performance. Although, the posttest mean performance of the unstructured group is higher than the structured group. The data reveal that the Mathematics performance of both groups improved after the experimentation. This result evidently manifests and agrees with the findings of Belango (2014) that employing a variety of instructional strategies in Mathematics teaching could enhance the Mathematics performance of the learners.

Table II. Pretest and posttest scores of the students in the structured and unstructured groups

Tests	Grouping Scheme	Mean Score	SD	Computed t Value	P Value	Interpretation
Pretest	Structured	10.80	3.22	0.39	0.69	Not Significant
	Unstructured	11.20	3.21			

B. Comparison between the Students' Pretest Scores in the Achievement Test in each group

As reflected on table III, the pretest scores of the two groups yielded a computed t-value of 0.39 and a probability value of 0.69 at 0.01 level. This finding means that there is no significant difference between the Mathematics performances of the two groups before their exposure to group activities. This finding signifies that the participants are initially comparable in terms of their Mathematics performance prior to the conduct of the activity.

Table III. T-test on the significant difference of the pretest scores of the unstructured and structured groups in the achievement test.

Group	Score Range	Pretest		Posttest		Descriptive Interpretation
		F	%	F	%	
Structured Grouping Scheme	25-32			3	15	Very Satisfactory
	17-24	1	5	14	70	Satisfactory
	9-16	15	75	3	15	Fairly Satisfactory
	0-8	4	20			Poor
	Total	20	100	20	100	
	Mean Score	10.80 (Fairly Satisfactory)		20.65 (Satisfactory)		
Unstructured Grouping Sceme	25-32			12	60	Very Satisfactory
	17-24	2	10	7	35	Satisfactory
	9-16	15	75	1	5	Fairly Satisfactory
	0-8	3	15			Poor
	Total	20	100	20	100	
	Mean Score	11.20 (Fairly Satisfactory)		24.30 (Satisfactory)		

C. Unstructured Grouping Scheme VS Structured Grouping Scheme

The Table IV reveals that the posttest scores of the unstructured and structured groups recorded a computed t-value of 2.79 and a probability value of 0.01 at 0.01 level. Hence, there is a significant difference between the Mathematics performances of the two groups after their exposure to group activities. Those students in the unstructured grouping scheme performed better than those in the structured group as supported by the means. This finding signifies that Unstructured Grouping Scheme is more effective to enhance Mathematics performance better. It implies that the students' effective way of learning through group work is achieved when they are unstructured to choose their group members during the group activity. In this case, the members whom they work with could be their friends or someone whom they are comfortable to work with.

Furthermore, this result contradicts the findings of Gillies (2004). Gillies found that students in structured groups were more willing to work with others on assigned tasks and provide assistance to their peers than the students in the unstructured groups.

Table IV. t-test on the significant differences of the posttest scores of the unstructured and structured groups in the achievement test.

Tests	Grouping Scheme	Mean Score	SD	Computed t Value	P Value	Interpretation
Posttest	Structured	20.65	3.75	2.79	0.01	Significant
	Unstructured	24.3	4.49			

D. Comparison between the Students' Pretest and Posttest Scores in the Achievement Test of the Structured and Unstructured Groups

As shown in Table V, the pretest mean score of 10.80 of the structured group is lower than the posttest mean score of 20.65. The t-test yielded a t-value of 10.06, which has an associated probability of 0.00.

Similarly, the pretest mean score of 11.20 of the unstructured group is lower than the posttest mean score of 24.30. The t-test yielded a t-value of 15.38, which has an associated probability of 0.00, the obtained probability value leads to the rejection of the null hypothesis thus, indicating that a significant difference exists on the pretest and posttest scores of the unstructured and structured groups.

On the whole, the finding means that the cooperative learning strategy is effective in enhancing learning of the concepts and skills covered in the course. Both grouping schemes have positively influenced Mathematics learning. Whatever grouping scheme is used, both can contribute to enhance Mathematics performance. Thus, the use of cooperative learning as a strategy significantly increases learning of Mathematics.

Table V. T-test on the significant differences of the posttest scores of the structured and unstructured groups in the achievement test.

