
ARTICLES

EFFECT OF COOPERATIVE SMALL GROUP MODE OF INSTRUCTION ON PRIMARY SCHOOL LEAVERS' PERCEPTION OF SCIENCE

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Abstract

This study aimed at determining the effect of cooperative small group mode of instruction on primary school pupils' perception of science. Intact classes of primary six (6) pupils consisting of 200 pupils were used for the study. The classes were randomly assigned to control and experimental groups using simple random sampling. The experimental group was taught force and motion using cooperative small group instructional mode by their class teacher while the control group was taught the same using the usual whole class instructional mode by the class teacher. The study lasted for 4 weeks. Each group was pre-tested and post-tested. Instrument for data collection was an attitude towards science arranged in a four Likert point scale with alpha coefficient ranging from 0.88 and 0.91. Data collected was analyzed using mean to answer the research question while the hypothesis was tested using Z-test of difference. Educational implications were discussed and recommendations were made.

Keyword: Cooperative small group, Mode of instruction, Primary school pupils, Experimental group, Nigeria.

INTRODUCTION

Until recently, researches are concentrated on achievement and attitude of secondary schools students to science and technology. Little or no attention is directed to the depth of primary science acquired by the students when they were in the primary school level. The importance of primary education as the bedrock of educational continuum where solid foundation for science and technology is laid cannot be overemphasized. It is in the primary school that early interest in science is laid (Rubin, 2002). In Nigeria the situation is the opposite. Primary science in our schools experiences deplorable condition. The level of input into primary science is very poor and low (Okebukola, 1996). Majority of the teachers in the primary schools are generalists (Jack and Jill's) of all trade, master/mistress of none (Ezeliora, 2005). Facilities for teaching primary science are grossly inadequate in most schools (FGN/UNICEF, 1992).

In most primary science classroom, the typical interaction profile of the science teaching processes is lecture, the traditional chalk and talk by the teacher (Okebukola, 1997). Worst still, many primary school teachers teach primary science from their table by

reading out from the textbook. The pupils are mostly passive and there is little or no interactions between the teacher and the pupils. In the midst of the above situation, perception of science by the pupils may not be wonderful since there is no hands-on interaction between the pupils and the science they were taught. This is evidenced on the poor attitude, low enrolment and performance of male and female students in sciences in secondary schools (Ezeliora, 2005; Ezech, 2005). Research has consistently demonstrated the need to improve upon traditional lecture formats because they are linked to poor attendance (Van Blerken, 1992), low quality interaction with facility or peers, little time on text or motivation and poor examination performance (Gatherer & Manning, 1998). Science educators have advocated the need to organize science learning in such a way that it takes into consideration the innate tendencies of children (Bajah, 1983). Such tendencies include: curiosity, interactive learning, learning, action manipulation, playing. These tendencies provide basic dispositions for learning science. Reviewed experimental studies including Johnson and Johnson (1981), Schmuck and Schmuck (1981), Mulryan (1994) and Jegede, Okebukola and Ajewole (1992) indicate that the use of cooperative learning results in positive cognitive and non-cognitive outcomes for students. Thus, the problem of this study put into question is: To what extent can cooperative small group learning mode of instruction influence Nigerian pupils' perception of science to achieve cognitive outcomes?

Cooperative learning according to Saddler, (1974) implies that children sit in group where they can help each other and work together. Since we live almost totally in groups, it is necessary as pointed by Nelson (1968) that we should try and solve science problems in group situation, even though learning is personal. By working in groups, students examine evidence that strongly supports explanation of phenomena (Rudge &

Howe, 2004). Having students work in small groups helps them arrive at the correct solution. As students become successful at their tasks, their confidence level soars (Rohrig, 2001) then their perception of the task become more positive. Cooperative small group learning mode is student centered and brings about interaction and active learning in the students. According to Riffell and Sibley (2003) interaction with others and immediate face-to-face interaction with the instructor are specific benefits of learning activities. It helps students to learn concepts and keeps them attentive during class; can provide them with hands on experiences with real world problems (Pratt, 2003). Cooperative small group mode of instruction involved posing question and giving students time to work on the problem. Student's answers are pulled together and the class from the lists of answers will choose the most suitable answer. It also gives the teacher opportunity to evaluate formatively students' mastery of the concept.

A typical classroom according to Baker, Bakishis and Tolere (1974) paints a picture of children with varying abilities, needs and interest. These differences such as perception manifests itself in attitude to learning and strategies of problems solving. It might be assumed that the perception and attitude to science that a child exhibits might be greatly influenced by pedagogical techniques individual teachers use during instructional process. For some time now the popularly used whole class lecture format which is teacher dominated teaching and learning process has not been necessarily effective to achieve the typical interaction profile of the science teaching process. This study wished to determine which mode of instruction generates positive perception of science among Nigerian pupils: cooperative small group instructional mode or the whole class instructional mode.

