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Research Paper Education

Effect of Reflective Inquiry Instructional Technique on Students' Achievement in Environmental Related Contents in Senior Secondary School Geography

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ABSTRACT

The study investigated the effect of reflective inquiry instructional technique on students' achievement in Environmental Related contents of senior secondary school Geography in Kolga Education Zone, Bayelsa State of Nigeria. The study adopted quasi experimental design. Specifically, the pretest posttest non-equivalent group design was employed. The population of the study consisted of all the 1,820 senior secondary school two (SS II) students who offer Geography in the 14 co-educational public secondary schools in the Zone. Four (4) co-educational schools were drawn out of the fourteen schools. A sample size of 160 SS II Geography students were drawn out of the four (4) schools through simple random sampling technique. The instrument used for data collection was Environmental Related Contents Achievement Test in Geography (ERCATG). The instrument was validated by three experts. The reliability index of the ERCATG instrument was established using Kudder-Richardson (K-R20) method of internal estimate which gave an overall reliability index of 0.66. Oneresearch question guided the study and one null hypothesis was also formulated to guide the study. Mean and standard deviation were used in answering the research question while the null hypothesis was tested at 0.05 level of significance using analysis of covariance (ANCOVA). Findings from the study revealed that students taught Environmental Related contents with reflective inquiry instructional technique achieved better than those taught with the conventional lecture method. It was therefore recommended that Geography curriculum planners should carry out a review of the senior secondary school Geography curriculum with a view to incorporating Reflective Inquiry Instructional Technique (RIIT) in order to ensure effective teaching and learning of Environmental Related contents of Geography. That Government should organize periodic workshops, conferences and seminars with a view to training and retraining Geography teachers on the use of Reflective Inquiry Instructional Technique (RIIT) for effective teaching and learning of Environmental Related contents through the Geography curriculum.

KEYWORDS Environmental Issues, Geography, Reflective Inquiry Instructional Technique and Achievement.

Background of the Study

Many environmental problems or challenges that face humanity are as a result of human activities. These activities occur as humans realized the need to struggle to improve the lot of life and living standards through science and technology. These human actions, according to Ogueri (2004) include over-exploitation, deforestation, mining, the release of harmful gases into atmosphere such as sulfur dioxide (S0), methane (CH), chlorofluorocarbons (CFCs), the hydroxyl radical (OH), and carbon dioxide (C0). Other sources of environmental problems include natural hazards such as flooding, earthquake and volcanic eruptions (Ezeudu, 2003). These have created unfavorable environmental conditions for living things and have only contributed in weighing down the environment and thereby have resulted to many environmental issues or challenges (Collins &Ertel, 2012). However, these issues such as global warming, ozone layer depletion, pollution and over-population have provided the necessary justification for humans to consciously protect and conserve the environment and the resources in it.

Thus, in line with the need for environmental protection and management, the National Open University of Nigeria,-NOUN(2006) defines environment as a set of natural resources for man's prudent use. In the view of Nwosu, Uju, Nweze, Nwadinigwe, Abu and Njokuocha (2011), environment means the sum total of all the external conditions affecting the life of an organism or group of organisms. It is made up of all the physical (non-living or abiotic) and biological (living or biotic) factors. However, the environment has lost its aesthetic quality and original make-up due to human mad rush on natural resources andthis is detrimental to humans and has posed great threat to life's existence on earth (NOUN, 2006).

In line with the above statement, Ngwoke (2011) warns that the environment is man's first right and so the absence of a safe environment makes it impossible for man to fight for other rights whether they are economic, social or political. This therefore calls for prompt intervention and action on the part of humans to consciously engage in practices that promote and encourage environmental conservation and sustainability. It is therefore necessary to create awareness about the environment and the associated challenges through education.

Education, according to Chukwu (2011) is the transmission of what is worthwhile from generation to generation. It is a process of assisting learners to acquire knowledge, skills and acceptable attitudes and moral behaviours that would make them to become responsible citizens in society. It is also seen as a process of inculcating certain knowledge, attitudes, values, skills and experiences of certain domain to a person or group of persons (Ezeudu, 2003). Hence, such education is required to promote effective teaching and learning of Environmental Related (ER) contents which according to Ezeudu are also referred to as Environmental Education (EE) contents.

