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EFFECTIVENESS OF TEACHER-GUIDED INQUIRY (TGI) TECHNIQUE ON THE LEARNING OUTCOMES OF GEOGRAPHY STUDENTS IN LAGOS STATE SENIOR SECONDARY SCHOOLS

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Abstract

The study investigated the effectiveness of teacher-guided inquiry technique on learning outcomes of senior secondary school students in Geography in Lagos State, Nigeria. Four research questions were answered and four hypotheses were tested at a 0.05 level of significance. The study adopted a quasi-experimental pretest posttest non-equivalent control group design. The population of the study consisted of all senior secondary two (SS 2) Geography students in Lagos State. Multistage sampling techniques were used to narrow down the sample to four (4) intact classes of students who were then selected purposively to give a sample size of 99. Geography Achievement Test (GAT) and Geography Students' Attitude Questionnaire (GSAQ) were used for data collection. The internal consistencies of the instruments were measured using Cronbach's alpha with co-efficient values of 0.76 for GAT (pre and post-test); 0.87 for GSAQ pre-treatment and 0.79 for the GSAQ post-treatment. While mean and standard deviation were used to answer the research questions, an independent t-test was used to test all the hypotheses at a 0.05 level of significance. The findings revealed that teacher-guided inquiry technique is more effective in improving academic achievement and attitude of students toward Geography than the use of conventional method and that, there was no significant difference in the academic achievement and attitude of students based on gender. Based on the findings of the study, it was recommended among others that curriculum planners and teacher training institutions in Nigeria should revisit their curriculum to embrace more inquiry-based techniques with less emphasis on conventional methods; workshops, seminars, and conferences should be organized to enlighten Geography teachers on the applications of teacher-guided inquiry technique in classroom teaching; the school time-table should be restructured to give more opportunity for the practice of teacher-guided inquiry technique, and above all, gender stereotyping should have no place in Geography classroom.

Keywords: Academic Achievement, Attitude, Conventional Method, Geography, Teacher-guided inquiry.

Introduction

There is no doubt that Geography stands out as an important subject in the school curriculum. Apart from its multi-disciplinary nature which provides wider knowledge and skills to the learner to exploit his immediate environment, its global relevance cannot be over-emphasized. Geography studies the origin of the physical and human phenomena of the earth's surface, the processes that change them and have brought them to the present state, and arranged them in space in the way they exist without forgetting to analyse the implications of the location and arrangement of these phenomena for human beings. The environmental challenges bedevilling the world such as global warming, soil degradation,

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flooding, deforestation, climate change, acid rain, ozone layer depletion, pollution (Akpanfun, 2020), and many others are the aftermaths of the interplay between physical and human phenomena and are all under the purview of Geography. These issues need curricular solutions and a reason why they form the objectives and subject matters of most nations' geography curriculum of which Nigeria is not an exception. Geography propensity to solve world challenges makes it stands out as an essential subject resource of the 21st century that could help the world address problems about sustainable living in a globalized society (Aston Manor Academy, 2023). Balasubramanian (2014) asserts that life becomes easy when there is an understanding of geography. Balasubramanian further argues that Geography is a basic subject for all human beings to learn and should be an essential discipline for academic fields. The values of Geography to the society however, would be a function of the quality of learning outcomes acquired by the learners.

The concept 'learning outcome' is a controversial term to define. Yurdugül and Menzi (2015) refers to learning outcome as a set of observable and demonstrable statements about what the learner knows and understands at the end of the learning experience. Mahajan et al. (2017) sees it as statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning. Oxnard College (2021) lend credence to this definition by stating that learning outcomes should be what students are expected to know, be able to do or be able to demonstrate when they have completed or participated in a course or programme which are essentially observable, measurable and can easily be demonstrated. Ramzi and Biju (2022) assert that learning outcomes can be framed through knowledge; skills and competencies acquired and demonstrated when students complete a programme. From these assertions, in a generic term, learning outcomes would be described as an observable changes in all the domains of learning i.e. attitude, interest, values, skills, competencies and knowledge (achievement and performance) which apparently serve as measure of its actualization.

