

Effect of Inquiry Teaching Strategy on Academic Achievement of Senior Secondary School Chemistry Students in Okrika Local Government Area

Sylvanus, Tamunonengiyeofori & Eke, Silas

Faculty of Technical & Science Education
Department of Science Education (chemistry Option),
Rivers State University,
Nkpolu-Oroworukwo, Port Harcourt
sylvanustammy@yahoo.com, ekesilas14@gmail.com

Abstract

The study investigated the effect of inquiry teaching strategy on academic achievement of senior secondary school chemistry students in Okrika local Government area. The study was quasi experiment. A simple random sampling technique was used to select one hundred and twenty (120) senior secondary schools in Okrika local Government area of Rivers state. To guide the study two research questions were raised two hypotheses tested at 0.05 level of significance. The instrument used in gathering data for the study was chemistry achievement tests (CAT). Data collected was analysed using two sample t-test; analysis of covariance (ANCOVA). The result showed that both methods enhanced academic performance in chemistry. The result also indicated that male chemistry students achieved higher than their female counterpart. Conclusions were drawn and some recommendations were also pointed out.

Keywords: *Inquiry; Achievement; Chemistry*

Introduction

Chemistry is the science that systematically studies compositions, properties of organic and inorganic substance and various elementary forms of matter (Nnoli, 2011). Chemistry education has been identified to be one of the major bedrock for the transformation of national economy and hence must be given adequate attention due to the gains of learning and advancement of science education (Lawrence & Abraham, 2011).

According to Sunday, (2009) opined that it is also an international enterprise which plays a key role in the future progress of mankind.

Asiyai (2015) reported that chemistry has helped in the development of modern technology through the application of its principle in modern invention. Generally, science is a powerful tool for nation development, it is this realization that chemistry curriculum had to adjust her academic knowledge, technical and vocational skills (Ikwanusi, 2011).

Aniodoh (2012) defined science as a way of investigating and a body of established knowledge. Teaching methods are important instrument that the teacher employs in performing his function (Lyop & mangut, 2001).

According to Maduabum, (1992) Science teachers have used a number of traditional instructional strategies in science teaching and learning such as lecture, discussion, demonstration, project, field trip, inquiry and expository method.

Yagger & Akcay, (2010) defined inquiry as an approach to teaching, the acts scientists use in doing science and it can be highly effective teaching method that helps students to understand concepts and use of process skills. Inquiry method is a teaching strategy which enables students to find the answers themselves (Maduabum, 1992). It is a learner – centred approach hence it is called heuristic method. It is also a term used in science teaching that refers to a way of questioning, seeking knowledge, information or finding out about phenomena (Sola & Ojo, 2007). Cheval & Hart, (2011) classify inquiry teaching method into two (2) categories namely; guided and unguided inquiry. The guided inquiry is often used in science classroom in form of laboratory exercises where the teacher provides fairly structured procedures to enable learners to carry out investigation (Omokaadejo, 2015).

Guided inquiry teaching method has been described as problem solving, critical thinking, reflective inquiry, deductive thinking and not mere personal assumption. It is a method of teaching that involves probing, finding out, investigating, analysing, synthesizing, discovering, evaluating, questioning and thinking (Muhammad, 2007). The unguided inquiry involves the student's discovery for themselves both the general principle and solution to a scientific problem (Maduabum, 1992). Traditional method is an oral (lecture) method of teaching (Bimbola, 2010). It is essentially a one way process of transmission of knowledge with the lecturer and teacher being active while the learners are passive.

Omokaadejo, (2015) reported that the current Nigerian classroom whether primary, secondary or tertiary institutions level tends to resemble a one person show with a captain but often comatose audience. Classes are usually driven by “teacher talk” and depend heavily on textbooks for the structure of the course.

According to Dianye & Gbamaja,(1990) traditional method is defined as a teaching technique in which one person usually presents a spoken discourse in a particular subject.

Therefore, the study is aimed at determining the effects of inquiry teaching strategy on academic achievement of senior secondary school chemistry students in Okrika local government area.

Purpose of the study

The study intends to determine the;

1. Mean achievement of secondary school chemistry students taught chemistry using inquiry teaching strategy and students taught chemistry using traditional lecture method.
2. Mean achievement of male students taught chemistry using inquiry teaching strategy and female student taught chemistry using traditional lecture method.

Research question

To enhance a successful conduct of this study, the following research questions will guide the study;

1. What is the effect of guided inquiry teaching strategy and traditional lecture method on the academic achievement of Chemistry?
2. What is the effect of guided inquiry teaching strategy on the academic achievement of male student taught chemistry and female student taught chemistry using traditional lecture method?

Research Hypothesis

The following null hypotheses were formulated and tested at 0.05 level of significance in order to make necessary decisions.

Ho₁ There is no significant difference in the mean score of students taught chemistry using inquiry teaching strategy and students taught chemistry using traditional lecture method.

Ho₂ There is no significant difference in the mean scores of male students taught chemistry using inquiry teaching strategy and female student taught chemistry using traditional lecture method.

Significance of the study

The findings of this study will benefit chemistry teachers by helping students understand chemistry teaching and to provide effective instructional plan as to improve students' outcome.

Research design

The design used in this study was quasi experimental. The design is a pretest, posttest and control group to determine the effect of inquiry teaching strategy on academic achievement of senior secondary school chemistry students in Okrika local government area of Rivers state.

Area of study

The study was conducted in senior secondary schools in Okrika local government area of Rivers state.

