

OPTIMIZATION OF STUDENTS' PERFORMANCE IN SECONDARY SCHOOL: A CASE STUDY OF ADAMAWA STATE, NIGERIA

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ABSTRACT

This research Analysis the effects of inquiry teaching methods of Geography on senior secondary school students' academic performance and retention, in Adamawa State. The hypothesis was formulated and tested at 0.05 level of significance. The study employed pre-test, post-test, non-equivalent quasi-experimental control group design. A sample of 168 students participated in the study. Four schools were randomly selected for the study. The instruments for the study were Geography Achievement Test (GAT) and Geography Retention Test (GRT) constructed by researchers and validated by experts in geography. Test measurement, evaluation and a reliability coefficient of 0.85 was obtained. The data obtained in the study were analyzed using mean, standard deviation and analysis of covariance (ANCOVA). The study reveals that there is a significant difference between inquiry teaching method and lecture teaching method in favour of inquiry teaching method.

INTRODUCTION

One of the major goals of today's education is to make the students gain the thinking skills and strategies which they will use throughout their lives, rather than storing information. A good education should be able to equip students on how to learn, how to remember, how to motivate themselves and how to control their own learning. Geography, which has been simply described as the study of the interrelationship between man and his environment (Ilesanmi, 2009), is not only important and useful to the students, but to everyone who seeks to cope with the ever-emerging realities of our time. This is because

the earth, which is the focus of geography study, is the “theatre” where virtually all human activities are carried out.

According to Akorede (2010) students regard geography as a difficult subject because of the abstract manner the subject is being taught with students and teachers depending on textbook. Often times, due to dearth of appropriate geographical instructional materials, many of the topics treated could not be illustrated with maps, charts, pictures, models and modern weather instruments. As a result, teachers have to make verbal descriptions of phenomena that are too remote from the experience of the students. The importance of Geography in secondary school curriculum cannot be overemphasized. It trains the learners to manage their environment for good of the society as a whole (Bloomfield, 2009). As one of the optional subjects in the secondary school curriculum, Geography is being taught in most Nigeria secondary schools. The effectiveness of teaching in schools can be measured by examining the methods of teaching applied by the teachers and the academic performance of students in the school examination (Eshiwani, 2005).

Inquiry Teaching Method and Students’ Academic Performance

Inquiry learning begins when students are presented with questions to answer, problems to be solved, or a set of observations to be explained. If the method is implemented effectively, the students should learn to “formulate good questions, identify and collect appropriate evidence, present results systematically, analyze and interpret results, formulate conclusions, and evaluate the worth and importance of those conclusions. The same statements could also be made about problem-based learning, project-based learning, discovery learning, certain forms of case-based instruction and student research, however, so that inquiry learning may be considered an umbrella category that encompasses several other inductive teaching methods. Inquiry is also consistent with interactive lecture, discussion, simulation, service learning, and independent study, and in fact “probably the only strategy that is not consistent with inquiry-guided learning is the exclusive use of traditional lecturing (Bionder, 2008).

Besides overlapping with other inductive methods, inquiry learning encompasses a variety of techniques that differ from one another in significant ways, differentiate between structured inquiry (students are given a problem and an outline for how to solve it), guided inquiry (students must also figure out the solution method) and open inquiry (students must

formulate the problem for themselves. The instructor serves as facilitator, working with student groups if they need help and addressing class-wide problems when necessary. Some proponents of inquiry suggest using a relatively structured form of inquiry in the first year, gradually shifting toward more self-directed learning (including problem formulation) as the curriculum progresses, while others advocate moving immediately to self-direction. The teacher's coaches, moderates, suggest, but allow the students room to experiment, ask questions, try things that don't work. Learning activities the students' full participation (like hands-on experiments). An important part of the learning process is that students reflect on, about their activities. Students also help set their own goals and means of assessment (Hassard, 2005).

Inquiry teaching method is an activity-based teaching method, which involves the students in the learning process, placing less emphasis on transmitting knowledge and more on developing students' science process skills. Based on this fact, it is assumed that inquiry teaching method which is an activity-based method will aid better learning enhances retention level of the students and it is hoped to change the attitude of the students towards geography to be positive (Hssard, 2005).

Metz (2004) also state that Inquiry is a method of forming questions about natural world, finding answer, studying and understanding it thoroughly as scientists do rather than knowing generally through an expert or by other means. Teaching and learning process during which learners ask their own questions, plan their inquiries, analyze and discuss their findings and construct their own understandings proves learning to be more effective and long lasting. The most important feature of this method is to enable both teachers and learners to be researchers, idea propagators and problem solvers. Furthermore, it has some positive consequence such as making students active, developing their understandings, improving their research skills and understandings of the nature of the science.

