

USING COOPERATIVE LEARNING TO TEACH THE CONCEPT COLLECTING AND HANDLING DATA IN MATHEMATICS IN BASIC SCHOOL

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Abstract — *This study sought to use cooperative learning to enhance the understanding of JHS 2 pupils in a Basic School of Assin North Municipality on the concept of collecting and handling data in mathematics. The study used action research as the research design. 20 JHS 2 pupils in a Basic School of Assin North Municipality were purposively selected as the sample size. Purposive sampling procedure was used to select the sample for this study. Test and observation were the research instruments used to collect data for this study. The data gathered from test and observation were analyzed quantitatively using of descriptive statistics such as frequency distribution table, mean, percentages and pie charts. It was concluded that cooperative learning activities helped pupils to understand the concept of collecting and handling data in mathematics. Cooperative learning leads to better group activity, improved attitudes and increased in school achievements. It was also concluded that groups which were given the same task as their group assignment performed better than those groups which were not given the same task as their group assignment. It was therefore recommended that, teachers and other educators should use cooperative learning to enhance pupils understanding of the concept collecting and handling data in mathematics. Also, teachers should employ the use of cooperative learning activities in large class sizes to maximize school performance.*

Index Terms — *cooperative learning, collecting and handling data, mathematics, basic school, teaching*

I. INTRODUCTION

It is in the field of Mathematics where cooperative learning has been used more, perhaps due to the high level of failure that this subject involves in almost all the countries in the world. Mathematics is a subject, initially, pupils or students like less. Collecting and handling data is a concept that is taught from kindergarten two through primary school to the Junior High School (JHS) and beyond levels of education in Ghana. According to Curriculum Research and Development Division (CRDD, 2012), pupils in JHS 2 are to learn the concept of collecting and handling data in mathematics.

In teaching of mathematics, it was observed by the researchers that, teaching method used by the teacher mostly concentrated on whole class with very little concentration for the individuals or small groups. According to National Council of Teachers of Mathematics (NCTM, 1989), there is the need for change in teaching. That is, instead of traditional lecture method where teachers ‘tell’ pupils information that they are to ‘remember’, teachers are rather encouraged to introduce learning activities where pupils are able to construct their own knowledge. So, teachers can incorporate active learning in their classroom by structuring opportunities for pupils to learn together in small groups. In order for teachers to create active learning environment, the NCTM (1991) pointed out that, learning should be created to promote active learning and teaching. That is, active learning can be done in a classroom discourse which involves the individual, small group and whole group learning. Cooperative learning is an instructional arrangement that can be used to raise active learning of pupils which is an important dimension of mathematics learning and highly recognized by mathematics educators and researchers. Pupils can be given tasks to discuss, solve problem and accomplish whenever one use cooperative learning strategy to teach mathematics.

Also, other researches have pointed out that when classroom learning activities are organize in a cooperative way, learning tasks are structured such that pupils collaborate, there are more positive effects in the co-existence, motivation and school performance than when learning activities are structured in an individual or competitive way (Echeita & Martin, 1990). Johnson and Johnson (1987) stated that, working cooperatively increases the motivation to learn and activity in class. So, when pupils learn using cooperative learning it makes them understand concepts better than learning individually or whole class. According to Diaz Aguado (1996) and Buchs and Butera (2001) cooperative learning is identified as the efficient or alternative method to answer the problems socialization, motivation and school performance that are often found in class. Entonado and Garcia (2003) also pointed out that, pupils’ interest in mathematics increases when cooperative learning method is used to teach. Cooperative learning also, promotes teamwork as pupils develop collaborative and mutual helping attitude. Teachers can use cooperative learning activities to assist pupils make relations between the concrete and abstract level of instructions through peer interactions and cautiously designed activities.