Population

This study comprises of SS 2 chemistry students in all the public secondary schools in Okrika local government area of Rivers state. A total of 1025 students in 2016/2017 academic session formed the population.

Sampling/Sampling Technique.

The sample consisted of one hundred and twenty SS 2 Chemistry students. Simple random sampling technique was used to select two schools for the experimental and control group.

Research instrument

The instrument used was chemistry achievement test (CAT). It was a 50 item multiple choice objective question with options A to E developed by the researcher.

Validation

The instrument was validated by chemistry teachers in the department of chemistry, Rivers state University.

Experimental procedures

In order to collect the required information, the researcher visited the two schools. One school each served as the experimental and control group. The pre-test was administered to the experimental and control group before the commencement of teaching. One hour was allowed for pre-test, thereafter the question papers and the answers were collected from each of the students. The aim for retrieving the question papers was that the same questions will be used for the post-test as to avoid familiarity with the items of the instrument by the student. The post-test was administered to both experimental and the control group.

Results

The results are presented according to the research questions and the hypotheses

Research question 1

What are the mean achievement scores of secondary school students taught chemistry using inquiry teaching strategy and students taught chemistry using traditional lecture method.

Table 1: Mean Chemistry achievement scores of student taught using inquiry teaching strategy and traditional lecture method.

Groups	Pre-test	Post-test	Difference within groups
Experimental Group (N=60)	36.60	51.87	15.27
Control Group (N=60)	31.33	46.43	15.10
Difference between groups	5.27	5.43	

Source: Field study (2017)

Table 1 shows a pre-test mean score of 36.60 for the experimental group and a pre-test mean score of 31.33 for the control group. This slight difference in the mean scores of the two groups could be attributed to extraneous variables. The table also reveals a mean difference of 15.27 for the control group and a mean difference of 15.10 for the control group which indicates that the mean score in chemistry for the both groups was improved after being exposed to the two instructional methods. It is however observed from the table that the mean post-test score for the experimental group 51.87 was higher than that of the control group 46.43. This indicates a difference of 5.43.

Research question 2

What are the mean achievements of male students taught Chemistry using inquiry teaching strategy and female students taught Chemistry using traditional lecture method.

Table 2: Mean Chemistry achievement scores of male and female student taught using inquiry teaching strategy and traditional lecture method.

Groups	Post-test
Experimental Group	54.13
Control Group	49.60
Difference between groups	5.46

Source: Field study (2017)

Table 2 indicates a mean achievement score of 54.13 for male students exposed to chemistry concept through inquiry teaching strategy and a mean achievement score of 49.60 for male students exposed to chemistry concept through traditional lecture method. A mean difference of 5.46 shows that on the average, male students performed better than female students.

Research Hypotheses 1

Ho₁ There is no significance difference in the mean score of students taught chemistry using inquiry teaching strategy and students taught chemistry using traditional lecture method.

Table 3: ANCOVA for research question 1

Source of Variation	Sum of Squares	df	Mean Square	F _{cal}	Sig.
Corrected Model	3767.119	2	1883.559	40.169	.000
Intercept	6166.492	1	6166.492	131.509	.000
pretest	2881.485	1	2881.485	61.451	.000
method	156.936	1	156.936	3.347	.070
Error	5486.181	117	46.890		
Total	299140.000	120			
Corrected Total	9253.300	119			

Source: Field study (2017).

For hypotheses 1 table 3 indicates that the method was significant at 0.70 which is greater than 0.05. Since the computed level of significance is greater than 0.05 the null hypotheses is accepted. This implies that there was no significant statistical difference in the mean score of students taught inquiry teaching strategy and traditional lecture.

Research Hypotheses 2

Ho₂ There is no significance difference in the mean scores of male students taught chemistry using inquiry teaching strategy and female student taught chemistry using traditional lecture method.

Table 4 t-test for Research question 2

Groups	Mean	SD	N	df	t _{cal}	t _{crit}	p-value	Decision
Control	48.58	7.29	31	59	-3.00	2.00	0.0040	Reject
Experimental	54.13	7.18	30					

Source: Field study (2017).

The result from table 4 showed that the difference in posttest scores was statistically significantly different between the two groups, $t_{cal}(58) = 2.004$, $t_{crit}(59) = 2.001$, $P < 0.05$ with this result, the hypotheses was rejected. This implies that there was a significant statistical difference in the mean score of male students taught chemistry using inquiry teaching strategy and female student taught chemistry using traditional lecture method.

Discussion of findings

The result of hypotheses 1 from table 3 shows that there was no significance statistical difference in the mean score of student taught chemistry using inquiry teaching strategy and those taught traditional lecture method. This result is in consonance with the opinion of (Omokaadejo, 2015) where it was established that there was no significant effect on chemistry student taught inquiry teaching method and chemistry student taught using conventional lecture method.

The result of hypotheses 2 from table 4 showed that there was a significant statistical difference in the two groups. This result is in agreement to Ogu (2010) who observed no significant difference between student performance scores according to their gender when taught chemistry using inquiry teaching method and student taught using conventional lecture method

Conclusion

Based on the findings and discussion of this study, it was concluded that the both method of

teaching enhanced academic performance in Chemistry. Male chemistry student achieved higher than their female counterpart

Recommendation

Based on the results of the study, the following recommendations were made;

1. Training of teachers by the Government to enable them acquire necessary skills for the effective use of the various teaching methods.
2. The ministry of Education should make available all the required instructional infrastructural facilities for the effective application of the both teaching methods.

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