EFFECTS OF INQUIRY STRATEGY ON SENIOR SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE AND INTEREST IN GEOGRAPHY IN KATSINA, NIGERIA

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Abstract
This study investigated the Effects of Inquiry Strategy on Senior Secondary School Students Academic Performance and Interest in Geography, Katsina State, Nigeria. Three research objectives, three research question were raised and three null hypotheses were formulated and tested at 0.05 significant level. The study used quasi experimental involving pre and posttests control group design. The target population for the study covered 2,251 senior secondary school year II students in the study area. A total number of 100 students from two intact classes of SS II were purposively selected and used as sample of the study. One school was assigned as the experimental group, while the other one served as the control group. Two instruments namely, Geography Achievement Test (GAT) and Geography Interest Questionnaire (GIQ) were used for data collection. The instruments were validated by experts in science education and psychology and their reliability coefficients were calculated using PPMC and Cronbach Alpha reliability method and the indices were found to be 0.74 and 0.8 respectively. Research questions were answered descriptively using mean and standard deviation while null hypotheses were tested inferentially using t-test, ANCOVA, Mann Whitney U-Test and Kruskal Wallis H-Test. Findings of the study revealed that there was significant difference in the academic performance of students exposed to the inquiry strategy and lecture method in favour of experimental group. There was also significant difference in the interest of students exposed to the same strategy and those taught using lecture method. Gender difference exist in the performance and interest of students exposed to inquiry strategy. On the bases of the findings, the study recommended that the use of Inquiry Strategy in teaching geography in school should be encouraged by State Ministries of Education through training of teachers in form of seminars and workshops on how to use inquiry in teaching periodically. Similarly, Katsina State Ministry of education should ensure adequate monitoring of teachers when using Inquiry Strategy for improving achievement and interest towards school subjects with immediate effect.

Keywords: Inquiry Strategy, Academic Performance, Interest

Introduction

Geography is an academic subject taught in senior secondary schools and tertiary institutions in Nigeria. It is the study of natural features and phenomena on the earth's surface and in the atmosphere. It also focuses on locations, space relations, and changes of physical phenomena on the earth's surface. Thus, Geography is geared towards teaching the interrelationships among phenomenon on the earth surface and those in the atmosphere (Salisu, 2015). The objectives of teaching geography at Senior Secondary Schools level were spelt out by National Policy on Education (FME, 2014) and reinforced by examination bodies namely, the West African Examination Council, (WAEC, 2013) and National Examination Council, (NECO, 2013) and curriculum development body such as Nigerian Educational Research and Development Council (NERDC, 2014). These objectives have been thought of in terms of what geography can contribute to the realization of the aims of secondary education in Nigeria and include; giving students a sound knowledge of their immediate environment; inculcate in students

useful skills and outlooks that will enable them to make useful contribution to their community and nation at large; To develop in students the critical thinking ability, accuracy and objectivity for proper and logical investigation; among others (Aderogba, 2012). In line with the realization of these objectives, the Senior Secondary School Geography Curriculum should embed variety of methods and approaches that are learner centered, can allow student to learn at their own pace and evaluate their attainment of objectives. Those instructional strategies should endorses deep understanding and involves students in scientific questions, look for evidences supporting answer, articulate explanations and after reflection communicating the ideas formulated by them like Inquiry instructional model.

Inquiry as an instructional model, focuses on the process of learning and solving problems using a hands-on approach that involves reflection and evaluation in a cyclical manner (Mushi *et al.,* 2020). Inquiry methods of learning provide opportunities for students to focus on the process of how they learn through questioning and reflection skills. Inquiry skills are aligned with methods of learning that have been referred to as problem-based learning, authentic learning experiences, investigative processes, learning through lenses, and other activities that immerse students and teachers in both the making of personal connections and well throughout choices. According to Sylwen (2014) Inquiry teaching strategy allows students to make demonstrations about problems, challenges and issues they investigate, and helps to move the students into more meaningful engagement and deeper learning. Inquiry is a style or method of teaching where the learner with minimum guidance from the teacher seeks to discover and create answer to a recognized problem through procedure of making diligent search (Sylvanus & Silas, 2017). Shaheen *et al.* (2015) reported that inquiry-based learning was more effective as compared to traditional lecture method. This inconclusive agreement justified the gap and the need to find out the effect of Inquiry method on Student Interest and Academic Performance in Human Geography.