Grouping Scheme	Test	Mean	Standard Deviation	Computed t Value	P Value	Interpretation
Structured Grouping Scheme	Pretest	10.80	3.22	10.06	0.00	Significant
	Posttest	20.65	3.75			
Unstructured Grouping Scheme	Pretest	11.20	3.21	15.38	0.00	Significant
	Posttest	24.30	4.49			

E. Difficulties Encountered by the Students in the Unstructured Grouping Scheme

Table VI. Difficulties Encountered by the Unstructured Group in the Post Achievement Test

Item Number	Frequency	Level of Difficulty	Descriptive Interpretation
1	18	0.90	Very Easy
2	12	0.60	Moderately Difficult
3	16	0.80	Easy
4	16	0.80	Easy
5	4	0.20	Very Difficult
6	4	0.20	Very Difficult
7	10	0.50	Moderately Difficult
8	14	0.70	Easy
9	14	0.70	Easy
10	15	0.75	Easy
11	9	0.45	Moderately Difficult
12	11	0.55	Moderately Difficult
13	9	0.45	Moderately Difficult
14	13	0.65	Easy
15	15	0.75	Easy
16	17	0.85	Very Easy
17	15	0.75	Easy
18	13	0.65	Easy
19	15	0.75	Easy
20	5	0.25	Difficult
21	15	0.75	Easy
22	16	0.80	Easy
23	9	0.45	Moderately Difficult
24	15	0.75	Easy
25	15	0.75	Easy
26	13	0.65	Easy
27	14	0.70	Easy
28	9	0.45	Moderately Difficult
29	5	0.25	Difficult
30	15	0.75	Easy
31	14	0.70	Easy
32	4	0.20	Very Difficult
33	16	0.80	Easy
34	3	0.35	Difficult
35	12	0.60	Moderately Difficult
36	5	0.25	Difficult
37	15	0.75	Easy
38	16	0.80	Easy
39	15	0.75	Easy
40	15	0.75	Easy

Table VI reveals the difficulties encountered by the students in the unstructured grouping scheme. Among the 40-item post achievement test, the participants find 2 items as Very Easy items, 23 Easy items, 8 Average or Moderately Difficult items, 4 Difficult items and 3 Very Difficult items.

F. *Difficulties Encountered by the Students in the Structured Grouping Scheme*

Table VII. Difficulties Encountered by the Structured Group in the Post Achievement Test

Item Number	Frequency	Level of Difficulty	Descriptive Interpretation
1	16	0.80	Easy
2	12	0.60	Moderately Difficult
3	12	0.60	Moderately Difficult
4	9	0.45	Moderately Difficult
5	5	0.25	Difficult
6	5	0.25	Difficult
7	15	0.75	Easy
8	14	0.70	Easy
9	11	0.55	Moderately Difficult
10	13	0.65	Easy

11	9	0.45	Moderately Difficult
12	9	0.45	Moderately Difficult
13	13	0.65	Easy
14	15	0.75	Easy
15	9	0.45	Moderately Difficult
16	11	0.55	Moderately Difficult
17	12	0.60	Moderately Difficult
18	14	0.70	Easy
19	13	0.65	Easy
20	9	0.45	Moderately Difficult
21	10	0.50	Moderately Difficult
22	10	0.50	Moderately Difficult
23	10	0.50	Moderately Difficult
24	12	0.60	Moderately Difficult
25	8	0.40	Difficult
26	8	0.40	Difficult
27	12	0.60	Moderately Difficult
28	11	0.55	Moderately Difficult
29	12	0.60	Moderately Difficult
30	13	0.65	Easy
31	6	0.30	Difficult
32	5	0.25	Difficult
33	6	0.30	Difficult
34	7	0.35	Difficult
35	7	0.35	Difficult
36	3	0.15	Very Difficult
37	15	0.75	Easy
38	9	0.45	Moderately Difficult
39	11	0.55	Moderately Difficult
40	13	0.65	Easy

Table VII reveals the difficulties encountered by the students in the structured grouping scheme. Among the 40-item achievement test, the participants find 11 Easy items, 19 Average or Moderately Difficult items, 9 Difficult items and 1 Very Difficult item.

G. Comparison of the Difficulties Encountered by the Unstructured and Structured Group

Table VIII shows the comparison of the difficulties encountered by the participants in the unstructured and structured grouping schemes.