The available literature on cooperative learning indicates that, cooperative learning involves pupils learning in small groups consisting of two to six members in a group. The learning tasks in which pupils are engaged require that the pupils mutually and positively depend on one another and on the group's work as a whole. The learning environment offers all members of the group an equal opportunity to interact with one another concerning the learning tasks and encourages them to communicate their ideas in various ways, for example, verbally (Artzt & Newman, 1990; Sutton, 1992). Robertson, Davidson and Dees (1994) point out that, cooperative learning provided pupils with opportunity in which pupils can ask, discuss, rectify, receive new ideas and summarize acknowledgements. Thus, it constitutes a suitable environment for all pupils to be successful and progress since they are stimulated by the different contributions that emerge in the bosom of cooperation. Besides, it becomes an essential social mechanism of support in order to learn mathematics. Also, Johnson and Johnson (1990a) opined that, mathematics learning under cooperative method, pupils work systematically with this technique shows improvement in the use of reasoning strategies, the ability to generate new ideas, the appropriate solution to problems and the ability to transfer what is learnt in the group to the individual solution of problems.

Researches done by Entonado and Garcia (2003) and Leikin and Zaslavsky (1999) on cooperative learning in mathematics teaching suggest that, pupils with different levels of ability become more involved in task related interactions as a result of cooperative learning and that pupils' attitudes toward school and toward the discipline become more positive. While learning mathematics in cooperative learning settings, pupils often improve their problem solving abilities, solve more abstract mathematical problems, and develop their mathematical understanding. Also, pupils interact more effectively when put in small groups than larger groups (Garfield, 1993). The convenience of using techniques of cooperative learning in mathematical processes require an active learning process that emerges easily in pupils' discussions. The solution of mathematical problems involves an interpersonal work and most pupils feel more comfortable clarifying their thought in small groups, rather than in the discussions of the whole class. Discussing problems with classmates helps students to understand how to solve them in an adequate way (Johnson & Johnson, 1990a).

However, the traditional way of teaching mathematics has been based on the assumption that pupils are passive subjects that store what they learn as the result of repeated practice and reinforcement (Keyser, 2000). These studies did not stipulate how to use cooperative learning to teach the concept collecting and handling data in mathematics. The JHS 2 pupils in a Basic School of Assin North Municipality performance on collecting and handling data in mathematics was identified to be poor. Considering the impact of cooperative learning, a question was asked whether mathematics teachers use cooperative learning to enhance JHS 2 pupils understanding of the concept collecting and handling data in mathematics in the Basic School? To answer this question, the study was conducted using cooperative learning to enhance the understanding of the concept collecting and handling data in mathematics in a Basic School of Assin North Municipality. This study sort to examine how to use cooperative learning to enhance the understanding of the concept collecting and handling data in mathematics in the Basic School. It also find out how different tasks given to different groups in cooperative learning can influence JHS 2 pupils performance of the concept of collecting and handling data in mathematics.

II. METHODS

Action research was used as the research design for this study. The sample size used for this study was twenty (20) JHS 2 pupils in a Basic School of Assin North Municipality. The sample consists of 8 boys representing 40% and 12 girls representing 60%. The average age of the pupils is fourteen years. The 20 pupils were purposively selected from the JHS 2 class. Following the process of purposive sampling, the researchers used the results of each pupil's mathematical achievement level as determined by their previous year's assessment and it was used to rank the target group of the school. The top 5 boys and 5 girls and the bottom 7 girls and 3 boys were selected to participate in the study. The researchers used the top ten participants as high achievement level participants and the bottom ten as low achievement level participants.

2.1 Research Instruments

The research instruments used to collect data for this study were test and observation. Test consisted of pre-test and post-test. Pre-test was used to diagnose the JHS 2 pupils' difficulties of the concept of collecting and handling data in mathematics, and the post-test was used to assess the effectiveness of the cooperative learning to enhance the JHS 2 pupils' understanding of the concept of collecting and handling data in mathematics. Observation was chosen because, it is way of collecting data on the subject by watching participants, listening and recording what they observe rather than asking questions. The researchers used structured observation which has observational guide to follow to collect the data. The test questions and observational guide were developed, formatted and submitted to two senior tutors of Foso College of Education for their comments and enhancement of the instruments.