Studies such as Kaiko et al. (2023), Joseph et al. (2022), and Adebanjo and Ogunbiyi (2023) have shown that Geography teachers have failed in their primary roles of employing effective instructional strategies that could ensure the realization of sustainable learning outcomes. Learners are not only showing negative attitude to Geography, their rate of withdrawal is becoming alarming, leading to both a dwindling in enrolment of geography students for the Senior School Certificate Examinations and an abysmal failure (Onuoha & Eze, 2013). Kawu et al. (2023) opined that teachers use conventional methods which are theoretical didactic and teacher-centered, instead of experimental or activity-based methods. Teachers most often use lecture method that does not sufficiently give students the opportunities to participate in classroom instruction; an approach that has turned Geography students into computer machines that could only give out what the operators fed into it.

Isa et al. (2022) posited that the teaching methods used by teachers, determine the extent to which students perform in their academics. They revealed that traditional teacher-centred methods used by most teachers in the classroom encourage rote learning and fail to motivate the students' interest and achievement in their academics. This position was earlier maintained by Khalil et al. (2015) who noted that teachers' factors which largely rest on their methods of teaching are the bane behind the students' poor academic performance witnessed in West African Secondary School Certificate Examination (WASSCE) and the National Examination Council (NECO) results in Geography.

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Opoku (2020) reiterates that for Geography to continue to succeed, researchers and Geography teachers will need to look at ways to enhance curriculum, pedagogy, and assessment in Geography Education (Chang & Kidman, 2019), a situation which is believed would enhance performance and reduce 'attrition rate'. Drew (2023) also asserts that for meaningful learning to occur, students should be required "to examine ideas, and critique them, compare them to prior knowledge, and apply them to new contexts". One of the methods that possess these unique features as expressed in Abdul-Rabu, et al (2022) is inquiry-based learning.

Inquiry-Based Learning

The human environment is full of geographical objects and phenomena in which children are too curious to get answers on where, how, and why they exist and operate. The easiest way to get answers to these questions to satisfy their curiosity, however, is to make them inquire about these objects and their activities. This method is what Kleeman (2015) called inquiry-based learning and is defined as a process of seeking truth, information, or knowledge seeking information by questioning. To Kožuchová et al. (2023) inquiry-based education focuses on challenging, accepted ideas and presumptions, followed by experimental verification that may result in the proposal of novel concepts. In a more explicit term, it is a strategy that entails probing, enquiring, studying, analysing, discovering, assessing, questioning, thinking, searching, exploring, testing, and gathering to acquire new or verified geographic knowledge and information (Akinlaye, 2003). It is simply a method of finding out something. The main benefit of inquiry learning is helping students find answers through self-discoveries with the use of higher-order thinking skills such as problem-solving to reach conclusions (Drew, 2023). It stands in contrast to conventional instructional strategies that emphasize memory and repetition. Based on the above-mentioned understanding, the inquiry model is a method used in the learning process so that students have the ability to ask questions, examine, or investigate something which involves the entire student's ability to search and investigate in a systematic, critical, logical, analytical, so that they can formulate their own (Andrini, 2016). Yilmaz (2011) affirms that in inquiry learning, students construct knowledge and develop problem-solving skills through a process of formulating and testing hypotheses. Different forms of inquiry-based learning exist in literature which among others include teacher-guided inquiry, teacher-guided interview, teacher-guided survey (Akinlaye, 2003); constructed inquiry, guided inquiry and open-ended inquiry (Öztürk et al., 2022). However, for the purpose of this study, teacher-guided inquiry process described by Akinlaye (2003) as a process where a teacher assumes the role of a facilitator using 5E's (Engage, Explore, Explain, Elaborate and Evaluate) model as an instructional guide was adopted.