The students in the unstructured group find difficulty on the topics Simplifying Expressions with Rational Exponents to Radicals and vice versa. They also find difficulty on the topics Composition of Functions, Solving Quadratic Equations and Solving Word Problems on Quadratic Equation. On the other hand, participants in the structured grouping scheme find difficulty on the topics Simplifying Expressions with Rational Exponents to Radicals and vice versa. They also find difficulty on the topics Solving Linear Equations and Solving Word Problems on Linear Equation, Solving Quadratic Equations and Solving Word Problems on Quadratic Equation.

As a whole, both groups find difficulty on the topics Simplifying Expressions with Rational Exponents to Radicals and vice versa. They also find difficulty on the topics Solving Quadratic Equations and Solving Word Problems on Quadratic Equation.

Table VIII. Comparison of the Difficulties Encountered by the Unstructured and Structured Groups in the Post Achievement Test

Item Number	Unstructured Group	Structured Group
1	Very Easy	Easy
2	Moderately Difficult	Moderately Difficult
3	Easy	Moderately Difficult
4	Easy	Moderately Difficult
5	Very Difficult	Difficult
6	Very Difficult	Difficult
7	Moderately Difficult	Easy
8	Easy	Easy
9	Easy	Moderately Difficult
10	Easy	Easy
11	Moderately Difficult	Moderately Difficult
12	Moderately Difficult	Moderately Difficult
13	Moderately Difficult	Easy
14	Easy	Easy
15	Easy	Moderately Difficult
16	Very Easy	Moderately Difficult
17	Easy	Moderately Difficult
18	Easy	Easy
19	Easy	Easy
20	Difficult	Moderately Difficult
21	Easy	Moderately Difficult
22	Easy	Moderately Difficult
23	Moderately Difficult	Moderately Difficult
24	Easy	Moderately Difficult
25	Easy	Difficult
26	Easy	Difficult
27	Easy	Moderately Difficult
28	Moderately Difficult	Moderately Difficult
29	Difficult	Moderately Difficult
30	Easy	Easy
31	Easy	Difficult
32	Very Difficult	Difficult
33	Easy	Difficult
34	Difficult	Difficult
35	Moderately Difficult	Difficult
36	Difficult	Very Difficult
37	Easy	Easy
38	Easy	Moderately Difficult
39	Easy	Moderately Difficult
40	Easy	Easy

H. Intervention Measures Formulated to Address the Students' Difficulties in College Algebra

Table IX. Intervention Measures Formulated to Address the Unstructured and Structured Groups' Difficulties in College Algebra

Topics	Intervention Measures
Simplifying Expressions with Rational Exponents to Radicals and vice versa	The researcher will construct modules on Simplifying Expressions with Rational Exponents to Radicals and vice versa. Module is a self-instructional package dealing with one specific subject in convenient form. Modular approach as a form of instruction can be employed so that the students could learn at their own pace and they also assume responsibility for their own learning. The students can go over and over the topics they less understand.
Composition of Functions	Simulation activities on Composition of Functions will be prepared by the researcher. The students are obliged to participate in games and simulation activities so that they will understand the process, skills and application to reality. This is supportive to higher order knowledge and skills rather than rote memorization. The simulation activities will be composed of goal directed actions that must be undertaken to fulfill the objectives of the lesson. Relating realistic event to concept in Mathematics through simulation activities will ease the delivery of the lesson. Students learn Mathematics best when they approach the subject as something they enjoy. Speed pressure, timed testing and blind memorization pose high hurdles in the pursuit of Mathematics.
Solving Linear Equations and Solving Word Problems on Linear Equation	Remedial teaching can be done by the researcher since it assists students in order to achieve expected core competencies. Before preparing the lessons, the remedial teacher will identify the students' diverse learning needs so that she may design appropriate teaching plans to facilitate students' effective learning. Since the students have different characteristics in learning, the teacher must devise different learning activities with the same teaching objective to develop students' varied abilities and skills in problem solving. The teacher will give concrete examples before proceeding to abstract concepts by way of simple and easy steps at a pace in line with the learning abilities of students. The teacher may teach new concepts from different perspectives by various approaches so that students can grasp the ideas through meaningful and repeated illustrations.
Solving Quadratic Equations and Solving Word Problems on Quadratic Equation	Students with learning difficulties are less competent in understanding written language, therefore, the remedial teacher will give students short and clear instruction to avoid confusion. Students may encounter different problems on Solving Linear and Quadratic Equations and Solving Word Problems, remedial teacher should observe the learning process of individual student in class. Whenever necessary, she will provide individualized teaching before and after the class so that the students can remove their learning obstacles as soon as possible.