2.2 Data Collection Procedure

The data of this study were collected by pre-intervention, intervention and post-intervention stages. The data collection took four weeks to complete. The pre-intervention used pre-test to collect data before the intervention stage was carried out and post-intervention used post-test to collect data after the intervention was carried out. The pre-intervention and post-intervention activities were conducted in the first and last weeks of the data collection respectively. The observations were done in the pre-intervention and post-intervention stages.

2.2.1 Pre-Intervention Stage

The researchers prepared a comprehensive note on collecting and handling data that deals with representing data on pie charts and bar graphs. The researchers taught the lesson using the demonstration method and whole class discussion. This was because the researchers had in mind that, chalkboard illustrations help the pupils to understand the concept of collecting and handling data. The lesson was well taught but the pupil's participation and contribution were not encouraging and making the lesson to be teacher centred.

After the lesson, the researchers gave the pre-test questions to the pupils and allowed the pupils 45 minutes to answer the questions. The questions were answered on pieces of papers. The researchers then collected the papers, marked and scored all in the week. These activities were done to confirm the problem identified among the JHS 2 pupils in a Basic School of Assin North Municipality. Again, the researchers observed the behaviour of pupils in responding to problems involving collecting and handling data using observation guide.

2.2.2 Intervention Stage

The researchers used cooperative learning approach sessions for a period of two (2) weeks. Each teaching session lasted for 70 minutes. Four (4) small cooperative groups of five (5) pupils were formed by combining high achievement level pupils with low achievement level pupils. Pupils were made to understand that they are working in groups but must be willing to help any group member who ask for help. Pupils were made aware that problems can be solved in different ways, therefore as a group they should learn from one another by comparing solutions and explaining solutions to the group. Then, the pupils were made to present their solutions as a group. In carrying this intervention, the researchers observed the pupils involvement attitude and collaboration in cooperative learning.

Week one: The pupils were introduced to sources of data and how to collect data with the objectives below. By the end of the lesson, a pupil will be able to mention at least four sources of data and how it can be collected. Sample assessment results and bottle tops of assorted soft drinks were used as teaching-learning materials.

Activity 1: Lesson was introduced to pupils by asking them to mention the marks they obtained in their previous class test. For example, 1, 2, 3, ..., 10. Pupils were asked in their groups to group the marks into simple frequency distribution and present as a group.

Activity 2: Teacher distributed bottle tops of some soft drinks for example, Coca-Cola, sprite etc. to pupils in their various small groups and asked pupils to sort them out and record their results in a tabular form. Teacher again distributed sample assessment results to pupils and asked them to organize the results sheets into simple frequency distribution table individually, compare their answers by discussing and presented it as a group to the class.

Activity 3: Teacher guides pupils in their various cooperative groups to give other sources of data in their immediate environment such as pupil's height, weight etc. Teacher acts as a co-learner and at the same time a facilitator. Group members were asked to present their work. Each group member interacted freely with one another in the groups, presented their work as a group to the class and added up key points that were different to their points. Teacher further led pupils to understand that data can be any real number such as information from survey e.g. import and exports. The teacher applauded the pupils and brought the lesson to an end by assisting the pupils to summarize the outstanding points discussed.

Week 2: Pupils were introduced to graphical representation of data, that is, pie and bar charts with the following objectives; by the end of the lesson, a pupil will be able to:

- a. Draw a pie chart
- b. Represent data using bar chart

Teacher introduced the lesson by assisting the pupils to understand how data can be represented graphically depending on the data and the purpose for which it intended for. A pie chart is used to represent a given data pictorially, using sectors of a circle. The teacher taught the lesson using cooperative learning and encouraged the small groups to be active participants.

Activity 1: Teacher led pupils through the steps to follow in drawing pie chart.

Step 1: find the total of the category values

Step 2: calculate the angle of each category.

$$\text{Angle of category} = \frac{\text{category value}}{\text{sum of category values}} \times 360^\circ$$

Step 3: draw the sectors on a circle diagram using the angles.

Teacher assisted the pupils to draw pie chart by following the steps;

- i. draw a circle using a pair of compasses.
- ii. draw a radius as a starting line.
- iii. use a protractor to draw the angles of each sector making sure the protractor is on the centre of the circle and measure the angle very carefully and accurately.
- iv. label each sector carefully and the size of the angle also.

