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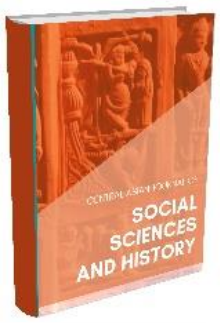

Team Teaching as a Panacea to Students' Low Academic Achievement in Chemistry in Rivers State, Nigeria

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Abstract:
Collaboration is a useful process of creativity. Hence, the main purpose of this study is to investigate team teaching as a panacea to students' low academic achievement in Chemistry. Quasi experimental research design was adopted for the study and purposive sampling techniques was used to select Emohua Local Government Area in Rivers State, Nigeria. Simple random sampling by balloting was carried out in two rounds to select two schools and a sample size of (100) SS2 Chemistry students that participated in the study. Chemistry Achievement Test (CAT) was used to collect data for the study. The data collected was analysed using mean and standard deviation to answer all the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at .05 level of significance. The study found that, there was significant difference between the mean score of students exposed to team teaching and those exposed to lecture method in favour of those exposed to team teaching in Chemistry. Gender had no significant effect on mean scores of students exposed to both lecture method and team teaching method in Chemistry. This study recommends the use of team teaching method for Chemistry teachers and equal opportunities for students irrespective of gender.

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Introduction

One of the toothing problems confronting scientific literacy of citizens and industrialization of developed and developing nations, such as Nigeria is the pattern of disseminating scientific information and skills to her citizens. Science educators have made several efforts to achieve a breakthrough in uplifting of scientific literacy in the world. Especially, as one essential role of science education is to stress on the potential of science to promote the development of intellectual qualities and skills of individuals rather than knowledge of facts and theories as has been the order of the day (Wagbara, 2015).

Apparently, science education leads to material reconstruction, development of self reliance and modernization of both developed and developing nations like Nigeria as it enhances their socio-economic development. All branches of science has contributions to make in a nation's scientific and technological development.

Nevertheless, Chemistry is the pivot on which all science and technology disciplines and careers are affixed for national development (Junture, 2005 cited in Njoku & Ezinwa, 2014). Also, Bankole (1983) asserted that, chemical science truly represents a basis or at least an assisting discipline for other fields just as the chemical industry stand as basis or a supporting industry for many other manufacturing industries. A good number of examples can be cited where Chemistry plays a very significant role in science and technology development. As every scientist uses directly or indirectly data or information obtained by applying techniques of Chemistry. Hence, there are many job opportunities available for people with good knowledge of Chemistry in public and private sectors. There are job opportunities for Chemistry graduates in teaching service, health service and food processing industries, mining, quality control and so many other sectors.

Despite, enormous importance of Chemistry and the numerous job opportunities available for people with qualifications in Chemistry and Chemistry related disciplines academic achievement of students in Chemistry is still low at secondary school level (Nbina, 2011 & Alozie, 2012). More than half the number of students who take science subjects each year fail the subject in West African School Certificate Examination (WAEC) (Alozie, 2012).

Furthermore, Aniodoh (2001) enumerated the possible constrains to chemical education and chemical industrialization to have its root from achievement of students in Chemistry. And the possible constraints include; poor chemistry teaching; inadequate Chemistry laboratories; obsolete chemical curriculum; lack of awareness of chemical education in national development and apparent lack of interest by government. Also, of all these constraints Aniodoh (2001) noted that, there is serious need for more meaningful teaching and learning of Chemistry in secondary schools which should be made relevant to real life. Hence, reflecting on the role of Chemistry to our national economy, Chemistry curriculum should be designed to produce personnels that are not only adequately trained but appropriately oriented.

Above all, in order to realize the noble goals of uplifting students' achievement in Chemistry, several efforts have been made by science and Chemistry educators as well as educators of other fields of endeavour. Oyedeji (1988) asserted that, the two types of instructional methodology that could be used are teacher centred and student centred. The teacher centred involved students to listen to their teacher and to read their books. While the student-centred approach involves discussions, debate, project, role-playing, discovery, simulation; individualized and independent study. However, Onifade (2000) cited in Uwaneiye & Ojikutu (2008) were of the opinion that, no method is the best for every teaching

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situation but conglomeration of carefully designed method can create wonders in making learning effective shymansky & Kyle (2008) supported this idea by asserting that instructional approach includes the materials, media setting and behavioour the teacher uses to create an environment to produce an effect on the learner. This indicates that achievement, instructional goals and the choice of teaching approaches are not separate.