Environmental Education (EE) is a programme of education that aims at helping students to acquire physical and mental

skills as well as attitudes, values and interest required for environmental protection and repair (Nwagu, 2001). Thus, the teaching and learning of Environmental Related contents or EE increases people's knowledge and awareness about the environment and the associated challenges. It helps learners to develop needed skills and expertise to address the challenges and fosters attitudes, motivations and commitments to make informed decisions in order to take responsible actions (UNESCO, as cited by Dare, 2013). Environmental Education (EE) is also seen as education from the environment, for the environment and about the environment. Education from the environment implies a situation where the environment is seen as a medium for the education of human perception and understanding (Abul, 2007). Hence, the health of the environment is improved through the study of topical environmental issues such as acid rain, flooding, excessive rise in global temperature, ozone layer depletion and pollution (Ogueri, 2004). Thus, in order to create more awareness about the above environmental issues or challenges, Igbogoro (2008) advised that EE sensitization and awareness programs in schools should emphasis on the teaching of environmental education contents through an 'integrated core curriculum' where EE contents (Environmental Related contents) should be taught through different independent subjects such as Geography, Biology, Agricultural science and integrated science. This therefore is the reason why Environmental Related (ER) contents should be taught through the secondary school Geography.

Geography is a science of spatial relationship which focuses attention mainly on the interactions between man and his environment. It is a science of synthesis which seeks to understand a given area in terms of the total integration of various phenomena which characterize it (Abul, 2007). Geography is undisputedly an environmental science that studies all systems of the environment. It is also seen as a subject whose practical and intellectual values have become widely applicable to many spheres of life and thereby contributes to national and international development. Geography is distinguished from other branches of study mainly because of its ability in taking a holistic approach in the study of phenomena and not in terms of a single issue (Obeka, 2007). Therefore, geography alone has no unique claim to environmental competence since it draws attention on the spatial relationship between phenomena in relation to space and time. It is therefore appropriate to teach Environmental Related (ER) contents which are also referred to as Environmental Education (EE) contents through the secondary school geography. In addition, Ezeudu (2003) confirms that Geography is closely related to Environmental Education since many of the concerns of EE coincide closely with those of Geography. Specifically, Ezeudu asserts that most environmental problems have a spatial dimension and it is this that makes the geographical perspective so important inEnvironment-related issues.

Hence, the objectives of geography according to Aman (2012) include: to enable students develop interest in both physical and cultural environment as a place and home of humans and thus broaden their outlook; to enable students gain an understanding of how the environment and climatic factors influence our lives; to develop in students an understanding of the basic concepts, principles and theories relating to geographical and environmental phenomena and finally, to help students develop a sense of responsibility towards the environment.

Similarly, the objectives of EE which closely coincide with those of geography were listed by Dare (2013) to include:

- Awareness: to develop and increase awareness about the environment and the associated challenges,
- Knowledge: to help students gain adequate knowledge and understanding of the total environment,
- Attitude; to help learners develop values, strong feelings and concern for the environment which will motivate them to actively participate in environmental protection and improvement,
- Skills: to assist students acquire the necessary skills for working towards the solution of environmental problems,
- Participation: to enable students to actively participate in activities that lead to the resolution of environmental challenges.

Thus, achieving the above lofty objectives of EE calls for an urgent need to consciously engage in practices that promote environmental or resource conservation. Hence, in an effort to actualizing the above needs or dreams, several sensitization efforts and programmes were initiated at global levels by United Nations Organization (UNO) which manifested in form of international conferences, workshops and inter-government meetings aimed at addressing environmental issues such as environmental degradation, global warming, the need to cut down pollution rates and as well encourage sustainable development (Ogueri, 2004). In line with the above statement, Abul (2007) stated that at those international conferences and inter-governmental meetings, the teaching and learning of EE components also known as Environmental Related contents were emphasized.