Academic Performance is the extent to which a student, teacher or institution has achieved their short- or long-term educational goals, cumulative GPA, and completion of educational benchmarks such as secondary schools, diplomas and bachelor's degrees. Poor academic performance have been linked to differences in intelligence and personality. Students with higher mental abilities as demonstrated by IQ tests and those who are higher in conscientiousness (Linked to effort and achievement motivation) tend to achieve highly in academic settings. A recent meta-analysis suggested that mental curiosity (as measured by typical intellectual engagement) has an important influence on academic achievement in addition to intelligence and conscientiousness (Von Stumm *et al,* 2011). Academic Performance in this investigation is operationally defined as the aggregate of each students' demonstrated learning, knowledge, skills, ability and indeed cognitive, affective and psychomotor domains in human geography (population, settlements and agriculture) as measured by Geography Performance Test (GPT).

Relevance of interest in learning can never be a dispute, Salisu (2015), in his work on impact of animated-media strategy on achievement, retention and interest among secondary school geography students in weather concept revealed significant difference in the retention and interest of subject expose to the same strategy and those taught using lecture method. Subject in the experiment group developed a significantly high positive interest than subjects in the control group.

Interest in this study is a feeling of curiosity or concerned of subject, topic, (in this case, population, settlement and agriculture) that make attention towards it. Salisu, (2015) seen interest as a psychological state of engagement, experienced in the moment and also a predisposition to engage repeatedly in particular ideas, events, or objects over time. Interest

simultaneously diversifies ones experience and focuses his experience; leading him to pay attention to only certain things and not to some other things that tend to stimulate the persons' attention. In recent years researchers have begun to build a science of interest, what makes things interesting, and how we can cultivate interest in ourselves and in others? In this study interest is considered as a variable measured in experimental and control groups. Inquiry strategy and lecture method were used in determining whether or not the strategies can enhance interest of student on human geography concept.

Gender has remained a debating issue and has also remained relevant in education because it has been linked to performance and participation in certain profession. Evidence from research findings indicate gender gap achievement in favour of males (Ezema, 2014, & Silas *et al.,* 2016), while some revealed that gender is not a factor in teaching and learning (Amosa, 2013, & Wada 2015). This generated a gap and justifies the need to determine the extend gender as a variable influenced students interest and performance in the study.

Statement of the Problem

Poor academic performance of secondary school student in Geography (WAEC Chief Examiners Report, 2019) has been linked to poor Teacher's performance in terms of accomplishing the teaching task, which have been attributed to instructional strategy. The problem of poor performance to a large extent has been attributed to ineffective teaching employed by geography teachers especially traditional lecture method which is largely dominated by teacher talk and chalk (Ezema, 2014; Salisu, 2015; & Yakubu, 2016). The use of lecture method is often responsible for learner low interest and poor academic performance in the subject. It discourages open question, inquiry and active participation of student and makes geography classes difficult and boring. Sylvanus and Silas (2017) revealed that inquiry method has no significant effect on student academic performance in chemistry and male chemistry students achieved higher than their female counterparts. This comes contrary with the findings revealed by Shaheen *et al,* (2015) that inquiry-based learning was more effective as compared to traditional lecture method. This inconclusive agreement justified the gap and the need to find out the effect of inquiry method on student interest and performance in human geography. It is on this basis that, the researcher investigated the Effect of Fieldwork and Inquiry strategies on Secondary Schools Geography Students' Academic Performance and Interest in Baure Zonal Education Quality Assurance (ZEQA), Katsina State.

Theoretical Framework of the Study

This work is based on the constructivist approach to learning emanated from the works of Bruner (1966) and Piaget (1973). The theory in reaction against the largely lecture based method of instruction which have significant limitation recognizes that the best way to learn is by having students construct their own knowledge instead of having someone to do it for them. It is a learner-center approach that emphasizes the importance of individual activity constructing their knowledge and understanding with guidance from the teacher. In the constructivist view, teachers should not attempt to simply pore information in to children's' mind. Rather children should be encouraged to explore their world, discover knowledge, and reflect and think critically with careful monitoring with meaningful guidance from the teacher (Zhou & Brown, 2017). Fieldwork teaching strategy can best suit this assertion.