Under the teacher-guided discovery paradigm, learners are formed into a small group and given thought-provoking questions with tangible resources to observe, probe, investigate, and come up with solutions to the questions or task at hand; thereafter, the instructor might go into further details about the findings the learners made in order to explain them and offer guidance (Warner & Myers, 2017). Akinlaye (2023) asserts that this teacher-guided inquiry is the most suitable form of inquiry technique when working with primary and secondary school learners. According to Yilmaz (2011), the 5-E model of inquiry focuses on the five phases which are: engagement, exploration, explanation, elaboration, and evaluation. This model provides an easy platform to a teacher using guided-inquiry method, and many lessons can be adapted to this instructional model. Teachers can use the

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5-E model to meet objectives and deliver specific concepts and explanations. This model also follows a step-by-step progression, where each step builds on the previous step (Warner & Myers, 2017; Bailey, 2018).

According to the experience of the discovery learning movement, inquiry-based learning starts by presenting questions, challenges, or scenarios and is dominated by students' own, explorative exploration. (Wang, 2019). In any case, the inquiry method has to be a series of learning activities that emphasizes the process by which a child will think critically and analytically to seek and find their answer to the problem in question.

The benefits derived from using inquiry-based methods are huge when compared to other child-centered teaching methods. Inquiry-based learning due to its instructional effectiveness according to National Research Council (1996) should be a central strategy of all science curricula as part of the process by which new knowledge is acquired.

The power of the inquiry-based approach to teaching and learning according to Kleeman (2015) is its potential to enhance intellectual engagement and foster deep understanding through the development of a hands-on, minds-on, and 'research-based disposition' towards teaching and learning. In a similar move, Avsec and Kocijancic (2014) submitted that the inquiry method has an impact on the increase in knowledge acquisition of technology, the development of problem-solving skills, and the ability to make critical decisions. This method motivates the learners how to reason and think for themselves. Therefore, the acquisition of these skills is very crucial and in fact, important for the learners of today and the future who have to face a myriad of unprecedented socio-political and economic problems to which they will have to find solutions to credible creativity. Andrini (2016) asserted that the inquiry learning model provides the opportunity for students to construct their own knowledge, using concepts that have been held to solve the problems encountered. The method gives students the opportunity to link new information with existing cognitive structure resulting in meaningful learning. Andrini stated that inquiry-based learning does not only develop intellectual abilities of all potential students but also their emotional and skill developments.

Similarly, Manishimwe (2022) posited that students who were exposed to inquiry-based learning have change in attitude towards learning biology at upper secondary schools than students taught using conventional methods. In his findings, Cakir (2017) posited that the 5E's (Engage, Explore, Explain, Elaborate and Evaluate) learning model had an effect on the students' academic achievement and attitude towards science and science process skills.

Succinctly, Akinlaye (2003) summarized the roles of inquiry-based learning as:

> *the development in the learners those skills, values and attitudes that will enable them to: (i) think critically; (ii) recognize problems in their environment; (iii) and in effects become independent problem-solvers and (v) help learners live a better life by directly contributing to the solutions of the urgent social issues and problems in the society and directly serving learners as the ultimate policy-makers in the future, by helping them to understand, explain, predict and control elements involved in social problems, and to enable them make a better and intelligent decision* (Akinlaye, 2003. p.141).

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All these show the effectiveness of teacher-guided inquiry learning technique and have lent credence to the Chinese proverb that says: "Tell me and I forget, show me and I remember, involve me and I understand".