Similarly in Nigeria, awareness on the need for EE increased in 1988 following the dumping of toxic wastes in Koko village of former Bendel State (National Open University of Nigeria, 2006). Pointing to that incident, Ezeudu (2003) clearly stated that the Koko toxic waste incident served as an eye opener to Nigerians and thereby prompted the Nigerian government to act in different dimensions to purposely and consciously conserve and secure natural resources even for generations yet unborn. This led to the promulgation of environmental protection decrees and laws such as: Federal Environmental Protection Agency (FEPA) decree No. 58 of 1988; Endangered Species Act Cap. 108 LFN 1990;Minerals Act 1958 Cap. LFN 1990; Harmful waste decrees No. 42 of 1988; Factory decree No. 16 of 1987, and Natural resources conservation decree No. 50 of 1989 (Zephaniah, 2012). Hence, the teaching and learning of Environmental Issues or contents was given top priority in order to equip people with the required knowledge and skills for environmental protection and management (Olusanya, 2007). In addition,Igbogoro (2008) explained that the Koko waste incident made the Nigerian government to emphasize more on the teaching and learning of environmental issues or topics at the primary, secondary and tertiary levels of education.

Thus, in recognition of the importance placed on the teaching and learning of Environmental Issues or contents at all levels of education, UNESCO (2001) recommended a multi-disciplinary approach to environmental related issues or topics which is capable of enabling students of various disciplines to achieve a life-long education for the environment. The report further stressed on the importance of acquisition of life-skills for the improvement, quality, and health of the environment for sustainable development.

Thus, stressing on the need for a proactive problem solving and learner centered methods which would facilitate the acquisition of life-skills in learners, Ezeudu (2003) clearly pointed out that Environmental Education (or the teaching and learning of Environmental Related contents) should not be theoretical but rather practical, action packed, problem oriented and issues based. Hence, Ezeudu, maintains that the environmental educator who teaches Environmental Related contents should as such create avenue for the students to observe, ask questions, collect and collate data, analyze data, pass value judgment and as well participate actively in the classroom.

In line with the above statement, Ezeudu (2003), Emesini (2011), Anyima (2011) and Mason (2012) recommended the following methods for effective delivery/teaching and learning: Fieldwork, problem solving method, constructivist method, inquiry method, simulation and games, computer assisted instructions (CAI), scaffolding, reflective inquiry instructional technique and demonstration method. In spite of the above recommended modern methods for effective teaching and learning of Environmental Related contents in Geography, ge-

ography teachers still resort to using the conventional lecture method (chalk-talk method) in teaching the subject at secondary school level (Abul, 2007).

Lecture method is viewed as a one way flow of communication from the teacher to the students (Igbogoro, 2008). It is a teacher centered or teacher dominated approach. As such, most of the talking is done by the teacher while students remain as passive listeners, taking down notes. However, in most cases it is only the brilliant ones that benefit from such lectures while the majority of students do not understand what is been taughtand thus become mere passive listeners (Nworgu, 2009). Another notable disadvantage in the use of lecture method in the teaching and learning of Environmental Related contents of secondary school geography is its ineffectiveness in developing the desired manipulative motor-skills and skills of the affective domain in students whichbasically does not encourage acquisition of life-skills for problem solving in real life situation (UNESCO, 2001). In addition, Asogwa and Echemazu (2011) maintained that the old method, conventional as it is, appears to reduce and kill students' interest and attitudes towards learning and thereby results to poor achievement.

Thus, the noticeable ineffectiveness of the lecture method has made it inappropriate to be used alone in teaching Environmental Related contents of senior secondary school Geography. In this light, Igbogoro (2008) and Abul (2007) confirmed that students' poor achievement in Environmental Related contents of secondary school Geography is as a result of the inappropriate teaching methods used by geography teachers at secondary schools. In view of this, there is therefore need for a more innovative approach to the teaching and learning of Environmental Related contents of Geography. To that effect,Ogbuanya and Owodunni (2013) suggested that teachers should adopt the use of innovative problem solving methods such as reflective inquiry instructional techniqueto enhance effective teaching and learning. According to Navaneedhan (2007), the use of such learner centered methods create opportunities for learners to actively participate through observation, questioning, collect and analyze data, pass value judgments, make informed decisions, and make inference based on their (students) own findings. This therefore drives home the need to critically examine the effect of reflective inquiry instructional technique on students' achievement in Environmental Related contents of senior secondary school Geography.