Scientists and philosophers like Dewey (1916), Piaget (1973), and Vygotsky (1978) have interpreted constructivism according to their own experience. In relation to that, the conclusion is that the learners' knowledge is their own life, their style and their life is an experience they get. Therefore, the teaching and learning process must be related to the practical real world so that the classroom is designed and shaped in such a way that teacher and students can share their knowledge and experience actively. The theory equally advanced

that learning is an active process of creating meaning from different experiences with the teacher as a guide to help them along the way. This is the basis of constructivist learning theory. Therefore, a constructivist teacher creates a friendly environment for learning in which students can become more engaged in interesting activities (like fieldwork) that encourage and facilitate learning. The teacher guides students as they approach problems, encourage them to work in groups, to thinks about issues and questions, support them with encouragement and advice as they tackle problems, adventures, and challenges that are rooted in real life situations (Zhou & Brown, 2017). Teachers' role thus, is mainly to facilitate learning and cognitive growth.

Bruner (1966) suggests that teachers should create situation that would help the learners to discover facts by themselves. In this case the teacher should establish an explorative environment for the learners to explore and discover facts and truth by themselves. According to him prepackaged information can lead only to rote memorization of facts. He then contends that rote memorization is of no substantial benefit to the learners because it is not of much benefit in the exploration of the environment and the solution of problem (Zhou & Brown, 2017). Bruner opined an individual requires information through his interaction with the environment and such information should retained and utilize for the solution of the environmental problems. Constructivists believe students should be engaged in active learning and that the teacher's role is to assist students in what they are doing. Students should be given the opportunity to explore a problem, try out solutions, build on this new knowledge to make adjustments and evolve new solutions. This learning application in constructivist theory means that all students have an input and are actively discussing and developing ideas. Students must be encouraged to draw, discuss and write about what they are learning. They should also talk to others while actively working and not just sitting in groups. In the constructivist classroom, the teacher's role is to prompt and facilitate discussion. Thus, the teacher's main focus should be on guiding students by asking questions that will lead them to develop their own conclusions on the subject. Inquiry teaching strategy can suit this assertion.

Objective of the Study

The study was guided by the following objectives:

1. To examine the effects of inquiry strategy on secondary school students' academic performance in human geography.
2. To examine the effects of inquiry strategy on secondary school students' interest in human geography.

Research Questions

The following research question were formulated to guide the research:

1. What is the difference in the mean academic performance score of secondary school student taught human geography using inquiry strategy and their counterparts taught the same concept using lecture method?

2. What is the difference in the mean interest score of secondary school students taught human geography using inquiry strategy and their counterparts taught using lecture method?

Research Hypotheses

The following null hypotheses were formulated to guide the research.

H_{O1}. There is no significant difference in the mean academic performance score of secondary school student taught human geography using inquiry strategy and their counterparts taught the same concept using lecture method

H_{O2}. There is no significant difference in the mean interest score of secondary school students taught human geography using inquiry strategy and their counterparts taught using lecture method

Methodology

The study utilized pre-test, post-test quasi-experimental and control group design. The study has two group; experimental (EG) and control (CG). Before treatment, the two group were pre-tested (O1) to ensure selection of schools with comparative abilities. The experimental group were taught using Inquiry (X) for a period of six weeks. Control group were taught using traditional lecture method. The two groups were post-tested (O_2) using the same instruments in pre-test.

The population for this study consists of all Senior Secondary two (SSII) students offering Geography in Baure Zonal Education Quality Assurance. Therefore, there are twelve (12) Senior Secondary Schools with a population of two thousand two hundred and fifty-one (2,251) Geography students with a total number of nine hundred and eighty-five (985) male Students and one thousand two hundred and sixty-six (1266) female students.

The sample of this study covered a total number of 100 SSII students selected from two public senior secondary school offering geography in the study area. The two schools are GSSS Karkarku, and GSS Yardaje. The schools are separated by not less than 20kilometers to minimize interaction effect. The choice of 100 students is in line with central unit theorem which prescribe that minimum of 30 participants is adequately enough to form a sample in an experimental study of this nature. In addition, Ker linger (1973); Tukman (1975); Kajuru and Ado (2012) stated that in research of this nature, 10-15% of the entire population can be used as a sample. In each school intact class of SSII were sampled and used for the study. . Details is presented in table 1.