There have been several studies that have examined the effects of gender on inquiry-based learning. Some researchers (Almasri et al., 2019; Jackman et al., 2019 and Erawati et al., 2020) found that girls tend to outperform boys in inquiry-based learning activities, possibly because girls are more likely to ask questions, seek help, and seek out resources when needed (Bailey, 2020). Similarly, Parajuli and Thapa (2017) asserted that girls are likely to be more adaptive in learning in a new environment than boys. This position was indirectly buttressed by Wrigley-Asante (2023) in her reports that studies conducted in the industrialized world have revealed a reversal in the academic performance of men and women, with women surpassing men in nearly every subject at all educational levels. Similarly, in their findings, Workman and Heyder (2020) contend that women appear to do better than men in language, the arts, and the natural sciences, even though the latter has historically been a field dominated by men. Other studies have found that boys and girls do not differ in their ability to learn through inquiry-based methods, but that boys may be more likely to engage in risk-taking and experimentation, while girls may be more likely to follow instructions and seek out confirmation from others. For example, a study by Renninger (1998) found that boys performed better than girls on a project-based learning task. The researchers suggest that this may be because boys are more likely to engage in deep processing of information, while girls may focus more on surface-level processing. Additionally, a study by Lamoureux (2022) found that during inquiry-based learning, boys exhibit greater confidence than girls, but once the inquiry process is completed, girls feel more pleased than boys.

In a related finding, Jones (2000) discovered that male students exhibited a more favorable attitude toward science and were more likely than female students to do better in science. This however stands contrary to Ogawa and Shimode (2004) who noticed no difference between boys and girls concerning their attitude towards science and Miller et al. (2006) who got a different result, where the female students were more interested in science than males and more often planned a science-related field as their future career. Additionally, Kubiatko et al. (2012) asserted that males expressed a more positive perception of Geography lessons than females, and they similarly viewed Geography as an easy subject, more relevant to their life careers, and desired to have Geography lessons more often than females.

Despite so many benefits of Inquiry-based method, Shaheen et al. (2015) expressed that science teachers feel hesitant to put inquiry-based teaching in practice as for them, it is time-consuming henceforth difficult to manage. Others oppose it due to the unavailability of necessary equipment and materials while few teachers feel that inquiry-based teaching/learning work for sharp, bright, and intelligent students.

Statement of the Problem

A look at the Nigerian Geography Education objectives, like many other nations, indicate that learners are at the centre of the teaching-learning processes. They need to be equipped with the knowledge, skills and values towards proffering solutions to the environmental challenges and make Geography a vital subject resource for 21st-century. But the situation

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in the teaching-learning of Geography in the Nigerian Senior Secondary schools' classrooms, shows that all is not well with Geography. Geography is still been largely taught using traditional methods of instruction which Majasan (1969) described as "Cape and Bay methods", full of memorization and regurgitation. Traditional methods are teacher-centered and have been proven by many researchers to be ineffective in achieving a meaningful learning outcomes in the learners.

The effect of teachers' use of conventional methods is found in the poor academic performance of Geography students in both internal and external examinations and loss of interest in geography by many students. That, within a space of five years, (2017-2022) a 20% decrease was noticed in the enrolment of students for WASSCE Geography despite the yearly increase in the national enrolment. This situation has become so worrisome that if care is not taken secondary school geography might become "moribund" and go into extinction. Therefore, there is need for an urgent paradigm shift to modern methods of instruction that is learner-centered. A method that will make learning to be meaningful to the leaner and give them opportunity to actively participate in the teaching-learning processes as accentuated in the 2013 National Policy of Nigeria. One of such method is teacher-guided Inquiry (TGI) technique. The thrust of this study therefore is to find out the effectiveness of teacher-guided inquiry (TGI) when compared with conventional method (CM) on the learning outcome of students in geography.

Research Questions

The following research questions guided the study:

1. What is the difference in the academic achievement mean scores of students taught Geography using teacher-guided inquiry and those taught using conventional teaching method?
2. What is the difference in the attitude mean scores of students taught Geography using teacher-guided Inquiry and those taught using conventional teaching method?
3. What is the difference in the academic achievement mean scores of male and female students in Geography when taught using teacher-guided inquiry?
4. What is the difference in the attitude mean scores of male and female students in Geography when taught using teacher-guided inquiry?