IV. SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

A. Summary of Findings

The main concern of this study was to compare the structured and unstructured grouping schemes in Mathematics instruction in terms of their effectiveness in reinforcing students Mathematics achievement of first year College of Teacher Education students enrolled in College Algebra at Cagayan State University, Lal-lo Campus, for second semester school year 2015-2016.

Based on statistical analysis, this study yielded the following findings:

1. Mathematics performance in College Algebra of the two groups of students based on the pretest and posttest results

Both the unstructured group and the structured groups had a Fairly Satisfactory Mathematics performance as reflected in their mean scores before their exposure to the cooperative learning strategy.

The unstructured group and the structured group had a Satisfactory Mathematics performance after their exposure to the cooperative learning strategy.

2. The t-test analysis between the unstructured and structured groups' pretest

There is no significant difference between the pretest scores of the unstructured and structured groups.

3. The t-test analysis between the unstructured and structured groups' posttest

There is a significant difference between the posttest scores of the unstructured and structured groups.

4. Test of significant difference between the Mathematics performance of the unstructured and structured groups

There is a significant difference in the Mathematics performance of the unstructured group and the structured group before and after their exposure to cooperative learning strategy. The unstructured and structured groups had a fairly satisfactory Mathematics performance before their exposure to the group activities and had significantly improved to a very satisfactory level of Mathematics performance after the integration of group work.

5. Difficulties encountered by the unstructured group on the post achievement test

Among the 40-item post achievement test,

the participants in the unstructured grouping scheme find 2 items as Very Easy items, 23 Easy items, 8 Average or Moderately Difficult items, 4 Difficult items and 3 Very Difficult items.

6. Difficulties encountered by the structured group on the post achievement test

Among the 40-item post achievement test, the participants in the structured grouping scheme find 11 Easy items, 19 Average or Moderately Difficult items, 9 Difficult items and 1 Very Difficult item.

7. Comparison on the difficulties encountered by the participants in the unstructured and structured grouping schemes

The students in the unstructured group find difficulty on the topics Simplifying Expressions with Rational Exponents to Radicals and vice versa. They also find difficulty on the topics Composition of Functions, Solving Quadratic Equations and Solving Word Problems on Quadratic Equation.

On the other hand, participants in the structured grouping scheme find difficulty on the topics Simplifying Expressions with Rational Exponents to Radicals and vice versa. They also find difficulty on the topics Solving Linear Equations and Solving Word Problems on Linear Equation, Solving Quadratic Equations and Solving Word Problems on Quadratic Equation.

As a whole, both groups find difficulty on the topics Simplifying Expressions with Rational Exponents to Radicals and vice versa. They also find difficulty on the topics Solving Quadratic Equations and Solving Word Problems on Quadratic Equation.

8. Intervention measures formulated to address the students' difficulties in College Algebra

B. Conclusion

Based on the findings of the study, it is concluded that the integration of cooperative learning strategy, either structured or unstructured grouping enhances the Mathematics performance of students. However, the cooperative learning has far better results when unstructured grouping scheme is employed among students.

C. Recommendations

In view of the findings and conclusions of the study, the following recommendations were made:

1. Cooperative learning employing the unstructured grouping scheme should be recommended to Mathematics teachers to encourage and promote active learning, thereby enhancing Mathematics performance of students.
2. The cooperative learning strategy is just one of the many ways to introduce the lesson, it is further recommended that the University through the Mathematics Department should establish linkages with other agencies to be updated with the latest trends in Mathematics teaching.
3. To attain the objectives of the college freshmen Mathematics instruction, University administrators concerned should support the use of cooperative learning through unstructured grouping scheme to develop globally competitive learners equipped with 21st century skills and values.
4. Since the study dealt only on college freshmen Mathematics students, it is recommended that the cooperative learning through unstructured grouping scheme should also be used in other Mathematics subjects.
5. Future researchers should conduct parallel studies in other areas of Mathematics or other subjects to include other variables that may affect the effectiveness of cooperative learning through unstructured grouping scheme.

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