However, it is notable that any educational venture or programme that creates room for students to observe, ask questions, and actively participate in the teaching learning process is under the umbrella of reflective inquiry instructional technique since it offers students such opportunities (Anyima, 2011). Hence, the teaching and learning of Environmental Related contents of secondary school Geography requires the use of an innovative method such as reflective inquiry instructional technique.

Reflective inquiry is seen as a broad based instructional technique that affords learners the opportunity to think critically, discuss and share their wealth of knowledge and experiences (both past and present) together in small groups on a particular subject matter (Anyima, 2011). Anyima further asserts that reflective inquiry technique is an innovative trend that incorporates a blend of scaffolded learning, inquiry and critical thinking skills, questioning skills, discussion, and collaborative learning in order to promote effective teaching and learning. It is therefore seen not as a one way technique. Reflective inquiry is learner centered as it engages learners in series of questioning and thinking processes which makes learners construct knowledge within and among themselves without necessarily relying on the teacher for everything (Ogbuanya and Owodunni, 2013). Reflective inquiry is a pedagogy by which inquiry thinking is nurtured toallow students to consider how they know, the way they learn and become more aware of themselves as knowledge constructors and knowers (Lyons, 2010). Reflective inquiry instructional technique is also seen as an inquiry and constructivist approach to teaching which emphasizes on student's active learning and creative problem solving (Eastern Mennonite University [EMU], 2013). Reflective inquiry is therefore seen as a continuous learning process that encourages life-long learning whichmotivates and sustains students' interests in learning and as well facilitates long time retention and transfer of learning in real life situation (Navaneedhan, 2007).

In support of the above assertions, Timitimi (2010) in his independent investigation found out that students taught with reflective inquiry instructional technique performed better than those taught with lecture method. Similarly,Ayama (2007) reported that reflective inquiry instructional technique was significantly more efficacious in improving students' achievement and interest than the traditional lecture method. In the same vein, Ogbuanya and Owodunni (2013) concluded that reflective inquiry instructional technique is a learner centered method that significantly improves students' academic achievement.

Achievement is a result gained by effort. It is a great or heroic deed. Achievement is the act of accomplishing or finishing. According to Pandey (2008), academic achievement is the performance of the students in the subjects they study in the school. It is directly related to students' growth and development of knowledge in educational situation where teaching and learning take place. To Usman (2000), academic achievement is the measure of students' learning acquisition of certain skills at the end of teaching and learning activities. As observed by Devis and Mayuri (2003), academic achievement is excellence in all academic disciplines, in classes as well as in extracurricular activities. However, students' academic achievement can be affected by the teaching method employed by the teacher(s). Therefore this study made an attempt to find out if reflective inquiry instructional technique has a significant effect on academic achievement in Environmental Related contents of secondary school Geography. Specifically, the study was designed to determine the effect of reflective inquiry instructional technique on students' academic achievement in Environmental Related contents of secondary school Geography.

Statement of the Problem

Obviously, the adoption of only teacher-centered methods of teaching by the teacher results to ineffective use of varieties of instructional method and resource materials.This is an indication of the inability of the teachers to effectively implement the curriculum to naturally increase and sustain students' interest, involvement and commitment in the learning process which has only contributed to poor academic achievement in Environmental Related contents of secondary school Geography. Moreover, it has been discovered that the persistent poor academic achievement and low interest of students in Geography is as a result of the inappropriate teaching methods (that do not blend proper instructional techniques) adopted by the teachers (Abul, 2007). The shortcomings in this teacher-centered method of teaching could be responsible for poor performance of Geography students in public examinations (Igbogoro, 2008).Thus, the lecture method is suspected to beineffective and inappropriate for the teaching and learning of Environmental Related contents of senior secondary school Geography since the subject is issues based and likely motivate and challenge students to be actively involved in teaching-learning activities. Therefore, these reasons justify the present attempt in this study to use reflective inquiry instructional technique in the teaching and learning of Environmental Related contents of senior secondary school Geography.