Hypotheses

The research hypotheses below were tested at 0.05 level of significance:

1. There is no significant difference in the academic achievement mean scores of students taught Geography using teacher-guided Inquiry and those taught using conventional teaching method
2. There is no significant difference in the attitude mean scores of students taught Geography using teacher-guided Inquiry and those taught using conventional teaching method
3. There is no significant difference in the academic achievement mean scores of male and female students in Geography when taught using teacher-guided inquiry
4. There is no significant difference in the attitude mean scores of male and female students in Geography when taught using teacher-guided inquiry

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Methodology

The study adopted a quasi-experimental research design of pre-test and post-test, non-equivalent control group. Intact class of Geography students among the senior secondary school two Geography classes were involved in the intervention. The variables in the study were crossed in a 2 × 2 × 2 factorial matrix - one level of independent variable (teacher-guided inquiry), two levels of moderating variable (male/female) and two levels of dependent variable (academic achievement and attitude). The arrangement of the design is as shown below:

O_1 X_1 O_2 Experimental Group (Teacher-guided inquiry)
O_3 – O_4 Control Group (C)
Where:
O_1 represents pre-test for experimental group
X_1 represents treatment given out to experimental Group
O_2 represents post-test for experimental group
O_3 represents pre-test for control group
O_4 represents Post-test for control Group

All students in Lagos State public senior secondary schools with a total population of 228,660 (118,461 girls and 110,199 boys) from 321 Senior Secondary Schools (Lagos State Ministry of Education, 2018). Senior Secondary School Two (SSS 2) was the class of choice for treatment because it is the most stable at Senior Secondary School level. Students of this class are not novice in geographical concepts and procedures and more importantly, the selected Geography concepts for treatments are in the SSS2 scheme of work. A multistage sampling technique was adopted. Stage one involved stratifying all the senior secondary schools in Lagos State into six clusters (Districts). Stage two involved choosing two Educational Districts (Districts I & V) from the six Districts using random sampling technique. In stage three, two schools were chosen randomly from each District. In the last stage, one intact class of Geography in SSS 2 was selected from each school and assigned to Experimental (Teacher-guided inquiry) and Control (Conventional Methods) groups through purposive sampling technique. Each Experimental group was assigned to a teacher-guided inquiry technique while Control Group was assigned to conventional method. The results of the two schools under same intervention were merged together to form two groups. Experimental group and Control group had 52 and 47 respondents respectively which gave sample a size of 99; comprising of 20 males and 32 females in the Experimental group and 23 males and 24 females in the Control Group. The instruments adopted for the study were tagged Geography Achievement Test (GAT) and Geography Students' Attitude Scale (GSAS) which comprise of Pre- and Post- GAT and Pre- and Post-treatment GSAS. GAT consisted of 50-item Multiple Choice Objective Questions (MCOQ) and GSAS was made up of 20-items using varying scales in Section A and four-point Likert scale of: **Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD)** in Section B. They were both constructed by the researcher.

Before the commencement of the treatment, a pilot study was conducted. Geography Achievement Test (GAT) and Geography Students' Attitude Scale (GSAS) were subjected to reliability test. Test-retest method was used to estimate the reliability coefficients of the Geography Achievement Test (GAT) while pre-test and post-test of Geography Students' Attitude Questionnaire (GSAS) were estimated using split-half method. The internal consistencies of the instruments were measured using Cronbach's alpha with co-efficient

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values of 0.76 for pre- and post-tests of GAT; 0.87 and 0.79 for the pre-and post-treatments of GSAQ respectively. The intervention, however, took seven weeks. Both descriptive and inferential statistics were used in the analyses. Descriptive statistics (tables, means and standard deviation) were used to answer the research questions while inferential statistics of the independent t-test was applied to test the hypotheses.

Results

Data analyses with respect to the research questions and the hypotheses were presented in tables.

Research Question One

What is the difference in the academic achievement mean scores of students taught Geography using teacher-guided inquiry and those taught using conventional teaching method?