Hassard, (2005) asserted that many educators discussed the nature of inquiry by making use of open inquiry and guided inquiry because open inquiry is described as a student-centred approach. Students, in this approach form their own problems and hypotheses, make plans for scientific research, carry out investigation in order to test their hypotheses, and discuss their findings with other friends.

Accorded to Cheung (2011) and Njoroge (2007) teachers play an important role in the implementation of this inquiry model, this approach faces many difficulties during

implementation and obstacles confronted in using Inquiry method of teaching include: insufficient time, teachers' beliefs, scarcity of effective research materials, pedagogical problems, management problems, crowded classes, security issues, fear of encouraging students to misunderstandings, students' complaints, fear of assignment and scarcity of teaching materials. Furthermore need for academic support, need to be informed about learning and teaching processes through research and the usage of guided inquiry method and in order to resolve teachers' lack of knowledge according to social constructivist approach of learning.

Research Questions

This research question will be used as a guide in the study:

What is the difference in academic performance of Senior Secondary School Students when taught using Inquiry and lecture methods of teaching in Adamawa State?

Hypotheses

H₀: There is no significant difference in the academic performance of Senior Secondary School Students' in geography when taught using inquiry and lecture methods of teaching in Adamawa State.

The null hypothesis will be tested at 0.05 level of significance.

METHODOLOGY

The study adopted a pre-test, post-test, control group, quasi- experimental design with factorial matrix of 2x2 for matching of variables involved. The design is considered appropriate for this study because intact classes were used and classes are divided into experimental and control groups. This is to avoid disorganization of the school time table and calendar arrangement. The explanation of factorial matrix depicts the variables in the study as follows:

- (a) Independent variables: Treatment at two levels (Inquiry and lecture methods)
- (b) Moderator variables (Gender at two levels)

(c) The dependent variables are (academic performance and retention)

Area of the Study

The study was conducted in Adamawa State which lies geographically between latitude $70^{\circ} 28^1$ and $10^{\circ} 55^1$ N and longitude $12^{\circ} 30^1$, $12^{\circ} 35^1$ E. The state capital Yola, lies on latitude $90^{\circ} 14^1$ N and longitude $12^{\circ} 28^1$ E. The state shares boundary with Borno, with Gombe and Taraba State. The state also share international boundary with Federal Republic of Cameroon. Adamawa has a total land area of $42,159 \text{ km}^2$ (Adamawa State Government Diary, 2003). Adamawa State has 21 local government areas with three hundred and thirty seven (337) Senior Secondary Schools. The state is divided into five Education Zones as follows: Mubi zone with 76 senior secondary schools, Gombi zone with 55 senior secondary schools, Yola zone with 93 senior secondary schools, Ganaye zone with 52 senior secondary schools, and Numan zone with 61 senior secondary schools (Adamawa State Post primary Schools Management Board, 2015).

The target population for the study was all SS II students offering geography in all the Senior Secondary Schools in Adamawa State. The reason why SSII was selected is based on the fact that the class is stable. It was also because the students were not freshly introduced to senior secondary Geography as SSII students were not preparing for external examination like SSIII students. Therefore, it is easy to get permission from school authorities to use them. A total of 8012 SSII students in senior secondary schools offering geography in Adamawa State (Adamawa State Post Primary Schools Management Board, 2015) constitute the population of the study.

The sample consisted of 168 Senior Secondary School SS II Students from four Schools in Adamawa State. Purposive sampling technique was used to select one intact class from each school and the classes were grouped by simple balloting in all the Schools (as shown in the Table 1) into experimental and control groups. The first criteria, was to select mixed school which is co-educational and had presented students for external schools examination yearly from five years. The second criteria, was that a school must be a day school and the third criteria is that a school must offer geography. Four schools which met these criteria were selected. Therefore two schools was used for experimental classes for inquiry method and also two schools was used as control group for lecture method.

Method of Data Collection

The student was first exposed to pre-test to check their knowledge baseline in Geography. The experimental group was exposed to treatment through inquiry method and the control group was taught for four weeks using the lecture method. The post-test was then being administered on all the students after the experiment to check their level of academic performance. The treatment lasted for four weeks and each topic was treated per week.

The purpose of pre-test is to ascertain students' entry behaviour on the topics to be taught, control selection, to ascertain that the groups are equivalent at the beginning of the experiment and also to control extraneous variable that was as a result of selection.

The teaching in both classes was done by the Geography teachers in the sample schools who were trained on modalities of the research. There were three lesson plans for each topic and one topic was covered for the first week since each topic was broken down into sub topics and the total numbers of lessons plan that was delivered for both control and experimental group is 12 each.

The total number of lessons plans delivered for control group is 12 on the following topics as earth and the solar system, latitude and longitude, structure of the earth and rock of the earth were selected for the study. The Geography Retention Test (GRT) was administered on the same set of students that were involved in the study within two weeks after post-test so as to determine the ability retention of geography concepts by the students and each correct answer attracts 2 marks, giving a total mark of 80 for a student that answers all the correct questions.

