

EFFECTS OF GUIDED DISCOVERY METHOD ON GEOGRAPHY ACHIEVEMENT OF SENIOR SECONDARY STUDENTS IN MANGU, PLATEAU STATE, NIGERIA.

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ABSTRACT

The study's main purpose was to investigate the effects of the guided discovery method on the Geography achievement of senior secondary school students in the Mangu Local Government Area of Plateau State. Three research questions and three research hypotheses were answered and tested at a 0.05 level of significance, respectively. A quasi-experimental research design, particularly the non-equivalent pretest-posttest design, was adopted for the study. The stratified sampling techniques was used to select a sample of 90 students, consisting of 63 boys and 27 girls, for the study. The treatment for the experimental group was a guided discovery method, conducted over four weeks. The instrument used for data collection was the Geography Achievement Test (GAT). The reliability of GAT was computed using the Pearson Correlation method, which stood at 0.90. The mean and standard deviation were used to answer the research question, while the t-tests of independent samples and analysis of covariance (ANCOVA) were used to test the hypotheses. The results of the study showed that the guided discovery method had positive effects on senior secondary school students' achievement in Geography, particularly map reading, environmental resources and regional geography of Nigeria. The results also revealed that there was a significant difference between public and private school students in achievement, there was no significant difference between gender groups. Therefore, it was recommended that Geography teachers should be trained through workshops on the guided discovery method for the effective teaching the subject in schools.

INTRODUCTION

Geography is one of the disciplines being taught in Nigerian senior secondary schools. It is a science that deals with explaining the distribution of phenomena on the earth's surface. Thus, it is a systematic science that builds and organizes knowledge by explaining and predicting phenomena on the earth. Geographers explore the physical properties of the earth's surface and the human societies. Therefore, Geography is an earth science that analyses how human culture interacts with the natural environment to produce the experiential patterns of different places. Hence, it seeks to understand where things are found, why, and how they developed or changed over time as products of spatial interaction.

At the secondary school level in Nigeria, Geography like many other subjects is taught to provide students with basic skills and knowledge for self-reliance in society or to prepare them for further studies. According to Dakur (2018), Geography is endowed with enormous knowledge and skills by which potential professional Geographers are trained so that they can contribute to national growth and development. This portrays the subject as a discipline whose importance cannot be over-emphasized. Dakur posits that this value of Geography education cannot be realized unless Geography teachers are committed to its teaching. Unfortunately, the teaching and learning of Geography at the secondary school level appears to be faced with difficulties, evidenced by students' failure in its external

examination. Geography teachers concentrated on teaching methods such as lectures and discussions. This method of teaching stresses more on the transmission of knowledge in a manner that emphasizes memorization. More so, these methods are rather teacher-centred approaches where students are passive and unable to construct meaningful knowledge in the learning of the subject.

To harness students' potential through Geography Education, the emphasis needs to shift from content to processes of teaching (Otobo, 2012). This implies a shift of emphasis from the traditional chalk-and-talk method to modern methods of teaching Geography (Omiko, 2016). Thus, there should be a change in the teaching-learning process where students are passive receivers of information to that in which they are active participants in the construction of knowledge. This means students should be involved actively in the learning process. This is imperative because (Ajunwa, 2009) students by nature are investigators who have the potency for manipulation of materials and curiosity for finding out what happens. Therefore, Nwoji, (2014) maintained that despite changes in theories of instruction and designs of curriculum, there is unanimous agreement that children are likely to acquire scientific and Geographical skills that will enable them to solve problems associated with human needs and be self-reliance, through firsthand experience of handling concrete materials themselves during learning. Hence, the need for teachers to create an enabling environment for students to interact with the learning materials during the teaching-learning process.

Despite the lofty objectives of the Nigerian senior secondary school Geography curriculum, students' achievement on external examinations has been dismal, especially in the aspects of map reading, environmental resources and regional Geography of Nigeri Dakur (2018) therefore stated the chief Examiner's reports for West Africa Senior School Certificate Examination (WASSCE) from 2008 to 2014 revealed that the overall achievement of candidates was either poor or below average. The author noted that many factors are responsible for the dwindling trend in the achievements of students. These factors include poor teaching methods which make students lose interest and consequently achieve poorly. Omole (2003) attributed students' poor achievement in Geography to teachers' use of ineffective methods and strategies which has resulted in inability of the students to display positive skills, attitudes and thinking in the learning of the subject. If this phenomenon continues, the objectives of Geography education in Nigerian senior secondary schools will not be achieved. This phenomenon serves as the motivation for this study which aimed to investigate the effects of the guided discovery method on the Geography achievement of senior secondary school students in the Mangu local government area.