Table 1a

Difference in the Mean and Standard Deviation of the Academic Achievement of Geography Students Taught with Teacher-guided Inquiry (TGI) and Conventional Methods (CM)

Treatment	N	Mean		Diff. in Mean	SD		Diff. in SD
		Pre-test	Post-test		Pre-test	Post-Test	
TGI	52	21.76	57.06	35.30	7.01	8.78	1.78
CM	47	19.47	19.94	0.47	6.29	6.64	0.35
Diff. Means (TGI & CM)				34.83			

Source: Fieldwork, 2023

Table 1a shows the academic achievement of the students in both groups before and after treatments. From the analysis, the two groups had mean gain in their achievement scores which implies that they both had better scores in their post-test than pre-test. However, the table revealed that TGI had higher mean gain of 35.30 than CM group who had mean gain of 0.47. A comparison of the difference in the mean scores between the two instructional groups indicates a difference of 34.83. The significance of the difference is tested under hypothesis one.

Hypothesis One: There is no significant difference in the academic achievement mean scores of students taught Geography using teacher-guided inquiry and those taught using conventional teaching method

Table 1b

Test of Significant Difference in the Academic Achievement of Geography Students Taught with Teacher-guided inquiry and Conventional Methods of Instruction

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Groups	N	Mean	SD	DF	T-calculate	P-value
TGI	52	57.06	8.78	97	23.53	0.0001
CM	47	19.94	6.64			

The analysis in table 1b shows that the P-value obtained was lesser than the significant level of 0.05 at 97 degree of freedom [t (97) =23.53, p<0.05)] which means the null hypothesis stated above was rejected. Thus, there is a significant difference in the academic achievement mean scores of students taught Geography using teacher-guided inquiry and conventional methods, with TGI group showing better performance than CM.

Research Question Two

What is the difference in the attitude mean scores of students taught Geography using teacher-guided inquiry and those taught using conventional teaching method?

Table 2a

Difference in the Mean and Standard Deviation of the Attitude of Students to Geography when Taught using Teacher-guided Inquiry and Conventional Methods of Instruction

Instructional Method	N	Mean		Diff. in Mean	SD	
		Pretest	Posttest		Pre-test	Post-Test
TGI	52	57.08	72.40	15.34	8.76	7.69
CM	47	62.06	60.02	-2.04	9.41	9.41
Diff. Means (TGI & CM)				13.30		

Source: Fieldwork, 2023

Table 2a shows the attitude of students in both groups before and after the treatments. From the analysis it reveals that TGI group had mean gain of 15.34 in the attitude score which implies that students in the group had better score in their post-test than pre-test while CM had mean loss of 2.04 indicating that students performed better in pre-test than post-test. When the difference in the mean scores between the two instructional groups were compared, it indicates a difference of 13.30. The significance of the difference is tested under hypothesis one.

Hypothesis Two

There is no significant difference in the attitude mean scores of students taught Geography using teacher-guided inquiry and those taught using conventional teaching method

Table 2b

Test of Significant Difference in the Attitude Mean Scores of Students Taught Geography Using Teacher-guided Inquiry and Those Taught Using Conventional Methods of Instruction

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Groups	N	Mean	SD	DF	T-Cal	P-value
TGI	52	72.40	7.69	97	7.20	0.0001
CM	47	60.02	9.41			

The analysis in table 2b shows that the P-value obtained was lesser than the significant level of 0.05 at 97 degree of freedom [t (97) =7.20, p<0.05)] which means the null hypothesis stated above was rejected. Thus, there is a significant difference in the attitude mean scores of students taught Geography using teacher-guided inquiry and conventional methods, with TGI group displaying a better attitude to Geography than CM.

Research Question Three

What is the difference in the academic achievement mean scores of male and female students in Geography when taught using teacher-guided inquiry?

Table 3a

Difference in Mean and Standard Deviation of the academic achievement mean scores of male and female students in Geography when taught using teacher-guided inquiry

Instructional Methods	Gender	N	Mean	Gender Mean Difference	Std. Deviation
TG1	MALE	20	54.45	-4.35	10.25
	FEMALE	32	58.80		7.33

Source: Fieldwork, 2023

Table 3a showed the academic achievement of the students in TGI based on gender after the treatment. From the analysis it shows that female students taught with TGI had a higher mean score of 58.8 with Standard Deviation of 7.33 than their male counterparts who had a mean score of 54.45, Standard Deviation of 10.25. This implies that there is a difference in the academic achievement of male and female students taught Geography through TGI with a mean difference of 4.35. The significance of the effect of this difference was further examined under hypothesis three.