Method of Data Analysis

The research questions were answered using mean and standard deviation while the hypotheses were tested at 0.05 level of significance using ANCOVA. The reason for using ANCOVA is because it removes differences in the experimental and control groups when pre-test score is used as covariate. The decision was that if the computed P-value was greater than the critical F-value, the null hypotheses will not be rejected, and the researcher will conclude that there is no significant difference between the groups. But if the computed P-value is less than the critical F-value, the null hypothesis will be rejected, and the researcher will conclude that there is a significant difference between the groups.

The data collected for the study were statistically analyzed using analysis of variance (ANCOVA). The table contained information on the research questions and hypothesis which was tested at 0.05 level of significant.

Presentation of Results,

The information given in table 1 gives the analysis that addressed the research question under consideration

Research Question: What is the difference in academic performance of Senior Secondary School Students when taught using Inquiry and lecture methods of teaching in Adamawa State?

Table 1: Mean and Standard Deviation of Students’ Post-Test Scores by Treatment Group

Types of method	N	\bar{x}	δ
Inquiry Method	102	28.51	3.74
Lecture Method	66	18.97	4.59
Total	168	24.76	6.21

A total of 168 students participated in the study with 102 students at the experimental group and 66 students at the control group. The mean scores of students taught geography using inquiry teaching method is 28.51 with standard deviation of 3.74 while the mean scores of students taught geography using lecture method is 18.97 with standard deviation of 4.59. The differences between the mean scores of the two methods of teaching is 09.54 in favour of inquiry teaching method.

Table 2 gives the summary of one way Analysis of Covariance which were used in testing the hypothesis:

H₀: There is no significant difference in the academic performance of Senior Secondary School Students’ in geography when taught using inquiry and lecture methods of teaching in Adamawa State.

Table 2: Summary of one way Analysis of Covariance of Treatment Method

Source	Type III Sum of squares	df	Mean square	F	Sig
Corrected Model	4865.40	4	1216.35	126.680	0.000
Intercept	4230.51	1	4230.51	440.599	0.000
Pre-test	1185.21	1	1185.21	123.437	0.000

Teaching method	2444.73	1	2444.73	254.614	0.000*
Error	1565.08	163	9.60		
Total	109440.00	168			
Corrected Total	6430.48	167			

The result of the analysis in table 8 shows that there is significant effect of teaching method on the mean achievement scores of students. Since the computed p-value (0.000) with df (1) is less than F-value (254.61) at 0.05 level of significance. Therefore, the null hypothesis was rejected (*P<0.05) which shows that there is a significant effect of the treatment on teaching methods.

Research question shows that the difference between the mean scores of the two methods of teaching is 09.54 in favour of inquiry teaching method while hypothesis shows that there is a significant effect of the treatment on teaching methods.

Discussion of the Results

The findings of the study revealed that, the results of the pre-test and post-test at the beginning and the end of the teaching found out that, there was a significant difference between inquiry and lecture methods. It was found out that the use of students centred teaching methods like inquiry with the consideration of students’ previous knowledge in geography make it possible to have interactive lesson. It can also be stated that the use of inquiry teaching methods have positive effects on the student’s academic performance in geography. The level of students’ academic performance improved significantly in the experimental groups after the treatment. This is in line with the findings of Ogunbiyi (2012) who found similar result that, that the use of effective teaching methods increases students ‘academic performance in geography.

Summary and Conclusion

The purpose of this study is to determine the effects of inquiry teaching method on senior secondary school students’ academic performance and retention in geography in Adamawa State. The research question and null hypothesis were formulated and tested at level of significant. Related literature and related empirical studies were reviewed. The theoretical frame work used in the study was constructivist theory of J. Bruners’ (1966). The study employed pre-test, post-test, quasi- experimental non- equivalent control group design. The target population for the study was all SS II students in four of the schools in Adamawa State. A sample of 168 students participates in the study. The schools were randomly selected which were allocated to experimental and control group. The instrument for the study was tested and the data for the study was collected through Geography Achievement

Test (GAT) and Geography Retention Test (GRT) constructed by the researchers and validated by experts. The data obtained in the study were analysed using analysis of covariance (ANCOVA).

The study found out that there is a significant difference between the post- test mean academic performance scores of students taught geography using inquiry teaching method and students taught using lecture method in favour of inquiry teaching method. Also the study revealed that there is significant difference in retention between students taught with inquiry and students taught with lecture method.

The researcher concludes that inquiry was an effective method of teaching geography in senior secondary schools in Adamawa State. Furthermore, inquiry was a teaching method that benefits both male and female students in the learning geography in senior secondary schools in Adamawa State.

Recommendation: We recommend that secondary school teachers In Adamawa State should adopt the inquiry method of teaching for optimum student performance.

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