Chemistry is a practical subject hence, there is the probable feeling that the cause of low achievement in Chemistry and other science subjects could be due to lack of practical skills in Chemistry (Hirvonen & Virin, 2002, Nbina, 2011). There is need for more meaningful teaching of Chemistry that will be coupled with functional laboratories in our secondary schools. This will enhance the teaching of chemistry that is relevant to real life. To this effect, there is need for vigorous search to improve quality of instruction in schools that, will replace the conventional method that, the teacher transmits information of the subject matter verbally to the students by writing on the board or using instructional materials.

To achieve the goal of creating a method that will meet up both the learners needs and societal demands; it becomes pertinent to use a method that will involve cooperation efforts among teachers. Most Chemistry topics and courses has the theory, laboratory and the application aspects. And there is the need to take the teaching of the various aspects holiostically in order to achieve the best outcome. Hence, there is the need for team teaching of Chemistry topics and courses. Weldh, Brownell & Seridan (1999) noted that, team teaching is the instructional method of teaching procedures in which two or more educators who possesses distinct set of skills, work in co-active and coordinate way to jointly teach academic and behaviourally homogenous group of students in educational integrated setting. According to Ajayi Ajibode & Amiemeka (2002) team teaching incorporates a number of instructors who shares the same subject matter area and engages actively in all aspects of course development from sequence of topics in unit plan, generation of learning activities and development of appropriate evaluation instrument.

For this study, team teaching refers to the teaching strategy which involves the use of two or more instructors to teach the different aspects or units of a particular subject matter or topic conglomeratively to produce optimal learning outcome. Team teaching can uplifting students' achievement of determined outcome and thereby making the teaching of Chemistry in secondary schools to be more relevant to real life. Hence, it becomes essential to investigate team teaching and achievement of students in Chemistry.

Purpose of the Study

The main purpose of this study was to investigate team teaching as panacea to students' low academic achievement in Chemistry. Specifically, the study sought to:

1. determine the difference between the academic achievement of the students exposed to the conventional lecture method and those exposed to team teaching method.
2. find out the difference in the academic achievement of the male and female students taught by use of lecture method.
3. find out if there is difference between the academic achievement of male and female students taught by the use of team teaching method.

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Research Questions

1. What are the mean achievement scores of students exposed to lecture method and those exposed to team teaching method in Chemistry?
2. What are the mean achievement scores of male and female students taught Chemistry by the use of lecture method?
3. What are the mean achievement scores of male and female students taught Chemistry by the use of team teaching method?

Hypotheses

The following null hypotheses which were tested at .05 level of significance guided the study:

1. There is no significant difference between the mean achievement scores of the students taught Chemistry by the use of lecture method and those taught by the use of team teaching method.
2. Gender does not have any significant effect on achievement mean scores of students taught Chemistry by the use of lecture method.
3. Gender does not have any significant effect on mean achievement scores of students taught Chemistry by the use of team teaching method.

Methodology

The research design adopted for this study was quasi experimental research design. This research study was carried out in Emohua local government area of Rivers State in Nigeria. A sample size of one hundred (100) senior secondary school two (SSS2) Chemistry students comprising (50) males and (50) females participated in the study. The purposive sampling technique was used to select Emohua local government area in Rivers Central Education zone of Rivers State. Simple random sampling by balloting was carried out to obtain 100 SSS2. Students that participated in the study. One of the two schools was assigned experimental group (Team teaching method) while the other was assigned control group (lecture method). In the two schools intact classes of 50 chemistry students each were used for the study. The instrument used for the data collection was Chemistry Achievement Test (CAT) which was subjected to face and content validation by experts in the field of science education. The instrument was trial tested on 20 SSS2 Chemistry students of one of the schools in central educational zone of Rivers State and reliability coefficient at 0.85 was obtained by using Cronbach alpha formula, which indicates that the instrument was reliable. The data collected were analyzed by using mean and standard deviation to answer all the research questions while the Analysis of Covariance (ANCOVA) was used to test the hypotheses at .05 level of significance.

Results

Research Question I

What are the mean achievement scores of students exposed to lecture method and those exposed to team teaching method in Chemistry?

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Table I: Mean and standard deviation scores of students exposed to lecture method and those exposed to team teaching method in Chemistry.

Teaching method	N	Pretest		Posttest		Mean Grain
		x	SD	*x*	SD	
Lecture	50	2702	8.39	49.70	9.17	22.68
Team	50	27.04	6.06	74.18	10.76	47.14
Mean Diff.						24.46

Table I shows that, the mean score of the students taught Chemistry by the use of lecture method in the pretest group was 27.02 with associated standard deviation score of 8.39 whereas the mean score of the posttest group was 49.70 with associated standard deviation of 9.17. The students exposed to team teaching had a mean score of 27.04 in the pretest group with associated standard deviation score of 6.06 while in the posttest group they obtained a mean score of 74.18 with associated standard deviation of 10.76. Learning mean gain of 22.68 was obtained for lecture method while that of team teaching method a mean gain of 47.14 was obtained. The mean difference of 24.46 was obtained in favour of team teaching method.