Research Question:

One research question was asked to guide the study.

To what extent has cooperative small group learning mode/whole class instructional mode influenced pupils' perception of science in Primary School?

Hypothesis:

One hypothesis was formulated to guide the study.

There is no significant difference in perception of science between pupils taught science using cooperative small group mode and whole class instruction mode.

Method: The design of the study is a quasi-experimental design involving two groups, one control group and the other experimental group. Intact classless of primary 6 pupils consisting of 200 pupils were used for the study. The classes were randomly assigned to groups using simple balloting that each group consists of 100 pupils. The two groups were pre-tested and post-tested. The experimental and control groups were taught force and motion for 4 weeks as it appeared in the class time-table for primary science. The control group was taught the unit in primary science in the usual whole class instructional mode with lecture and demonstration. The classroom environment was barraged such that interaction among pupils or teacher and pupils is very little if any. The experimental group was divided into groups of 4 pupils each sitting together to interact face to face. Each child has opportunity to contribute to the activity and receive assistance from others. To promote individual accountability each student is assigned a distinctive role in the group as follows: 1-researcher; 2-note taker; 3-rough draft writer and 4-reviser as modeled by Johnson & Johnson (1992). The groups were heterogeneous consisting of two boys and two girls involving one high ability, one low ability and two middle achievers as suggested by Kayan (1997).

Pupils were instructed to remain in their group throughout the course of 4 weeks. Interaction in the class adopted Kayan (1997) model of "think, Pair and Share." When a question is asked, each individual in the group thinks about the question and puts it down, exchange the answer with the member opposite within 10 second. The group collects the different answers and selects the best answer for presentation before the whole class. It is the whole class that will select the correct answer. Instrument for data collection was an attitude towards science scale arranged for scoring on a four point Likert scale developed by Francis & Greer (1999). The scale was arranged from strongly agreed, agreed, strongly disagreed and disagreed on which the respondents express their degree of agreeing or disagreed on which the respondents express their degree of agreeing or disagreeing with the ideas. The instrument has an alpha coefficient range of 0.88 to 0.91. The instrument was weighted and any item with mean below 2.50 was rejected while items with mean above and equal to 2.50 was accepted. Data was analyzed using mean to answer the research question while hypothesis was tested using z-test of difference.

RESULTS

Table 1: Pretest Perception Mean Scores of The Pupils Before The Treatment

Item	Pretest Control Group Mean score X	Pretest Experimental Group Mean score X
Science has ruined the environment	3.30	3.34
Working in science lab would be an interesting way to earn a living	2.33	2.22
Science is very important for a country's development	2.20	2.29
Money spent on science is well worth spending	2.17	2.19
In my future career, I would like to use science I learnt in school	2.08	2.09
Science will help to make the world a better place in the future	1.80	1.89
Scientific discoveries do more harm than good.	2.53	2.48
Science and technology are the cause of many of the world's problems	2.06	2.04
Science is an enjoyable school subject	1.90	1.90
The science taught in school is interesting	2.14	2.5
Sciences is a difficult subject	2.29	2.30
Sciences is relevant to everyday life	1.72	1.73
I do not have much interest in science	2.29	2.29
More scientists are urgently needed	1.92	1.91
Studying science gives me great pleasure	2.23	1.73
I will seriously consider becoming a scientist when I leave school	2.02	2.07
I look forward very much to science lessons in school	2.22	2.22
I would like to understand more about scientific explanations for things	2.15	2.19
I would like to study science more deeply than I do at present	2.26	2.26

Table 2: Z Test Analysis of the Pretest Scores of the Pupils before the Treatment

Group	n	Mean	SD	Standard Error	Z-table	Z-cal	P
Control	20	2.06	.36	.11	1.96	.08	0.03
Experimental	20	2.06	.35				

Table 3: Z-Test Analysis Of The Perception Scores Of The Subject After The Treatment

Group	n	Mean	SD	Standard Error	Z-table	Z-cal	P
Control	20	2.21	.30	.16	0.5	1.96	3.06
Experimental	20	2.69	.63				

In table 3, the perception means score of the experimental groups was 2.69 while the mean score of the control group was 2.21. The perception mean score of the experimental groups was higher than the perception mean score of the control group after the treatment. The Z-test of difference between the experimental and control group was 3.06, $p < 0.05$ as against Z-table value of 1.96. This has helped to reject the hypothesis that there would be no significant difference in pupils' perception of science between those exposed to cooperative small groups learning mode and the traditional whole class instructional mode.

