EFFECTS OF COOPERATIVE LEARNING METHODS ON BASIC TECHNOLOGY ACHIEVEMENTS IN SELECTED SECONDARY SCHOOLS IN IBADAN, NIGERIA

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Abstract
The Basic Technology teachers in the JSS level do not seem to be aware of the activity-based instructional methods such as co-operative learning strategies as school instructions remain teacher-dominated. In order to popularize the co-operative learning methods in Basic Technology, this study examined the effect of co-operative learning methods (Learning Together (LT) and Jigsaw group (JG) as well as sex effect on Basic Technology achievement in the JSS level. Two hypotheses were tested, and the study employed a three-way factorial non randomized control group, pre-test, post test design. The treatment groups consisting of 290 subjects were exposed to three weeks treatment with three different instructional packages. The subjects were selected from three secondary schools using judgmental sampling procedure. Data were collected and analysed using descriptive and inferential statistics and post-hoc analysis applied where possible. The findings revealed that students taught with co-operative learning strategies performed better in Basic Technology achievement than those taught with expository method. There was no sex effect in the achievement. The use of co-operative learning methods was recommended and Governments and Educational agencies should organize workshops to popularize co-operative learning methods.

Introduction

The teaching of Basic Technology in Nigerian schools especially in the junior secondary schools (JSS) is relatively new when compared to other conventional subjects in Sciences. The teaching of Basic Technology in the junior secondary schools came into the limelight when the National Policy on Education (6-3-3-4) was introduced by the Federal Government (FRN, 2004,). The introduction and implementation of the policy brought a lot of awareness to the students of Basic Technology especially in the junior secondary schools.

The nature of Basic Technology can be best understood if the Nigerian philosophy of education is highlighted. The Nigerian philosophy of education among other things included the inculcation of national consciousness and national unity, inculcation of the right type of values and attitudes for the survival of the individuals in the society and the acquisition of appropriate skills, abilities and competence both mental and physical as equipment for the individual to live in and contribute to the development of his society (FRN, 2004).

Government, taking cognizance of the Nigerian philosophy of education became interested with schooling process in terms of educational outcome, learning activities, instructional resources, instructional strategies and evaluation procedures. Government therefore emphasized the need to make educational activities centre on the learners instead of the teachers, for maximum self-development and self-fulfillment.

The implication of all these for the classroom teachers is that teachers especially in the junior secondary school, should develop and employ learning approaches which will encourage learners to participate actively in the learning processes. They are to promote in the learning strategies which bring about interaction among the students and improve on their relationships with individuals in the classroom situation. One of the alternatives in this regard is the use of cooperative learning methods.

According to Felder and Brent (2007) cooperative learning refers to students working in teams on an assignment or project under conditions in which certain criteria are satisfied, including that the team members be held individually accountable for the complete content of the assignment or project.

Co-operative learning is a learning strategy in the school in which the classroom is structured to accommodate co-operative teams of learners. There are many components of co-operative learning. Thus, co-operative learning strategies include:

(a) **Learning Together (LT).** This is a learning strategy within the co-operative learning developed by (1975).

(b) **Jigsaw group JG).** Peer tutoring in small investigative groups with a leader developed by Slavin (1990).

It is to be noted that in spite of the effects of Government and curriculum planners, the teachers in the junior secondary schools still use expository teaching strategy to bring about learning in Basic Technology lessons. There is no evidence that teaching has been successful especially as it affects students' academic achievement and other measures (Yager and Lutz, 1994).

Statement of the Problem

This study grew out of the problems the secondary school Basic Technology teachers are facing as a result of the ever increasing alternative methods. Scholars like Iyamu and Ukadike (2007). Ukadike (2006), Yager and Lutz (1994) have already observed the dominant usage of expository techniques in the teaching of social studies lessons in junior secondary schools which they have also condemned. Abdulahi (1982), Mezieobi (1995) and Joof and Okam (1992) revealed that the prevailing teaching methods in Nigerian schools is expository and this has accounted for the poor academic performance in schools. Thus the teachers in the junior secondary schools have not done enough to involve the learners actively so that they can contribute to the generation of their own knowledge. Though literature abounds on the relative effectiveness of co-operative learning strategies in Basic Technology education, they are still not popular among the secondary school teachers. Could it be that teachers in Nigerian secondary schools are not aware of the efficacy of this instructional strategy?

The primary purpose of the study was to determine the effectiveness of co-operative learning strategies (learning together (LT) and Jigsaw group (JG) over the expository method (lecture method) and to find out sex effect on the co-operative learners.