Hypothesis I

There is no significant difference between the mean achievement scores of the students taught Chemistry by the use of lecture method and those taught by the use of team teaching method.

Table 2: Analysis of Covariance (ANCOVA) of the significant difference between the mean scores of students taught Chemistry by the use of lecture method and those taught by use of team teaching method.

Source	**Type III sum of squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected model	15045.485	3	5015.162	52.625	.000
Intercept	191504.570	1	19154.570	201.109	.000
Pretest	144.322	1	144.322	1.515	.221
Group	14899.990	2	749.995	78.219	.000
Error	9143.575	96	95.245		
Total	407350.000	100			
Corrected total	24189.000	99			

a. R Squared = .622 (Adjusted R. Squared = .6100)

The result in Table 2 was used to determine whether there was significant difference between the mean achievement scores of the students taught Chemistry by the use of lecture method and those taught by the use of team teaching method.

Table 2 shows that, an F-ratio of 78.21 with associated probability value of .00 was obtained. The probability value of .00 was compared with .05 and it was found to be significant because .00 was less

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than .05 (P < .05) and inference drawn that there is significant difference between the mean achievements scores of students exposed to lecture method and those exposed to team teaching method. Hence, the null hypothesis one (HO_1) which states that there is no significant difference between the mean achievement scores of the students taught Chemistry by the use of lecture method and those taught by the use of team teaching was rejected.

Research Question 2

What are the mean achievement scores of male and female students taught Chemistry by the use of lecture method?

Table 3: Mean and standard deviation scores of male and female students taught Chemistry by the use of lecture method

Gender	N	Pretest		Posttest		Mean Gain
		x	SD	*x*	SD	
Male	25	25.24	9.18	51.60	7.59	26.36
Female	25	29.28	7.28	48.20	9.77	18.92
Mean Diff.						7.44

Table 3 shows that, the mean score and standard deviation score of the male students in the pretest group are 25.24 and 9.18 respectively, whereas in the posttest group to male students had a mean score of 57.60 with associated standard deviation of 7.59. The female students had a mean score of 29.28 with associated standard deviation of 7.28 in the pretest group while in the posttest group a mean score of 48.00 with associated standard deviation of 9.77 were obtained. The mean gain of 26.36 was obtained for the male students while the female students had a mean learning gain of 18.92. The mean difference of 7.4 was obtained in the favour of the male students.

Hypothesis 2

Gender does not have significant effect on achievement mean scores of students taught Chemistry by the use of lecture method.

Table 4: Analysis of Covariance (ANCOVA) of gender effect on mean academic achievement score of students taught Chemistry by the use of lecture method.

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	194.733[a]	2	97.367	1.261	.293
Intercept	11563.609	1	11563.609	149731	.000
Pretest	50.233	1	50.233	.650	.424
Gender	99.04	2	99.04	1.283	.263
Error	3629.767	47	77.229		
Total	128325.000	50			
Corrected total	3824.500	49			

a. R Squared = .051 (Adjusted R. Squared = .011)

The result in Table 4 was used to determine whether gender have significant effect on mean achievement scores of students taught Chemistry by the use of lecture method. Table 4 shows that an

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F-ratio of 1.28 with associated probability value of .263 were obtained. The probability value of .263 was compared with .05 and it was found not to be significant because .263 was greater than .05 (P > .05). Hence, the null hypothesis two (HO_2) was accepted and inference drawn that, gender does not have significant effect on mean achievement scores of students taught Chemistry by the use of lecture method.

Research Question 3

What are the mean achievement scores of male and female students taught Chemistry by the use of team teaching method?

Gender	**N**	**Pretest**		**Posttest**		**Mean Gain**
		x	**SD**	*x*	**SD**	
Male	25	28.36	6.60	75.80	11.78	47.44
Female	25	24.92	5.01	72.60	8.30	47.68
Mean Diff.						0.24

Table 5 shows that, the mean score of the male students in the pretest group was 28.36 with associated standard deviation of 6.60 while in the posttest group the males had a mean score of 75.80 with associated standard deviation score of 11.78. The female students in the pretest group had a mean score of 24.92 with standard deviation of 5.01 whereas in the posttest group the females had a mean score of 11.78. The female students in the pretest group had a mean score of 24.92 with standard deviation of 5.01 whereas in the posttest group the females had a mean score of 72.60 with associated standard deviation of 8.30.