Table 1: Sample of the Study

Schools	Status	Male	Female	Total
A	Experimental Group	26	19	45
B	Control Group	32	23	55
	Total	58	42	100

The instruments for this research is Geography Performance Test (GPT) and Geography Interest Questionnaire (GIQ). The GPT instrument consists of thirty (30) items test adapted from West African Senior School Certificate Examination (WASSCE) conducted by the West African Examination Council (WAEC) from 2015 to 2019. All the 30 questions adapted from this instrument, which are objective (multiple choice) items in human geography with four options (A-D) out of which only one option is correct to the items, are based on the topics selected from SS II geography syllabus. The topics selected are; Population, Settlement, and Agriculture. The Geography Interest Questionnaire (GIQ) is a 25 items interest inventory questionnaire adapted from Salisu, (2015) to determine the interest of students between and after treatment on concepts of human geography. The items were developed using Likert, (1970) 4-point rating scale involving strongly Agree (SA); Agree (A); Disagree (D); and Strongly Disagree (SD). Each option carries weight in the order of priority from four to one in

positive interest responses and from one to four in negative interest on Human geography concepts by simply ticking one of the four options that suit their interest.

In order to determine the extent to which the instruments can measure the Academic Performance of Students in Human Geography, the GPT are scrutinized by the five lecturers (Three from science and vocational education and two from Geography) in Umaru Musa Yaradua University, Katsina. A copy of the developed items were submitted to each Science Education expert for validation. GIQ was validated by panel of three qualified experts with PhD. qualification in the field of psychology in Umaru Musa Yar'adua University Katsina. The scores of the students obtained from the pilot testing were analyzed using Cronbach Alpha and PPMC where the common inter-item correlation coefficient *r* is obtained at 0.8 and 0.73 indicating that the instruments have consistency of the items, thus the instruments is said to be reliable for this study.

Data collection procedures begin with introducing the researcher and research assistants to ministry of education and secondary schools to be used in the study by means of introductory letter. Immediately after introduction, the researcher explains to the respondents the purpose of the study and the need for cooperation. Pretest was then administered before treatment.

The treatment is teaching experimental group using Inquiry method, while control group were exposed to lecture method. The procedure for the research treatment is in four phases. The data collected were subjected to analysis at two different levels, VIS: the research questions were answered by using Mean and Standard Deviation. The hypotheses were tested using t-test and Mann Whitney U-test at 0.05 alpha level t using SPSS Package Version 25.1 as follows:

Results

RQ1: What is the difference in the mean score of secondary school student taught human geography using inquiry strategy and their counterparts taught the same concept using lecture method

Table 2: Mean and Standard Deviation of Academic Performance of Experimental and Control Group.

Variable	N	Mean	SD	SE	Mean D/F
Inquiry strategy	45	21.77	4.99	0.74	10.52
Lecture Method	55	11.25	2.94	0.39	

Table 2 shows that experimental group II has a mean of 21.77 and Standard Deviation of 4.99, while the mean of control group is 11.25 with standard deviation of 2.94 and a mean difference of 10.52. This shows that geography students taught human Geography Inquiry strategy achieved higher academically, by mean score of 21.77, than their lecture group counterpart with mean score of 11.25.

RQ2: What is the difference in the mean interest score of secondary school student taught human geography using inquiry strategy and their counterparts taught using lecture method?

Table 3: Mean Rank and Sum of Rank of Interest Scores of the Subjects in the Experimental and Control Group

Group	N	Mean Rank	Sum of Rank	Mean Difference
inquiry strategy	45	71.11	3200.00	42.13
Lecture Method	55	28.98	1594.00	
Total	100			

Table 3 showed the change in interest of the subject toward Geography in experimental and control group. From the Table, the mean rank value of 71.11 was obtained in experimental group with sum of ranks of 3200.00. While in the control group, a mean rank value of 28.98 with a sum of ranks of 1594.00 was obtained. Difference in the mean rank signifies difference in the interest rating of the subject in geography due to exposure to inquiry and lecture method. This shows that group taught using Inquiry Strategy developed higher interest in Geography than group taught using Lecture method as revealed in their mean rank score.

H_{O1}. There is no significant difference in the mean score of secondary school student taught human geography using inquiry strategy and their counterparts taught the same concept using lecture method

Table 4: T-test Analysis of Performance Scores of the Subjects in the Experimental and Control Groups.

Variable	N	Mean	SD	T	DF	*P*	decision
Inquiry strategy	45	21.77	4.99	13.04	98	0.01	Rejected
Lecture Method	55	11.25	2.94				

**Significant at p ≤ 0.05 level of significant*

Table 4 shows that the t-value computed is 13.01 and the p-value of 0.01 is observed at degree of freedom of 98. Since the p-value of 0.01 is less than the alpha value, there is significant difference in the academic performance of the subjects in experimental and control group. Therefore, null hypothesis that states that there is no significant difference in the academic performance scores of geography students taught using Inquiry Strategy and those taught the same concept using lecture method is rejected.