Hypothesis Three

There is no significant difference in the academic achievement mean scores of male and female students in Geography when taught using teacher-guided inquiry

Table 3b

Test of Significant Difference in the Academic Achievement of Male and Female Students in Geography when taught with Teacher-guided inquiry

Instructional Methods	Gender	N	Mean	SD	Df	T-cal	P-value
TG1	MALE	20	54.45	10.252	50	1.78	0.081
	FEMALE	32	58.80	7.327			

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The analysis in table 2b shows that the P-value obtained was greater than the significant level of 0.05 at 50 degree of freedom [t (50) =1.78, p>0.05)] which means the null hypothesis stated above was accepted. Hence, there is no significant difference in the academic achievement mean scores of male and female students in Geography when taught using teacher-guided inquiry. What this implies is that though female students had better performance than their male counterparts, the result of the analysis shows that the difference is insignificant.

Research Question Four

What is the difference in the attitude mean scores of male and female students in Geography when taught using teacher-guided inquiry?

Table 4a

Difference in the Attitude Mean Scores of Male and Female Students in Geography when Taught Using Teacher-Guided Inquiry

Instructional Methods	Gender	N	Mean	Gender Mean Difference	Std. Deviation
TG1	MALE	20	72.41	0.42	4.15
	FEMALE	32	72.83		4.78

Source: Fieldwork, 2023

Table 4a shows the attitude of male and female students under TGI group after the treatment. From the analysis it shows that male students taught with TGI had a higher mean scores of 72.41, standard Deviation of 4.15 than their female counterparts who had a mean score of 72.83 and Standard Deviation of 4.78 with mean difference of 0.42. What this implies is that there is a difference (0.42) in the attitude of male and female students to Geography when taught through TGI. The significance of this difference was further examined under hypothesis four.

Hypothesis Four

There is no significant difference in the attitude mean scores of male and female students in Geography when taught using teacher-guided inquiry

Table 4b

Test of Significant Difference in the Attitude of Male and Female Students to Geography when taught with Teacher-guided Inquiry

Instructional Methods	Gender	N	Mean	SD	Df	T-cal	P-value
TG1	MALE	20	72.41	4.15	50	0.324	0.748
	FEMALE	32	72.83	4.78			

The analysis in table 4b shows that the P-value obtained was greater than the significant level of 0.05 at 50 degree of freedom [t(50) = 0.32, p>0.05] which means the null hypothesis

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stated above was accepted. The result reveals that there is no significant difference in the attitude of male and female students to Geography when taught using teacher-guided inquiry. What this implies is that though female students had better disposition than their male counterparts in the descriptive analysis, but the difference is meagre to produce a significant difference.

Discussions

The analysis and interpretation in the findings revealed that TGI had significant effect on the academic achievement of Geography students in senior secondary schools, $t_{(97)} = 23.53$, $p < 0.05$). This implies that students taught with TGI had better performance when compared with CM group. This discovery is not far-fetched. Hussain and Shah (2015) affirm that inquiry-based method improves different learning domains such as knowledgeability, comprehension ability, application ability, and skill development ability of students. The technique, however, became more effective because students had life interaction with the concepts under study and where this was not possible visual materials such as photographs, maps and other materials were made available for them to see. As narrated by Hull (1993) learning is contextual; it should connect the concepts taught in the classroom to everyday life of the learners; only with this, learning can be meaningful and assimilation is enhanced (Davtyan, 2014). During the intervention, students had opportunity to satisfy their curiosity through the 5 E's of inquiry process (Engage, Explore, Explain, Elaborate and Evaluate). They had the opportunity of answering and asking series of questions; examining, and investigating issues in a systematic, logical and analytical ways; present their findings while teacher buttress and expand on their ideas. This process clears their misconceptions and aid better assimilation of new knowledge, hence a better performance. This also supported the findings of Abdi (2014 who discovered that students who have been educated by inquiry-based instruction, supported by 5E's (Engage, Explore, Explain, Elaborate and Evaluate) learning cycle method are more successful than those students who have been educated by the traditional teaching methods and Hakverdi-Can and Sonmez (2012), who similarly posited that inquiry-based learning helps students to strengthen their investigative, collaborative, and inquiry abilities, which improve their overall understanding of the problem..