Teacher assisted the pupils to follow the steps in their cooperative learning small groups as they work on task that involved the concept of drawing a pie chart.

Activity 2: Teacher gave a set of data to pupils to solve individually in their various cooperative groups. For example, the data that involves the names of people and the number of votes in an election for class prefect. The teacher assisted pupils to draw a pie chart to illustrate the information in their groups by following the given steps. Let pupils now bring their works together in their cooperative groups and discuss among themselves. Each group prepared a final work and presented it in front of the class.

Activity 3: Assign pupils to analyze and discuss and write a report on what they have learnt by representing data on pie chart. Teacher then gave them a group exercise that involved the monthly budget of a man in Ghana cedis and draw a pie chart to illustrate the information.

Activity 1: Teacher introduced to pupils a bar chart as series of parallel bars of equal width, i.e. one bar for each category. Teacher assigned pupils temporarily to new groups and task them to discuss the steps involved in drawing a bar graph. Each group learnt something new and then returned to their initial groups and taught each other the new ideas they just learned. The small groups presented their understanding as follows:

Steps to follow in drawing the bar graph or chart;

1. draw two perpendicular axes on a graph sheet and label both axes according to the category.
2. calibrate the areas taking into consideration the highest frequency.
3. mark out the width of the bars and write out the individual marks for each bar ensuring equal width for the bars.
4. construct rectangular bars on each category with its height equal to the frequency of the distribution.
5. give a title to the graph.

Activity 2: Teacher discussed with pupils the steps to follow in drawing a bar graph and then gave out a set of data to pupils to analyze and draw a bar graph with it. Groups met and presented their work when they finished. After the pupils completed the task, teacher let various groups meet as a class and group leaders led the class discussion on how they came about with their findings. Teacher assisted the pupils to summarize the lesson and gave group assignment to be submitted the following week. Groups one and two were given the same task such as data that represents the expenses of a family in a certain month and groups 3 and 4 also had the same question such as data on amount of money that some pupils have in their pockets.

The teacher allowed the pupils to cooperatively learn when the groups were introduced to different tasks. That is, groups 1 and 2 have seen the questions previously while groups 3 and 4 have not seen their questions at all. The researchers observed the pupils attitude and recorded their performance while they were working on different tasks.

2.2.3 Post-Intervention Stage

After the intervention was carried out, the researchers gave the pupils a post-test. The researchers used two sets of questions at this stage. The first set of questions were the same as questions for the pre-test to ascertain the effectiveness of the intervention. The second set of

questions were chosen from the task assigned to groups 1 and 2. This was done to justify the effectiveness of cooperative learning groups with the same task as against assigning the other groups with different task to perform.

The researchers gave the pupils 1 hour 30 minutes to answer the questions on pieces of papers. The papers were then collected, marked and marks recorded by the researchers. The researchers also used the observation guide to record the pupils' attitude and performance during intervention stage.

III. RESULTS

The results of this study were analysed using quantitative method. Both test and observational items were analysed using descriptive statistics such as frequency distribution table, percentage, mean and pie chart. The analysis of results were done to answer questions pose by the study. The results of the test and observation were analysed under the following sub-headings:

- Cooperative learning and the concept of collecting and handling data
- Effects of cooperative learning on pupils performance
- Effectiveness of cooperative learning groups with different tasks
- Observational responses on cooperative learning.

3.1 Cooperative Learning and the Concept of Collecting and Handling Data

The results of the pupils in the pre-test is presented in Table 1.

Table 1: Pupils Result of Pre-Test

Marks out of 20	Number of pupils	Percentage (%)
0 – 4	5	25
5 – 9	8	40
10 – 14	5	25
15 – 20	2	10
Total	20	100

From Table 1, it can be seen that 7 pupils representing 35% of the sample had 10 marks and above whilst 13 pupils representing 65% scored marks below 10. This indicates that, 35% of the pupils scored the pass mark and above. The mean mark for the pre-test was 8.5.