Hence, the problem of this study therefore, put in question form is: What is the effect of reflective inquiry instructional technique on students' academic achievement in Environmental Related contents of senior secondary school Geography?

Purpose of the Study
The main purpose of the study was to determine the effect of reflective inquiry instructional technique on students' academic achievement in Environmental Related contents of senior secondary school Geography. Specifically, the study determined:

1. The effect of reflective inquiry instructional technique on students' achievement in Environmental Related contents of Geography.

Significance of the Study
This study has both practical and theoretical significance. Theoretically, this work can be used to support Piaget's Cognitive Development Theory, Socio-constructivist Theory and Ausubel's Theory of Meaningful Learning.

Specifically, this work could be used to support Piaget's Cognitive Development Theory because cognitive development theory maintains that cognitive development occurs as learner(s) creatively interact with their environment continually, adapt and build their sense of reality by exploring their environment. The theory recognizes the role of the student as a self-regulated active learner who is intrinsically motivated to learning by exploring the environment (Piaget, 1952). This of course, is the main stay of this work as reflective inquiry instructional technique spectacularly improves students' achievement in Environmental Related contents of Geography by promoting students' active learning through use of questions which help students to explore their environment for purposeful learning.

Again, the Socio-constructivist Theory by Vygotsky (1962) was particularly important since it emphasizes on learners mastery of new approaches of learning and gaining knowledge through interaction with others. It advocates for assisted learning also referred to as scaffolding, enhanced through social interactions. This of course, is the main stay of this work as reflective inquiry instructional technique is expected to improve students' achievement in Environmental Relate contents of Geography by promoting students' active learning through group discussions, questioning and scaffolding approaches which usually encourage social interactions.

Finally, this work could be used to support Ausubel's Theory of Meaningful Learning because this theory maintains that the use of advance organizers increases recall and helps learner(s) to connect and reconcile already existing knowledge (or learner's prior existing cognitive structure) to the new experience which leads to meaningful learning and retention (Ausubel, 1960). This of course, is the main stay of this work as reflective inquiry instructional technique spectacularly improves students' achievement in Environmental Related contents of Geography by promoting students' active learning through critical thinking, and use of advance organizers which enhance recall and remembering processes.

Practically, the findings of this research work would be beneficial to students, teachers, curriculum planners and future researchers.

The findings of this study could be of great benefit to students because reflective inquiry instructional technique is an innovative instructional method that is issues based and problem oriented. It is a learner centered method and as such, students have the opportunity to observe, collect and analyze spatial data, and as well carry out experimentations. Reflective inquiry technique allows room for students group discussions where individual students have ample chance to air his/her own views, ask questions and learn meaningfully. The technique encourages students to participate actively in the teaching learning activity. Hence, students learn practically by exploring environment/phenomenon; asking probing questions and construct knowledge meaningfully, acquire skills necessary for problem solving and decision making, develop attitudes and values that promote resources conservation and sustainable development. Thus, through the findings of this study, students would begin to have a better understanding of Environmental Related contents of senior secondary school geography and see it as a subject that one can pass without struggle. The findings will also help students to see the need to engage in reflective learning to gain self-confidence and get them prepared for meaningful learning.

The findings of this study would also be of great benefit to teachers in the sense that geography teachers could find it very easy to teach Environmental Related contents of Geography by adopting and applying Reflective Inquiry Instructional Technique (RIIT) in the teaching–learning situations in Geography classes. The RIIT requires teachers to act as moderators, one who guides the learning process by asking leading questions to bring out the main points or placing factual statements. As such, the teacher saves a lot of energy, talks little and at same time, becomes very effective in the teaching activity. Therefore, teachers of geography would see reasons to adopt the RIIT for effective teaching of Environmental Related contents of Geography which is expected to bring about a significant improvement in the achievement of students at schools.