A significant difference was also found in the attitude of students to Geography when taught using teacher-guided inquiry **[t (97) = 7.20, p<0.05]** with students under TGI group showing more positive disposition to Geography than those under conventional method. The finding from this study is in tandem with the findings of Nzomo et al. (2023) who posited that there was a positive association between the use of inquiry-based learning (IBL) and students' attitudes towards lessons. This display of positive attitude could be attributed to the opportunities given to learners to interact, collaborate, discuss with each other and involve in various other group activities that got them elated and thus showed positive disposition to Geography. The findings is further supported by Saleem et al. (2021)

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assertion that students preferred a greater participatory learning environment where they perceive learning to have more personal relevance; where they share control with their teachers, have critical voice and negotiate their learning. Thus, Teacher-guided inquiry would go a long way in developing positive attitude towards Geography if constantly used by teachers.

It was also revealed that there was no significant difference in the academic achievement of students taught lessons in Geography based on gender in spite of the mean gain of female over male **[t(50) = 1.78, p>0.05].** This result confirmed the findings of Odukwe and Nwafor (2022) who earlier asserted that inquiry-based learning technique is more efficient, and also reported that there was no significant difference between the performance of male and female students taught with this technique.

The result of students' attitude to Geography based on gender when exposed to teacher-guided inquiry learning was also found to be insignificant [**t (50) = 0.32, p>0.05)]** in spite of the mean gain observed in female over male. This in essence means, positive attitude of students to Geography is not solely a factor of gender but rather could be that of others. Geography is majorly a practical subject that if well-handled would draw students' interest irrespective of the gender they belong. The result agrees with the findings of Falode et al. (2016), and Onuoha and Eze (2013) identifying that gender does not influence attitude of students towards Geography. The little higher positive change in female attitude over male in the descriptive analysis lend credence to Irungu et al. (2019) who revealed that girls are more likely to interact among themselves than boys by working well in small group settings and discuss a problem or task ideas while boys prefer to work alone, and will often "argue over who will lead when working in a group.

Conclusion

The study revealed that inquiry method is more effective than conventional method in ensuring students have positive attitude toward Geography with improved academic performances. It was also discovered that gender is not a factor to consider in planning and teaching of Geography under teacher-guided inquiry technique since no significant difference was found in attitude and academic achievement between male and female students exposed to teacher- guided inquiry technique. This implies that this technique should eagerly replace the conventional methods in the school curriculum and teacher should remove stereotype placed on girls and see Geography as a subject with no gender bias. Future research should however look into the effect of inquiry-based learning on the students' Geographical skills acquisition.

Recommendations

The following recommendations were made based on the findings of the study.

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1. Geography curriculum planners should ensure senior secondary school Geography curriculum have places for the utilization of teacher-guided inquiry learning technique.
2. Teacher training institutions in Nigeria should revisit their curriculum to embrace more of inquiry-based technique with less emphasis on conventional methods of instruction.
3. Inquiry methods, from the findings, have propensity to develop learners' interest towards Geography, as such should be engendered into the teaching and learning
4. Geography teachers should remove gender stereotype in their classrooms and see all students as having equal capacity to learn
5. Workshops, seminars and conferences should be organized by stakeholders in education to enlighten Geography teachers on the applications of teacher-guided inquiry technique in classroom teaching.
6. School authority should re-structure the school time-table to give more time to Geography for the practice of inquiry-based method

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