The pupils' results for the post-test is presented in Table 2.

Table 2: Pupils' Results of Post-Test

Marks out of 20	Number of pupils	Percentage (%)
0 – 4	1	5
5 – 9	1	5
10 – 14	8	40
15 – 20	10	50
Total	20	100

Table 2 showed that, 18 pupils representing 90% scored 10 marks and above whilst 2 pupils representing 10% scored marks below 10. This indicates that, 90% of the pupils scored the pass mark and above. The mean mark for the post-test was 14.0.

3.2 Effects of Cooperative Learning on Pupils Performance

The performance of pupils in the pre-test and post-test for the test item 1A which dealt with the drawing of pie chart is presented in Figure 1.

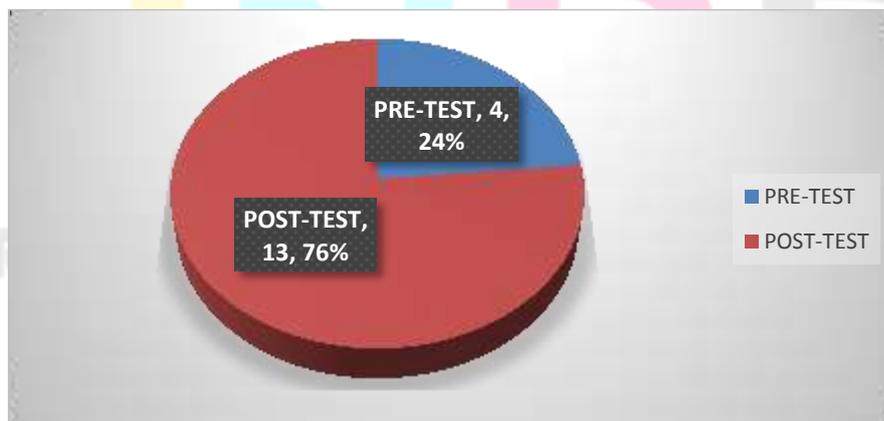


Figure 1: Performance of Pupils in Pre-Test and Post-Test for Test Item 1A

From Figure 1, it can be seen that 4 (24%) pupils scored test item 1A correctly in the pre-test whilst 13 (76%) pupils scored test item 1A correctly in the post-test. This show that, the performance of the pupils became better after the implementation of the cooperative learning.

The pupils' results for post-test for test item 1B which involved the construction of bar chart is presented in Figure 2.

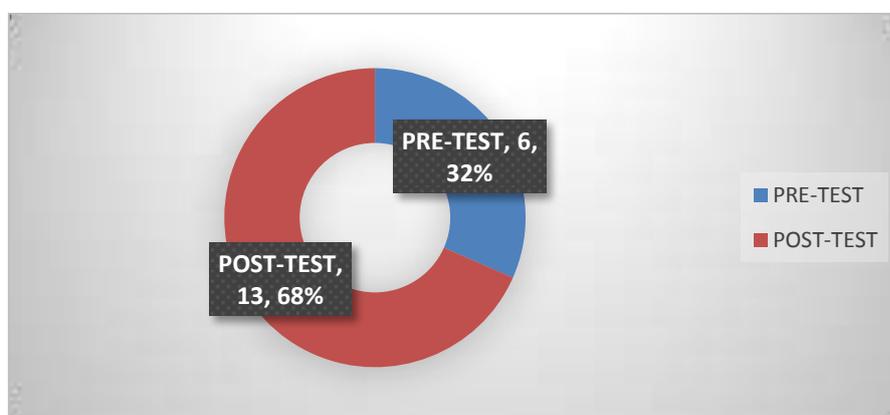


Figure 2: Performance of Pupils in Pre-Test and Post-Test for Test Item 1B

It can be seen from Figure 2 that, 13 (68%) pupils answered test item 1B correctly in the post-test whilst 6 (32%) pupils answered test item 1B correctly in the pre-test. Again, the performance of pupils in the post-test was better than that of pre-test due to cooperative learning method implemented.