Therefore the objective of the study was to assess the effect (LT) and (JG) on students' achievement and to determine sex effect on the co-operative learners.

The following hypotheses were tested in this study.

1. There is no significant difference in students' achievement in Basic Technology due to different instructional methods.
2. There is no significant difference in students' achievement in Basic Technology due to their sex.

Methodology

The design of study was three-way factorial non randomize control group pre-test, post test design. It was intact classes that were randomly assigned to treatment. The population under study was Junior Secondary school class two (JSSII) Basic Technology students in Oyo State, a region in South West Nigeria. All the students in JS II classes used the new National Basic Technology Curriculum for the junior secondary schools. The subjects of study were three arms of JS II Basic Technology students in each of the school selected. Judgmental sampling procedure was employed to select the schools. This became possible because the classes were intact and randomized by the school authorities. Secondly, all the JSS classes in Oyo State have a common National Curriculum. Three schools were selected from Ibadan urban area each with three arms of classes bringing the total to nine classes. Three classes in each school, were exposed to learning together (LT), Jigsaw group (JG) and Expository method (EM) respectively. This was what

happened in all the schools selected for the study. The distribution of students that completed the experiment is shown in the design over variables.

Table 1: Design over variables

Methods (Group)							
Ability	LT		JG		EXP		Total
	M	F	M	F	M	F	
High 56-83	23	14	23	23	3	9	95
Average 40-55	17	16	19	19	10	17	98
Low 11-39	13	7	17	14	20	26	97
	53	37	59	56	33	52	290
Total	**90**		**115**		**85**		

LT is Learning together
JG is Jigsaw Group
Exp is Expository method

Instrument

The only instrument used in the study was constructed by the researcher. It was a 30 item multiple choice questions designed to assess the knowledge of students on the topics taught. The instrument was used as post test scores. The items in the achievement test covered the content of three week instructional units. These were you and Technology, safety materials and Processing, Drawing office, Tools and Machines Energy and Power, Applied Electricity and Electronics, Building, Maintenance. One Basic Technology specialist and two specialists in test, measurement and evaluation were used to scrutinize the test items. The reliability index of 0.72 was obtained which was considered to be reasonably high (Ogundare 2008).

Out of the population of 300 subjects that started the treatment, only 290 subjects completed the treatment period. The students' promotion results JSS II were used to determine their initial ability levels. Thus 33rd and 67th percentile scores were used which was pegged 39 and 56. Those who scored 56 and above were regarded as high achievers, between 40-55 (average) and 39 and below, low achievers. These classifications in their promotion scores into year II stood in as their pre-test scores. A guide which contained instructional package of the co-operative learning strategies and the expository method was made available.

At the end of the treatment which lasted for 3 weeks, all the experimental groups as well as the control group were subjected to a post test session. The data collected were analyzed using statistical packages for social sciences (SPSS). The descriptive statistics of data collected from the treatment and control groups were also summarized.

Results

The results of this study are summarized in the tables that follow.

Table 2: Distribution of mean post-test scores by instructional method ability level and sex.

Ability	LT		JG		EXP		Total
	M	F	M	F	M	F	
High 56-83	(23) 72.13	(14) 70.71	(23) 75.04	(23) 74.70	(3) 71.00	(9) 67.44	(95) 72.77
Average 40-55	(17) 64.29	(16) 59.25	(19) 70.63	(19) 63.37	(10) 56.70	(17) 54.59	(98) 62.06
Low 11-39	(13) 63.00	(7) 67.43	(17) 48.71	(14) 54.29	(20) 37.55	(26) 38.08	(97) 47.07
Total	(53) 67.38	(37) 65.14	(59) 66.03	(56) 65.75	(33) 46.39	(52) 48.56	290 60.75
	(90) 66.46		(115) 65.90		(85) 47.72		

Table 3: Instructional method by sex effect

	Instructional Method			
Sex	**Leaning Together LT**	**Jigsaw Group JG**	**Expository EXP**	**Total**
Male	53 67.38	59 66.03	33 46.39	(145) 62.06
Female	(37) 65.14	(56) 65.75	(52) 48.56	(145) 59.43
Total	(90) 66.48	(115) 65.90	(85) 47.72	(290) 60.74

Table 4: ANOVA Summary for effect of method, sex and ability with scores on the post treatment achievement in Basic Technology as dependent variable.