Guided discovery is one of the strategies of science teaching that has been consistently advocated for by many educators on the belief that, science should not be taught to a child but that the child should be allowed to discover it. Guided discovery is the type of discovery that provides direct instructional guidance by the teacher about the concept and procedures to generalize. In guided discovery, the teacher develops a working plan, while the students perform the activities, gather data and draw conclusions. Guided discovery fosters the philosophy of learning by doing, and thus enhances students' participation and creativity. By implication guided discovery method promotes understanding which can lead to success in examination. Fotokun and Audu (2014) describe the guided discovery method as a resource learning which is an innovation that reverses the usual role of the teacher from that which he is the main authority and source of all knowledge to that of a guide to the students to enable them to make use of another source

of all knowledge. Guided discovery also fosters cooperation amongst learners. For instance, in a group project, members contribute and learn from each other. Thus, Guided discovery occurs when a learner is involved in utilizing his/her mental processes and physical activity to mediate, discover or grasp some principles, concepts or ideas in various situations. Generally, the guided discovery method of instruction increases retention of materials learnt because the learner organizes the new information and integrates it with the knowledge that has already been accumulated and stored. The use of the guided discovery method could make Geography lessons stimulating and interesting to the students and possibly increase their achievement. This implies that if teachers use guided discovery to teach Geography students' achievement could increase.

Achievement is the scholastic standing of a student at a given moment. It has to do with the successful accomplishment of the goal. One of the issues at stake in education today is students' achievement, measured by teaching, conceptual understanding and the overall success of learning outcomes. Students' Achievement is a measure of their ability to study and remember, reproduce and produce knowledge, especially during an examination. Their ability to do so could be hampered by many factors which are both intrinsic and extrinsic to them. For instance, Tshabalala and Neobe (2013) believe that lack of materials, bad teachers' behaviour, poor grounding in the subject at lower levels, poor teaching methods as well as fear of the subject are factors affecting the achievements of students. If a good foundation is laid at the secondary school level, this process might build up students' learning. Others factors of leaning being equal, there could be intrinsic difference among the students that affect their learning and achievement, such as gender and intelligent quotients.

Gender is an intrinsic factor that arguably influences students' achievement in Geography and other school subjects. Educators have divergent views about gender and achievement especially in Geography. While some are of the view that males do better than females, others disagree, arguing that other factors such as socio-economic background, and teaching method among others are rather responsible. Joseph, John, Eric, Yusuf, & Olubunmi,(2015) for instance are of the view that personality components such as the ways the students think, feel, and believe about themselves (self-concept) and other things, and consequential actions, rather determine their achievement, and not sex which is concerned with only the distinction between male and female based on biological characteristics. However, gender is conceived to mean much more than just biological differences in sex but compasses other personality attributes such as roles, orientation and identity based on an individual's conceptualization of self. Singh (2012) opines that gender refers to a socio-cultural construct that connotes the differentiated roles and responsibilities of men and women in a particular society. The important consideration in this study is the determination of the effect of gender difference (male and female) on secondary school students' achievement in Geography.

Senior secondary schools in Nigeria, the study area inclusive, are not homogeneous. They are heterogeneous with attendant differences in their culture, provision of teaching-learning resources, teacher qualification and general learning environment, all of which have snowball effects on students' achievement. The difference between School types and students' achievement is yet another problem which has attracted the attention of many researchers. The challenging questions are whether such difference truly exists, if it exists what factors are responsible, and what can be done to bridge the gap. These questions serve as a source of controversy among scholars. While some studies showed differences

between public and private school students on achievement in favour of the private, there still existed differences between the two types of schools (Dakur, 2018). Hence, the need for continuation of research in this regard.

Aim and objectives

The study's aim was to determine effects of the guided discovery method on the achievement of senior secondary II students in Geography in Mangu Local Government Area, Plateau State in Nigeria. This was accomplished through the following specific objectives:

1. Determine the pretest and posttest Geography achievement mean scores of the experimental and control groups.
2. Find out the posttest Geography achievement mean scores of male and female students in the experimental group.
3. To determine the posttest Geography achievement mean scores of public and private school students in the experimental group.

Research question

1. What are the pretest and posttest Geography achievement mean scores of the experimental and control groups?
2. What are the posttest Geography achievement mean scores of male and female students in the experimental group?
3. What are the posttest Geography achievement mean scores of public and private school students in the experimental group?