More so, this study would provide important information to curriculum planners of educational institutions in preparing Geography teachers. They would see the need to incorporate RIIT into the curriculum for training and re-training of teachers for improvement in teacher effectiveness in the class. Finally, the work could serve as a useful material to anybody carrying out research on similar topic especially for literature review.

Research Question
The following research question guided the study.

1. What are the achievement scores of students taught Environmental Related contents of Geography using reflective inquiry instructional technique and those taught using conventional lecture method?

Research Hypothesis
The following null hypothesis was formulated to guide the study at 0.05 level of significance.

$H0_1$: There is no significant difference in the mean achievement scores of students taught with reflective inquiry instructional technique and those taught with conventional lecture method.

METHOD
Design of the Study
The design of the study is quasi-experimental. Specifically, the study adopted the pretest- posttest non-equivalent control group design. The design was considered appropriate for this study because randomization of subjects was not possible and intact classes were used. This was to avoid disorganization of the school arrangement. However the intact classes were further assigned randomly to experimental and control groups respectively.

Population of the Study
The population of the study comprised of all the 1,820 senior secondary two (SS II) students who offer geography in the 14 public secondary schools spatially located within the urban and rural areas of Kolga Education Zone, Bayelsa State.

Sample and Sampling Technique
The sample consisted of 160 senior secondary two (SS II) students who offer Geography. Specifically, eighty students in the experimental and eighty in the control groups. Male and female students of Geography made up the sample size. Simple random sampling technique was employed to draw out four schools out of the 14 schools and about 160 SS II Geography students were sampled.

Instrument for Data Collection
The instrument used for data collection was the Environmental

Related Contents Achievement Test in Geography (ERCATG). The essence of the ERCATG instrument was to measure students' achievement in Environmental Related Contents of senior secondary school Geography. It was a structured fifty (50) multiple choice items instrument with four options, one of which is the correct answer. The items covered selected content areas or topics of Environmental Related Contents of the senior secondary school Geography curriculum. Specifically, the selected topics were Renewable and Non-renewable resources, Environmental problems, and Environmental Conservation - Importance of Resource Conservation. Each of these topics formed a cluster in the instrument and the 50 multiple choice items were raised from them.

The ERCATG instrument was validated by three experts in the faculty of Education, University of Nigeria Nsukka. The advice of the experts helped the researcher to modify and select the final instrument items used for this study. The ERCATG was trial tested using thirty representative sample from a co-educational school (Opolo Government School inYelga L.G.A) outside the study area. The internal consistency of the ERCATG was determined usingKudder-Richardson (K-R20). The choice of the K-R20 method was considered appropriate since all the ERCATG items were dichotomously scored. The reliability indices for the three clusters were 0.65, 0.74 and 0.73 respectively. This gave an overall reliability index of 0.66 whichmeans that the ERCATG was reliable

The topics were allotted to four (4) weeks following the normal school teaching time-table. The ERCATG was used for both the pretest and post-test.

Experimental Procedure
Training of the Teachers:
Prior to the actual treatment, training classes were organized for the regular Geography teachers of the sampled schools who participated in the study. During the training classes, the teachers were instructed on the treatment specifications. The teachers were provided with the validated lesson plans and were trained on the use of reflective inquiry instructional technique. They were trained on how to fully implement the seven distinct phases or steps in the reflective inquiry lesson plans prepared by the researcher. These steps are embedded in the lesson plans used for teaching the treatment groups. The steps are identification of prior ideas/concepts, exploration, discussion, application, seminar session, evaluation and conclusion/assignment. One notable thing is that the lesson plans of both lecture method and reflective inquiry instructional method are similar in terms of content coverage, instructional objectives, instructional materials, entry behaviour/ induction test, evaluation and take home tests or assignments.

However, the only difference between the two methods is that reflective inquiry instructional method is activities based and learner centered while lecture method is a teacher dominated method (teacher centered). Thus, the teachers for the treatment and control groups were specifically trained.