Score	**Type III sum of squares**	**df**	**Mean square**	**f**	**Significant**
Mode	1114823.000	18	6193.61	299.542	.000
Group	5009.868	2	2504.934	12115	.000
Sex	57.611	1	57.611	.279	.598
Ability	13886.049	2	6943.025	33.579	.000
Group* Sex	10.976	2	5.488	.027	.974
Group * Ability	4589.459	4	1147.365	5.549	.000
Sex * Ability	763.597	2	381.798	1.847	.160
Group * Sex * Ability	236.227	4	59.057	.286	.887
Error	56240.000	272	206.765	-	-
Total	1171063.000	290	-	-	-

Table 2 shows that 90 subjects were under Learning Together (LT), 115 under Jigsaw Group (JG) and 85 under Expository Method (EM). The descriptive statistics of data collected from the three groups are also summarized in Table 2.

The descriptive statistics of data collected from the male and female subjects in the groups of students is also summarized in Table 3.

The ANOVA summary table for effect of method, sex, and initial ability with scores on the post treatment achievement in Basic Technology dependent variables is also contained in Table 4.

Discussion

The null hypothesis 1 that there is no significant difference in students' achievement in Basic Technology due to difference in instructional methods was tested by analysis of variance summarized in Table 4. The f value for treatment group is 12.115 with Df = (2,272) significant at 0.05 level. The null hypothesis 1 was rejected. The conclusion is that there was significant difference in mean achievement of subjects taught by the three methods (LT, JG and EM).

To determine which of the methods was superior to the other, post hoc analysis using Scheffe method was employed since the three groups were of different sizes.

Table 5: Multiple comparisons of post hoc test using Scheffe technique with development variable of achievement in Basic Technology

(i) Research Groups	(j) Research Groups	Mean Difference (i – j)	Standard Error	Signi	95% Confidence Interval	
					Lower Bound	Upper Bound
Learning Together (LT)	Jigsaw Group (JG)	.56	2.02	.962	-4.42	5.54
	Expository (EXP)	18.74 *	217	.000	13.39	24.09
Jigsaw Group (JG)	Learning Together (LT)	-56	2.02	.962	-5.54	4.42
	Expository (EXP)	18.18 *	206	.000	13.12	23.24
Expository (EXP)	Learning Together (LT)	-18.74 *	217	.000	-24.09	-13.39
	Jigsaw Group (JG)	-18.18 *	206	.000	-23.24	-13.12

The mean difference is significant at the .05 level.
The multiple comparisons of Post Hoc test using Scheffe technique, shows that learning together (LT) was superior to expository method with the mean difference of 18.74 which is significant at 0.05 levels. In the same vein, Jigsaw group (JG) was superior to the Expository method with a mean difference of 18.18 which is also significant at 0.05 levels. However the mean difference of (LT) and (J.G.) which was 0.56 was not significant at 0.05 levels.

The second null hypothesis, which stated that there is no significant difference in students' achievement in Basic Technology due to their sex, is retained. The inferential statistics employed is also summarized in Table 4 above. The f value for sex was 0.279 DF = (1,272) which is only significant at 0.598 level. This f value is therefore not significant at 0.05 levels. It is concluded that there is no significant difference in the performance of male and female subjects. This finding is in line with similar studies carried out by Ezewu (1987), Okoye (1983), Leith (1993) academic performance of male and female science students.

Findings

The findings led to the acceptance of one hypothesis and the rejection of another.
The findings therefore are:

1. There is significant difference in students' achievement in Basic Technology due to different learning methods. Students in co-operative learning strategies (LT and JG) performed better than those under expository method. However no significant difference exists between LT and JG groups.
2. There is no significant difference in students' achievement in Basic Technology due to their sex.

Conclusion

1. Co-operative learning methods are good for the teaching of Basic Technology topics in the junior secondary schools. Learners accomplish understanding through the social interactions which occur in the classrooms.
2. Cooperative learning leads to greater learning and superior development of communications and team work skills.
3. Instructors who are successful in using cooperative learning in their classes will have the satisfaction of knowing that they have significantly helped prepare their students for their professional careers.
4. Co-operative learning strategies do not discriminate in the achievement of male and female students.

Recommendations

1. Since co-operative learning methods have been found to enhance achievement in Basic Technology, Basic Technology teachers should be encouraged to employ them more in the teaching of the subject in order to increase the level of Basic Technology achievement.
2. Seminars and workshops should be organized periodically to bring about awareness of co-operative learning strategies in the learning and teaching of Basic Technology concept.
3. The benefits of cooperative learning are not automatic, however, and if imperfectly implemented, the method can create considerable difficulties for instructors, most notably dysfunctional teams and students resistance or hostility to group work.
4. Instructors who have never used the approach are advised to move into it gradually rather than attempting a full-scale implementation on their first trial and to increase the level of implementation in subsequent course offerings.

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