Hypotheses

1. There is no significant difference between the experimental and control groups on posttest Geography achievement mean scores.
2. There is no significant difference between male and female students in the experimental group on posttest Geography achievement mean scores.
3. There is no significant difference between public and private school students in the experimental group on posttest Geography achievement mean scores

Research design:

The quasi-experimental research design was employed for the study, specifically the nonequivalent pretest-posttest control group design. A pretest was administered to both the experimental and control groups before the treatment. Then a posttest was administered after the treatment. The pretest was administered to determine the entry knowledge of the experimental and control groups in Geography before the treatment. The posttest was administered to determine the effectiveness of treatment (guided discovery method) on the experimental group's achievement in Geography.

Population:

The population of this study included all 1,767 SS II Geography students, distributed in 25 and 21 private and public schools respectively in Mangu local government area of Plateau state. This consisted of 965 boys and 802 girls; 1,125 and 642 students in private and public schools respectively;

Sample and Sampling Techniques.

The sample consisted of 90 students from two senior secondary schools in the study area, made up of 63 and 27 boys and girls respectively, and 46 and 44 students from public and private schools respectively. Each of the experimental and control groups constituted students from private and public schools. From the sample 90 students, 47 were in the experimental group, while in 43 were in the control group. Two intact classes, one each from private and public schools formed the experimental group (47), and likewise the control group (43). Thus, the experimental group comprised one intact class from a private school and one intact class from a public school, and likewise the control group. The stratified sampling technique was used to select the sample for the study. First of all, the private schools were numbered serially from 1-25, followed by the public schools from 26-46. Then a table of random numbers was used to select one school from each group (private and public) bearing in mind that numbers 1-25 represented private schools, while numbers 26-46 represented public schools.

Instrumentation

The instrument used for data collection for the study was the Geography Achievement Test (GAT). The instrument had three sections (A, B & C). Section A contained the bio-data of the students. Section B consisted of 40 multiple choice items made up of 16, 10 and 14 items each on map work, environmental resources and regional Geography of Nigeria. Section C was made up of 3 essay items, one each on map work, environmental resources and regional geography of Nigeria.

Validity and reliability

The instrument was content validated by three experts, one in educational psychology, one in test measurement and evaluation and one in Geography education. The reliability was tested using the Pearson correlation method which yielded a reliability of 0.90 and was considered appropriate for application for data collection for the study.

Method of data analysis

The data collected for this study was analysed using mean and standard deviation for the research questions, while the t-test of independent sample and analysis of covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance.

RESULTS

Research Question One

This question sought to measure the pretest and posttest Geography achievement mean scores of the experimental and control groups.

Table 1: Pretest and Posttest Geography Achievement of Experimental and Control Groups

Group		Control		Experimental		Mean Difference
Test	N	$\bar{X}$	sd	N	$\bar{X}$	
Pretest	43	27.86	8.67	47	26.19	1.67
Posttest	43	27.88	7.83	47	39.09	11.21

Note: N=90

Table 1 result indicates that the pretest achievement mean score of the control group (M=27.86, SD = 8.67) and that of the experimental group (26.19, SD=7.11) with a mean difference of 1.67 in the pretest, while the posttest achievement mean score for the control group (27.88, SD=7.83) and the experimental group (39.09, SD=8.92) with a mean difference of 11.21. This implies that achievement means scores in Geography increase after exposure to the guided discovery method of teaching.

Research question two

This question investigated the posttest geography achievement mean scores of male and female students in the experimental group.

Table 2: Posttest Geography Achievement of the Experimental Group Based on Gender

Gender	N	$\bar{X}$	sd	Mean Difference
male	63	27.98	8.21	1.76
female	27	29.74	6.97	

The result in Table 2 shows that the posttest Geography achievement mean score of female students (M=29.74, SD=6.97) and their male counterparts (M=27.98, SD=8.21) with a mean difference of 1.76.

Research question three

This question evaluated the posttest Geography achievement mean scores of public and private school students in the experimental group.

Table 3: Posttest Geography Achievement of Public and Private School Students in the Experimental Group

school type	n	$\bar{X}$	sd	Mean Difference
public school	46	24.65	5.53	7.9
private school	44	32.55	7.95	

The data Table 3 reveal that the posttest Geography achievement mean score of public schools students (M=24.65, SD=5.53) is lower than that of the private school. (M=32.55, SD=7.95) with a mean difference of 7.9. This means that private school students had higher Geography achievement mean scores than public school students after teaching with the guided discovery method of instruction.

Hypothesis One

This hypothesis tested significant differences between the experimental and control groups on posttest Geography achievement mean scores.

Table 4: Summary of ANCOVA Analysis of Posttest Geography Achievement Mean Difference Between the Experimental and Control Groups.