Table 4: Correlated Z-test Comparing Mean Effect Size of Perception of Science of the Experimental Group Before and After Treatment

Test	Mean X	SD	Standard Error	P	Z-cal	Z-table
Pretest	2.08	.35	.16	0.05	3.8	1.96
Posttest	2.69	.63				

Table 4 above showed the pre and post –test scores of the experimental group ($Z=3.8, p.05$) in their perception of science before and after they were exposed to the treatment.

The table showed that there was a significant difference between the two mean scores by the same group. This indicates that the treatment has positive influence on the way the pupils perceive science. The increase in perception may be explained on the fact

that cooperative small group learning mode appealed to the innate tendencies of children of working and playing together. Such interaction according to Mallaguzzi (1993) minimized negative results but promotes possibilities to adjust.

Discussion

The findings of the study showed that the pupils perception of science before the treatment was unsatisfactory as shown in the pretest mean scores. The pupils had negative impression of science. They perceived science as an agent of destruction, difficult to learn and irrelevant to life. The pupil's poor perception of science is not unconnected to the way science is taught to them (Ogunniyi, 1982). The traditional whole class instructional mode, usually adopted by the primary school teachers has not helped the pupils to appreciate the relevance of science and experience the doing nature/hands-on activity of science, thus the unsatisfactory perception. The whole class instructional mode does not bring about active and interactive learning environment. It does not encourage interdependence among the pupils. In the above instructional mode the pupils are passives with little or no hands-on experience. One would not be surprised that the pupils' perception of science was negative and did not change much with the mode of instruction. This finding is in line with Akpan (1992) who pointed out that pupils have negative attitude to science. Furthermore, it lacked the motivation to develop early interest in science. This negative perception of science in the primary school may have been responsible for the poor enrolment of students in science in the secondary schools in the country. The need to improve the traditional whole class instructional mode has become a necessity because it is linked to poor attendance and low quality interaction (Van Blerken, 1992; Gatherer & Manning, 1998).

The result of the study also showed that pupils taught science using cooperative small group mode of learning showed high and favourable perception of science than those taught the same science unit with traditional whole class instructional mode as is presented in table 3. The finding is alien with Mylryan (1994); Jegede, Okebukola & Ajewole (1992); Rohrig (2001) & Uyoata (2002) who indicated that the use of cooperative group instructional mode can result to positive cognitive and non-cognitive outcomes in students. The simple explanation to the above result could be based on the nature of cooperative groups providing environment for students to work together to accomplish shared goals in the group. The pupils interact face-to-face allowing each group member opportunity to contribute to the activity and receive assistance from others. Having students work in pair or small groups helps them arrive at the correct solution. As students become successful at their tasks, their confidence level soars (Rohrig, 2001). This reduces the difficulty in learning science. This benefit is lacking in traditional whole class instruction mode.

In cooperative group instructional mode, the teacher has direct interaction with each group as he/she can keep track of the activities of the groups. Face to face instructional techniques have potential to offset deficiencies of traditional whole class approach and retain positive aspects of classroom setting (Riffell & Sibley (2003). Interaction with others and immediate face to face interaction with the instructor has specific benefits of learning activities (Pratt, 2003). It helped the pupils to learn concepts and understanding, kept them attentive during class and provided hands on experiences with real world problems. By this instructional mode, pupils gained confidence in sciences. The level of interaction and active learning involved made the pupils to perceive science as knowledge good for life. This made them always

looking forward for science class and decided to study and understand scientific explanation.

Furthermore, cooperative small group instruction mode developed in the pupils some social skills such as being responsible for their own behaviour, helping others in their group, asking the teacher questions only if it is question for everyone in the group. It also helped the pupils to develop leadership ability, decision making, trust building and conflict management. This is evidenced on the nature of interaction and cordiality that existed in each group during the course. However, the pupils were involved in their learning and this developed in them great interest in learning science and thus changed their initial negative perception of science.

Educational implications.

The results of the study showed that using cooperative small group instructional mode was effective in influencing primary school pupils' perception of science. Learning science using cooperative group mode of instruction should be adopted by primary school teachers because it appeals to their social skills and innate tendencies of working and playing together in groups. The mode of instruction generated positive perception of science among the primary school pupils. Primary school teachers should always try to sustain this interest by varying teaching approaches, teachers should incorporate cooperative group learning in the teaching of science and technology to pupils.

Conclusion

The use of cooperative small group instruction mode helped pupils to gain confidence in themselves and in science. The mastery of the task before them made the pupils to perceive science as a relevant knowledge necessary for living. The use of cooperative learning mode will be very beneficial for

learning science as the interaction helped the pupils to overcome the abstract nature of science.

Further studies may ascertain the effects of cooperative small group instruction on pupils' academic or cognitive performance.

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