The training sessions were conducted in one of the sampled schools. This training lasted for four days. The sessions were in the evening (4-6 pm) in order not to interfere with the teachers' working hours. On the whole, four Geography teachers from the sampled schools were involved in the training program. The program of activities for the four days was as follows:

DAY 1: The day started with prayers and was followed by the introduction of the participants and the purpose of the training exercise. The teachers were asked to share their experiences with regard to the teaching of Environmental Related contents of Geography – their problems and challenges. Students' poor achievement due to selection and use of inappropriate teaching methods and inadequate knowledge in Environmental Related contents of Geography in both national and international examinations were discussed extensively.

DAY 2: Reflective inquiry instructional technique as an innovative method of teaching and lecture method of teaching were discussed. The participants were taught what these two methods of teaching are and how to use them. For instance, the participants were taught how the reflective inquiry technique could be used in teaching. Specifically, the research assistants were trained on how to establish good rapport with the students as he or she (teacher) presents the lesson, how to initiate discussions by asking probing questions in order to ascertain students' prior knowledge about the topic, how to scaffold or assist learners in the learning process and how to form collaborative learning groups and as well help students to learn in a collaborative way. In addition, the participants copied notes and they were also given details on the lecture method of teaching too.

DAY 3: Presentation and discussion of lesson plans. As regards the use of reflective inquiry instructional technique, the participants were given detailed explanations on how to help students to explore the materials or topics for learning. Other steps embedded in the innovative lesson plans such as application, the seminar sessions (organized by teacher) and how to evaluate were thoroughly explained by the researchers. Thus, both reflective inquiry and lecture methods of teaching were further discussed and practiced by the teachers.

DAY 4: Discussion on lesson plans continued. Further explanations were made on how to fully implement the distinct phases or steps in the reflective inquiry lesson plans. Questions were entertained from the trainees too. Thereafter, time was created for the trainees to engage in micro teaching. At this stage, one of the trainees was involved in a micro teaching while the others served as students. All the trainees participated in the micro teaching while the researchers observed, to ensure compliance. When this was done, the researchers recapped the major points and the training session came to an end.

Before treatment, all the subjects in both experimental and control groups were pre-tested with the structured ERCATG items to get the baseline data for the study. The experiment was conducted using the normal school periods of lesson. At the end of the treatment which lasted for four weeks, the teachers (research assistants) administered the ERCATG as post-test which was a disguised pretest to the research subjects. The pretest was disguised to avoid the test effect on the subjects. Each lesson period lasted for forty five minutes as specified in the normal school time table. The whole exercise of teaching and testing was monitored and supervised by the researchers to ensure that there was no deviation from the specifications in the guide.

Control of Extraneous Variables
Some measures were taken to ensure that the achievement/ performance of the students in the treatment (experimental group) were as a result of reflective inquiry instructional technique and not due to some extraneous variables. For instance, to reduce the error which might arise as a result of teacher differences, the researchers organized a pre-experimental training program for the regular Geography teachers of the classes which were used for this study. The training program helped in establishing a common instructional standard among the Geography teachers. Also, the same teachers that had been teaching the subject before the study taught both groups in their schools of study.

Method of Data Analysis
Data on the research question was answered using mean and standard deviation. Analysis of Covariance (ANCOVA) was used in analyzing the null hypothesis whereby the pretest scores on the students' achievement served as covariates to the post-test scores at 0.05 level of significance.

Decision Rule
The following decision rules were applied:

i. For the analysis of research question, accept any variable whose computed mean is higher than the other contrasting variable been compared. Such variable is assumed to have yielded a higher score.
ii. And secondly, for the testing of hypothesis, reject the null hypotheses where the calculated value of the test statistics is greater than the computed significance value at 0.05 level of significance. Otherwise, do not reject the hypothesis.

Results
The presentation of results is as follows:

Research Question 1:
What are the Mean achievement scores of students taught Environmental Related contents of Geography using reflective inquiry instructional technique and those taught using conventional lecture method?