3.3 Effectiveness of Cooperative Learning Groups with Different Tasks

The results of post-test for groups 1 and 2 that have seen similar questions before is presented in Table 3.

Table 3: Post-Test Results of Pupils in Groups 1 and 2

Marks out of 10	Number of pupils	Percentage (%)
0 – 4	0	0
5 – 8	8	80
9 – 10	2	20
Total	10	100

From Table 3, it can be seen that none of the pupils obtained marks below 5. This shows that 10 pupils representing 100% scored the 5 marks and above. This also shows that all the pupils in both groups scored the pass mark or above.

The results of post-test for groups 3 and 4 that have not seen such questions at all is presented in Table 4.

Table 4: Post-Test Results of Pupils in Groups 3 and 4

Marks out of 10	Number of pupils	Percentage (%)
0 – 4	3	30
5 – 8	6	60
9 – 10	1	10
Total	10	100

From Table 4, it shows that 3 pupils representing 30% scored the mark below 5 whilst 7 pupils representing 70% scored 5 marks and above. This also indicates that some of the pupils in groups 3 and 4 scored below the pass mark.

3.4 Observational Responses on Cooperative Learning

The results of the observation done by the researchers on the use of cooperative learning method in teaching the pupils is presented in Table 5.

Table 5: Observational Responses of the Pupils

Item	Responses			
	Pre-Observation		Post-Observation	
	Yes(%)	No(%)	Yes(%)	No(%)
Do pupils respond well to problems involving collecting and handling data?	4(20)	16(80)	18(90)	2(10)
Do pupils feel good working in cooperative learning groups?	7(35)	13(65)	20(100)	0(0)
Were pupils willing to assist their colleagues who are having difficulties in solving problem that involves representation of data on pie chart and bar chart?	5(25)	15(75)	20(100)	0(0)
Do pupils contribute well when doing group assignment?	4(20)	16(80)	17(85)	3(15)
Were pupils happy assigning them different task when working in cooperative groups?	0(0)	20(100)	3(15)	17(85)

Table 5 showed that, 16(80%) of the pupils were not responding well to problems involving collecting and handling data in mathematics for the pre-observation whilst 18(90%) of the pupils were responding well to problems involving collecting and handling data in mathematics for the post-observation. This shows that, cooperative learning assisted the pupils understanding to solve problems involving the concept of collecting and handling data. Table 5 also showed that, 13(65%) of the pupils were not feeling good working in cooperative learning groups during pre-observation stage whilst 20(100%) of the pupils were feeling good working in cooperative learning groups during post-observation stage. This implies that cooperative learning method made the pupils feel at ease to work with each other in the groups.

Again, Table 5 indicated that 15(75%) of the pupils were not willing to assist their colleagues who are having difficulties in solving problem that involves representation of data on pie chart and bar chart in the pre-observation stage whilst 20(100%) of the pupils were willing to assist their colleagues who are having difficulties in solving problem that involves representation of data on pie chart and bar chart in the post-observation stage. This indicates that, pupils were willing to help other colleagues to overcome their difficulties on solving problems involving representation of pie and bar charts due to cooperative learning method employed. This is supported by the research done by Garfield (1993) that pupils interact more effectively when put in small groups than larger groups

Table 5 indicated that, 16(80%) of the pupils did not contribute well when doing group assignment for the pre-observation period whilst 17(85%) of the pupils did contribute well when doing group assignment in the post-observation period. This showed that, after the pupils were taking through cooperative learning the pupils saw the need to contribute towards completion of group assignment. Also, Table 5 showed that 20(100%) of the pupils were not happy assigning them different task when working in cooperative groups and 17(85%) of the pupils were not happy assigning them different task when working in cooperative groups during pre-observation and post-observation periods respectively. This indicated that, pupils when tasked or assessed differently it has negative effect on the performance of some of the pupils and therefore, all pupils should be tasked or assessed with the same set of questions and situations.