H_{O2}: There is no significant difference in the interest score of secondary school students taught human geography using inquiry strategy and their counterparts taught using lecture method

Table 5: Mann-Whitney U-test Rank Interest Scores of the Subjects in the Experimental and Control Group

Group	N	Mean Rank	Sum of Rank	U-test	P	Decision
inquiry strategy	45	79.94	4077.00	310.00	0.01	Sig.
Lecture Method	55	28.98	1594.00			

****Significant at p ≤ 0.05 level of significant***

From the Table 5 Mann-Whitney U observed is 310.0 and the p-value observed was 0.01. Since the p-value of 0.01 is less than alpha value of 0.05, there is significant difference in the interest rating of the subject in geography and the hypothesis is rejected.

Summary of the Findings

From the results presented in this study, the summaries of the major findings are:

1. Significant difference exists in the mean score of secondary school student taught human geography using inquiry strategy and their counterparts taught the same concept using lecture method.
2. Significant difference exists in the interest score of secondary school students taught human geography using inquiry strategy and their counterparts taught using lecture method.

Discussion of Findings

Significant difference exist in the mean score of secondary school student taught human geography using inquiry strategy and their counterparts taught the same concept using lecture method. This finding is supported with the findings revealed by Shaheen, et al. (2015) that inquiry-based learning was more effective as compared to traditional lecture method. It also gained supported from Omakaadejo (2015) examines the effect of guided enquiry method on academic performance of chemistry student in selected senior secondary school in Kaduna state. Major findings revealed that chemistry student-taught using Inquiry teaching method performed significantly better than their counterparts taught using traditional teaching method. This comes contrary with Sylvanus and Silas (2017) findings that investigated the effect of Inquiry teaching strategy on academic achievement of senior secondary school chemistry student in Okrika local government area. The findings revealed that inquiry method has no significant effect on student academic performance in chemistry. The result shows that both methods enhanced academic performance in chemistry.

Significance difference exist in the interest score of secondary school students taught human geography using Inquiry Strategies and their counterparts taught using lecture method. This finding is in agreement with that Yakubu, (2016), Ezema, (2014) and Salisu (2015), Ibe (2013) and Obeka (2013). Result of study conducted by Yakubu (2016) on the effect of field-based teaching strategy on interest, retention and performance in climate change among secondary school students in Anchau, shows that students taught geography using Field-based Strategy displayed greater interest in the Climate Change concept of geography than lecture group. This is also in hamorny with Ezema, (2014)'s findings. The result of the data analysis indicated that, the effect of fieldwork on students' interest was significant. This findings is also supported by Salisu, (2015) who investigated impact of Animated Media Strategy on Students Academic Achievement, Retention and Interest among Secondary School Geography Students in Weather Concepts revealed a significant difference in interest among subject taught using Animated Media Strategy and those exposed to lecture method. Subject in the experimental group shows high positive interest than subject in the control group. The difference in the interest observed can be attributed to the use of innovations in teaching experimental group as stated by Neumann, et al. (2011). Ibe (2013) in his work finding on the effect of guided inquiry and expository teaching method on the performance and interest of secondary school student in biology, it was found that guided inquiry method fosters students' interest in biology, Also findings of the study conducted by Obeka (2013) revealed that development model and concept mapping have significant effect on students' interest in climate change concept of environmental education.

Conclusion

Based on the findings of this study, the study concluded that Inquiry Strategy appears to have a strong record of success in enhancing students' academic performance. Students exposed to Inquiry Strategy performed significantly better than those taught Human Geography by means of Lecture method. In terms of interest, Inquiry strategy is better than Lecture method.

Teachers at Senior Secondary Schools can explore the potentials of Inquiry Strategy in order to improve students' Academic Performance and Interest in Human Geography Concepts.

Recommendations

Based on the findings of this study, the researcher recommends that:

viii. The use of Inquiry Strategy in teaching geography in school should be encouraged by State Ministries of Education through training of teachers periodically using seminars and workshops to teachers on how to use Inquiry Strategy in teaching with immediate effect.

ix. Katsina state ministries of education should ensure adequate monitoring of teachers when using Inquiry Strategy for improving achievement and interest towards school subjects.

x. The Teacher Training Institutions and professional bodies such as NTI and STAN, to organize a special re-training, workshops, and seminars to geography teachers on how to use Inquiry Strategy.

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