The mean learning gain of the males was 47.41 while that of the females was 47.68. The mean difference obtained was 0.24 in favour of the female students.

Hypothesis 3

Gender does not have significant effect on mean achievement scores of students taught Chemistry by the use of team teaching method.

Table 6: Analysis of Covariance (ANCOVA) of gender effect on mean achievement scores of students taught Chemistry by the use of team teaching method

Source	**Type III sum of squares**	**df**	**Mean square**	**F**	**Sig.**
Corrected model	194.018[a]	2	97.000	.926	.403
Intercept	14199.773	1	14199.773	135.539	.000
Pretest	66.018	1	66.018	.630	.431
Gender	173.225	1	173.225	1.653	.205
Error	4923.982	47	104.766		
Total	290400.000	50			
Corrected total	5118.000	49			

a. R Squared = .38 (Adjusted R. Squared = .003)

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The result in Table 6 was used to determine whether gender have significant effect on mean achievement scores of students taught Chemistry by the use of team teaching by the use of team teaching method. Table 6 shows that, an F-ratio 1.65 with associated probability value of .20 was obtained. The probability value of .20 was compared with .05 and it was found not to be significant because 2.0 was greater than .05 (P > .05). Hence, the null hypothesis three (HO_3) was accepted and inference drawn that gender does not have significant effect on mean achievement scores of students taught Chemistry by the use of team teaching method.

Discussion

The result of Analysis of Covariance used in testing hypothesis one was shown in Table 2 which yielded an F-ratio of 78.21 with associated probability value of .00. The result showed that P < .05 which shows that team teaching method had significant effect on academic achievement of students in Chemistry. Hence, the null hypothesis one (HO_1) which states that, there is no significant difference between the mean achievement scores of students taught Chemistry by the use of lecture method and those taught by the use of team teaching method was rejected. The result of this study agree with the finding of Uwameiye & Ojikutu (2008) which states that, there is significant difference between the mean scores of the pretest and the posttest achievement of students taught using team teaching and those taught by using conventional single-teacher classroom. The result of this study is also in line with the finding of Karin (2000) as the finding stated that, team teaching is used to increase the students level of understanding and retention, in addition to enhancing the students achievement. This study have confirmed that, there is significant difference between the mean achievement scores of students taught Chemistry by the use of team teaching method and those taught by the use of lecture method.

The result in Table 4 had an F-ratio of 1.28 with associated probability value of .26. The result showed that P > .05 which indicates that gender had no significant effect on academic achievement of students taught Chemistry by the use of lecture method. Hence, the null hypothesis two (HO_2), which states that, gender does not have significant effect on achievement mean scores of students taught Chemistry by the use of lecture method was accepted. The result of this study agree with the finding of Onuhien & Khail (2016) as they stated that, there is no significant difference between the performance of male and female students exposed to demonstration instruction method in Chemistry. This study have confirmed that, gender does not have significant effect on achievement mean scores of students taught Chemistry by the use of lecture method.

The result in Table 6, the F-ratio of 1.65 with associated probability value of .20 was obtained. The obtained .20 value was compared with .05. The result showed that P > .05 which shows that gender had no significant effect on achievement of students exposed to team teaching in Chemistry. Hence, the null hypothesis three (HO_3) which states that gender does not have significant effect on achievement mean scores of students taught Chemistry by the use of team teaching method was accepted. the result of this study was supported by the finding of Opara & Waswa (2013) as they stated that gender does not have significant effect on achievement of students exposed to demonstration teaching strategy. However, Lawal (2009) did not support the result of this study as his finding states that, there was significant difference in ability of the male and female students to solve quantitative problems. This study has confirmed that, there is no significant effect of gender on students mean achievement scores in Chemistry by use of team teaching method.

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Conclusion

The students exposed to team teaching method did better than those exposed to lecture method in Chemistry. This indicates that team teaching is very effective as it encourages co- operative system of instruction among teachers who share the same subject matter. It also, help to boost students learning academic achievement in Chemistry.

Recommendations

Based on the findings of this study, the following recommendations were made:

Team teaching should be adopted in the teaching of Chemistry for effective teaching of the students, as it enhances collaboration in the teaching of Chemistry among Chemistry teachers. This will help to boost academic achievement of students in Chemistry.

Chemistry teachers should encourage the male and female students to cooperate in the learning of Chemistry while team teaching is used. That will help the students to share ideas and uplift their academic achievement in Chemistry.

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