Table 1: Mean and Standard deviation of pretest and posttest achievement scores of students taught Environmental Related contents of Geography using reflective inquiry instructional technique and those taught using conventional lecture method.

Variable		Pre test		Posttest		Mean gain
Method of Teaching	N	$\bar{X}$	SD	$\bar{X}$	SD	
Reflective Inquiry Method	80	47.74	7.68	67.16	8.59	19.42
Lecture Method	80	46.71	8.55	56.22	9.05	9.51
Total	160	47.23	8.12	61.69	8.82	14.46

Table 1 shows the pre-test and posttest mean and standard deviation (S.D) scores of students in the experimental and control groups. The result shows that the experimental group obtained a mean score of 67.16 in the post-test and 47.74 in the pretest respectively; and thus had a mean gain score of 19.42. On the other hand, the control group had the mean score of 46.71 and 56.22 in the pretest and post-test respectively and had a gain score of 9.51. This showed that the students in the experimental groups achieved higher than those in the control group in the ERCATG achievement test. Also, to confirm whether or not the observed difference in the achievement between the two groups was significant, hypothesis one was tested.

Hypothesis
H_{01}: There is no significant difference in the mean achievement scores of students taught Environmental Related contents of Geography with reflective instructional technique and those taught with conventional lecture method.

Table 2:Analysis of Covariance (ANCOVA) of students' Achievement in Environmental Related contents of Geography.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3037.067[a]	2	1518.533	20.246	.000
Intercept	12618.687	1	12618.687	168.236	.000
Pretest Scores	516.910	1	516.910	6.892	.010
methods	2367.845	1	2367.845	31.569	.000
Error	11775.927	157	75.006		
Total	653765.000	160			
Corrected Total	14812.994	159			
a. R Squared = .205 (Adjusted R Squared = .195)					

Table 2 above shows the result of ANCOVA used in testing hypothesis 1. From the data, it is observed that an F-ratio of 31.569 was obtained with an associated exact probability value of 0.00. Since the associated probability value (0.00) was less than 0.05 set as bench mark, therefore the null hypothesis was rejected. It was concluded that there is a significant difference between the mean score of students taught with reflective inquiry instructional technique and those taught with conventional lecture method.

Discussion of Results
Generally, the results (Table 1) showing a marked high increase in the mean achievement score of students in the experimental group than those of their counterparts in the control groups is an indication that the strategy of teaching employed(Reflective Inquiry Instructional Technique) had effect on the treatment groups. This difference in performance was confirmed to be significant (see Table 2). Thus reflective inquiry instructional technique had enhanced the understanding of students in learning the Environmental Related contents of secondary school Geography. The findings agree with those ofAyama (2007);Anyima (2011); Timitimi (2010) and Ogbuanya and Owodunni's (2013)who found out that students exposed to reflective inquiry instructional technique performed significantly better than those exposed to lecture method of teaching. This finding implies that reflective inquiry instructional technique can be employed as an effective method of instruction in Geography classrooms.

Conclusion
The need to find the best method to assist Geography students in learning Environmental Related contents is paramount since use of appropriate method is essential for students' achievement in Environmental Related contents of Geography. Thus, the findings of this study have shown that Reflective Inquiry Instructional Technique (RIIT) was more effective in improving students' achievement in Environmental Related contents of Geography than the conventional lecture(talk-chalk) method.

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

1. Geography teachers should adopt and use reflective inquiry instructional technique in Geography classes where Environmental Related contents are taught.
2. Curriculum planners of educational institutes should consider review of curriculum with a view to incorporating reflective inquiry instructional technique into the teaching of Environmental Related contents of Geography.
3. Government should provide the appropriate resource materials required to facilitate reflective teaching-learning activities in Geography classes where Environmental Related contents are taught.
4. Workshops, seminars and conferences should be organized by Ministry of Education and school administrators to enlighten teachers and as well improve their knowledge and skills on the use of reflective inquiry instructional technique for improving students' achievement in Environmental Related contents of Geography.

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