IV. DISCUSSION

The results of this study showed that, the pupils' performance of the concept of collecting and handling data in mathematics improved after the implementation of the cooperative learning method. Tables 1 and 2 indicated that, the pupils mean mark on understanding the concept of collecting and handling data increased from 8.5 to 14.0. Also, majority of the pupils representing 90% of the pupils scored the pass mark and above in the post-test as against 35% of the pupils who scored the pass mark and above. This is in line with the research conducted by Robertson et al. (1994) that cooperative learning constitutes a suitable environment for all pupils to be successful and progress since they are stimulated by the different contributions that emerge in the bosom of cooperation.

The results in Figure 1 depicted that, majority of the pupils representing 76% scored the test item that involved pie chart correctly in the post-test as against the few of the pupils representing 24% that scored the test item involving pie chart correctly in the pre-test. The results in Figure 2 showed that, majority (68%) of the pupils scored correctly the test item involving bar chart in the post-test and few (32%) of the pupils scored correctly the test item involving bar chart in the pre-test. This indicates that, the pupils' school performance involving pie and bar charts is enhanced due to the implementation of the cooperative learning and this is in consistent with Johnson and Johnson (1990a) research which pointed out that cooperation involves a greater performance than competitiveness and individualization.

There is effect on given different tasks to different groups when using cooperative learning strategy to teach mathematics. That is, groups which were given the same task as their group assignment performed better than those groups which were not given the same task as their group assignment. This is seen in the results of Tables 3 and 4 which indicted that, all (100%) of the pupils in the groups which were given the same task as their group assignment scored the pass mark or above and 70% of the pupils in the groups which were not given the same task as their group assignment scored the pass mark or above. This implies that, in conducting cooperative learning in the classroom the groups must be given equal tasks to perform during teaching and assessment.

As indicated in Table 5, it was observed that when pupils learn in small groups using cooperative method majority representing 90% of the pupils had interest and understanding in solving problems involving the concept of collecting and handling data in mathematics; all (100%) of the pupils were supporting each other in doing the group work which is in line with proposal from Artzt and Newman (1990) and Sutton (1992). That is, in cooperative learning each member of the group has a responsibility to contribute to the group work and is accountable for the learning progress of the group; all (100%) of the pupils were seen helping other colleagues to overcome their difficulties on solving problems involving representation of pie and bar charts; majority (85%) of the pupils were seen collaborating to complete group assignment; and almost all (100%) of the pupils were seen to be unhappy to be tasked or assessed with different set of questions and situations. This was seen to have negative effect on the pupils who have not seen the task earlier performance and therefore pupils in different groups should all be assessed or tasked with the same set of questions and situations.

V. CONCLUSIONS

Cooperative learning setting helps to address teaching and learning problems teachers and pupils have and gives them the opportunities to deal with the problems they face in their classrooms. Cooperative learning activities helped pupils to understand the concept of collecting and handling data in mathematics. Also, the use of cooperative learning leads to better group activity, improved attitudes and increased in school achievements. Thus, there is great contribution of the use of cooperative learning to academic and social arena of the learning process. The groups which were given the same task as their group assignment performed better than those groups which were not given the same task as their group assignment. Pupils working together in small group encourages comparison of different solutions, supporting attitude and pupils interact effectively among themselves. In line with other studies, pupils with different level of abilities become more involved in task related interactions as a result of cooperative learning and that pupils attitudes towards school and mathematics become more positive. In dealing with cooperative learning the same set of questions and situations should be given to all groups to have equal effect on the pupils.

VI. RECOMMENDATIONS

Based on the findings of this study, it is recommended that teachers and other educators should use cooperative learning to enhance pupils understanding of the concept collecting and handling data in mathematics. Also, teachers should employ the use of cooperative learning activities in large class sizes to maximize school performance. Curriculum developers at the basic school level should emphasize the use of cooperative learning in curriculum production in mathematics in order to attain active learning among the pupils. There should be in-service training for teachers from time to time to equip them with requisite knowledge on cooperative learning and collecting and handling of data in mathematics. In addition, Colleges of Education tutors should adopt the use of cooperative learning as part of classroom activities in

order to prepare pre-service teachers who will finally become in-service teachers to acquire this skills and use it in both on-campus and off-campus teaching practices.

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