Source	Type III Sum of Squares	df	Mean Square	F	p
Corrected Model	4355.79	2	2177.89	166.10	0.000
Intercept	139.32	1	139.32	10.63	0.002
Pretest	4323.38	1	4323.38	0.74	0.342
Group (Posttest)	159.88	1	159.88	329.74	0.000
Error	1140.70	87	13.11		
Total	78656.00	90			
Corrected Total	5496.49	89			

N=90. P<0.05

The data in table 4 indicates that $F(1, 87) = 329.74$, while $p=0.000$. Since the p-value is less than 0.05, it means that the difference between the experimental and control group was significant. Therefore the null hypothesis was rejected and it was concluded that the guided discovery method was effective in improving the achievement of students in Geography.

Hypothesis Two

This hypothesis evaluated the significant difference between male and female students in the experimental group on post-test Geography achievement mean scores.

Table 5: t-test Analysis of Difference in Posttest Geography Achievement Mean Scores of Students in the Experimental Group Based on Gender

Group	n	$\bar{X}$	sd	df	T	p	Decision
Male	33	29.48	8.35	58	-0.13	0.899	Accepted
Female	27	29.74	6.97				

N= 90. P > 0.05

The result in Table 5 reveals that $t = -0.13$, while p-value = 0.899. Since the p-value is greater than the significance level ($p > .05$), the null hypothesis was rejected. It was therefore concluded that there was no significant difference between male and female students on post-test Geography achievement mean scores. This means that the guided discovery method improved the achievement of male and female students equally without discrimination.

Hypothesis three

This hypothesis evaluated significant differences between public and private school students in the experimental group on posttest Geography achievement mean scores.

Table 6: t-test Analysis Significant Difference between Public and Private school students on Posttest Geography Achievement Mean Scores.

Group	n	$\bar{X}$	sd	Df	T	p	Decision
Public	32	25.47	5.25	58	-5.40	0.000	Significant
Private	28	34.32	7.38				

N= 90. P < 0.05

The data in Table 6 indicates that $t = -5.4$ while $p\text{-value} = 0.000$. Since the $p\text{-value}$ is less than the level of significance 0.05, the null hypothesis was rejected and thus considered that there was a significant difference between public and private school students on post-test Geography achievement mean scores. It was hence concluded that guided discovery differentially improved the Geography achievement of public and private school students.

Discussion of Findings

Result of the study revealed that guided discovery method of teaching improved Geography achievement of senior secondary school students. This outcome corroborates the findings of Adekunle (2015) who reported that students taught with guided discovery method and think-pair-share strategies obtained significantly higher posttest mean score than those in the lecture strategy.

Results of the study further revealed that guided discovery method improved the achievement of both male and female students equally without discrimination. This is in line with findings of Ifeanchi as cited in Ihedinihu (2014), that there is no significant difference in the performances of boys and girls in science, technology and mathematics respectively due to instructional techniques. This is an indication that no gender is superior to the other when taught using personalized mastery learning strategy.

The study also indicated that private school students had higher Geography achievement mean scores than public school students after teaching with the guided discovery method. On research hypothesis three which sought to find out if there is no significant differences between public and private school students in the experimental group on posttest Geography achievement mean scores. Thus, the study revealed that guided discovery differentially improved the Geography achievement of public and private school students in favour of private school students. This is agreement with Alewu, Nosiri & Ladan (2011) who asserted that, types of schools and students' achievement in Nigeria revealed that students in private schools performed relatively better than their counterparts in the public schools in mathematics and science subjects. However, Philias & Wanjobi (2011) and Alimi, Ehinola & Alabi (2012) found no significant difference in academic achievement of students in the two types of secondary schools but significant difference existed in facilities available in public and private school.

Summary of Findings

1. There was an improvement in the Geography achievement mean score of senior secondary school students due to the application of the guided discovery method.
2. The Geography achievement mean scores of male and female senior secondary school students equally improved as a result of the use of the guided discovery method.
3. Improvement in Geography achievement means scores of public and private school students showed significant differences after exposure guided discovery method.

CONCLUSION

- . The guided discovery method was effective in fostering significant improvement in Geography achievement of senior or secondary school students with no difference between gender groups. There was however significant difference between students in

public and private schools on Geography achievement after exposure to the guided discovery method.

RECOMMENDATION

Based on the outcome of the study, the following recommendations were made:

1. The guided discovery method should be incorporated into Nigeria's senior secondary Geography curriculum.
2. The Federal Ministry of Education of Nigeria in conjunction with state ministries of education should organize workshops and seminars for Geography teachers on the effective application of guided discovery methods in the teaching of Geography.
3. The plateau state government and school proprietors should provide sufficient resources to create the enabling environment for appropriating guided discovery methods in our schools.
4. Geography teachers should avail themselves of training through workshops and seminars on the use of guided discovery methods of teaching.

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