



INFLUENCE OF COGNITIVE ABILITY AND SCHOOL LOCATION ON STUDENTS' ACADEMIC ACHIEVEMENT IN GEOGRAPHY IN SENIOR SECONDARY SCHOOL IN UMUNNEOCHI LOCAL GOVERNMENT AREA OF ABIA STATE

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ABSTRACT

This study investigated the influence of cognitive ability and school location on students' academic achievements in senior secondary Geography in Umunneochi local government of area of Abia State. The descriptive research design of the ex post facto type was adopted in this study. The local government has 26 public and private secondary schools. A purposeful sampling technique was used to select one hundred and thirty-nine (139) females and one hundred and forty-five (145) males students from 15 out of 26 schools making a total of 284 Geography student. The instrument used for the data collection are Test of logical thinking (TOLT) and Geography achievement test (GAT). The instrument was validated by three experts, from Educational Research Centre NERDC. The instrument was pilot tested and reliability co-efficient index of 0.81. Data collected were analysed using mean and standard deviation. The findings revealed that the cognitive ability level of students with high ability had a higher achievement mean score followed by the medium ability student and the low ability students. Also the study indicates that the achievement mean score of students in rural schools is higher than their counterparts from the urban schools. Therefore it is recommended that Teacher should pay special attention to low and medium cognitive ability students to enable them measure up to students of high cognitive ability, among others.

INTRODUCTION

The role of Geography to human and social development cannot be over emphasized. This is because it instils in the students' knowledge of their environment

and its related body. Geography is taught at the senior secondary school level (SSI-SSIII) to science and social science inclined students (Madu, 2012).

Ezudu (2003) describes Geography as a subject which concern with the understanding of the spatial processes shaping the environment. Also Ofomata, (2008) defined Geography as the study of spatial form and the special relation as well as the distribution of phenomena on the earth surface. Geography at the secondary school level stands on tripod Okereafor (2012). The subject deals with the study of earth surface as a home of man or more precisely a science of spatial relationship, which focus attention on the interaction between man and his environment (Madu, 2012).

The three sub-divisions of Geography are: physical, Human and regional geography. Physical geography deals with the study of natural features of the earth surface, especially in its current aspect, including land forms, climate, currents and distribution of flora and fauna. Human geography is the study of interaction between human being and their environment in particular places and across spatial areas. Regional geography is a branch of geography that studies the unique characteristics of places related to their culture, economy, topography, climate, politics and environmental factors such as different species of flora and fauna. It is important to know that geography curriculum in secondary school aims at assisting students to:

Prepare for higher education
Choose career for which they can earn their living

Become future geography teacher/lecturer

Acquire knowledge of land, people and their interaction (National Education and Research Council 2006) in Madu 2012.

Teaching and learning process cannot be completed without finding out the extent to which the set objectives are achieved. The essence is to determine progress

students made in learning the concept, principles and theories presented to them in the course of teaching. Academic achievement is the outcome of education- the extent to which students, teachers, or institution has achieved their educational goals. It is commonly measured by examination or continuous assessment. It is an important parameter in measuring students learning outcome in various disciplines Mclahan, (2004). Academic achievement is the measure of students' learning acquisition of certain learning skills at the end of teaching and learning activities. In recent time, the academic achievement of student in O' level certificate examination in general and that of geography in particular has continue to dwindle Nneka (2011); Onah, (2011) and Akinwumi (2012). This view is in collaborated by the WACE chief examiner reports 2012, 2013 and 2014. These have caused great concern not only to the parent and the students but also to the general society. Apart from West African Examination Council chief examiner's report, many other factors have been suspected to be responsible for this ugly trend in the performance of students in secondary school geography. For instance, Lee (2001) pointed out the difference in student's achievement in geography is due to factors like students' attitudes to school, approach to learning and academic self-concept. On the other hand, Doollittle (2012) stress as that school location (rural or urban), nature of classroom (space, organization size) cognitive ability as well as availability of education facilities affects student achievement in school subject.

Cognitive ability is the individuals' capacity to think, reason, and solve problem. It is the capacity to perform higher mental processes of reasoning, remembering, understanding, and problem solving in teaching and learning process (cognitive ability- Brookings institution).

Also according to Smith (2011) cognitive ability is the biology-based differences in the make-up of human brain that affect the capacity of an individual to benefit from instruction. Cognitive ability influences the rate, quantity and quality of learning. It also affects how students transfer and retain what they have learnt in classrooms. Psychologists classify cognitive ability in to high, average, low cognitive levels. Student's ability in a learning task is usually grouped into these categories. Cognitive ability is measured through tests of intelligence and cognitive skills. Aiyedun (2010) reported that there is a difference between the mean performances in mathematics of students with high academic ability and those with low academic ability while Uzoegwu (2004) show that ability levels have no significant effect on the achievement of students in essay writing.

In a study by Adesoji (2008), shows that there was no significant difference in the performance of students in the different ability levels after the treatment method of instruction was found to influence academic achievement of low achievers. Location in this context is the settings of settlement in relation to other geographical areas. It could be rural or urban. Rural settlement is an area, which has less than a population of 10,000 people and lacks basic social amenities such as road, pipe borne water electricity, institution among others. Urban area on the other hand, are areas whose population exceed 10,000 people and are more viable in economic and social activities Welber (2012). By school location therefore it means urban-rural school settings and this classification has influence on educational development. Educational opportunities vary from one location to another. While some places are known to have enough schools with

facilities and teachers, other does not. Abidogun (2006) stated rural areas as having greater challenges concerning educational development than the urban centres, due to the peculiar socio-economic and institutional structures of the rural areas. Abidogun, (2006) reports that many teachers reject posting into the rural areas while those that do, treat their presence in such area as part time assignment. This situation creates differences in students' achievement. Bosede (2010) opined that location is not a significant factor in student's achievement.

Educators and researchers have long recognized the unique differences among individuals and the impact these differences can have on learning and location. It becomes imperative to carry out empirical research weather cognitive ability and school location contributes to secondary school student academic achievement in geography. The study, therefore, seek to examine the influence of cognitive ability and school location on students' academic achievement in secondary school geography in Umunneochi local government area of Abia State.

Objectives of the study

The general objective of the study is to ascertain the influence of cognitive ability, and school location on student's achievement in Geography. Specifically the study is set out to:

1. ascertain the influence of cognitive ability levels of students on academic achievement in Geography
2. establish the influence of school location in terms of rural and urban on student's academic achievement in Geography.
3. find out if school location and cognitive ability explains student's academic achievement in Geography.

Hypotheses

Ho₁: There is no significant difference of cognitive ability on student's academic performance in senior secondary school Geography.

Ho₂: There is no significant difference in the urban and rural students' academic performance in senior secondary school Geography.

Ho₃: There is no significant interaction effect of school location and cognitive ability on student's academic performance in senior secondary Geography.

Methodology

In this study, the descriptive research design of the ex-post facto type was adopted. The study involved two hundred and eighty four (284) SSII students offering Geography in Umunneochi Local government of Abia State. The choice of the local government area is due to its proximity to the researchers, which will ensure effective coordination in the process of data collection. The target population was the entire geography students in Umunneochi local government area. The area of the study has 26 public and private secondary schools that offer geography. A purposeful sampling technique was used to select one hundred and thirty-nine (139) females and one hundred and forty-five (145) males students from 15 schools out of 26 due to time and resources available. SSII students were selected because they would have at least covered some reasonable topics in geography as at the time of this study which gives them opportunity to respond to the achievement test as SSIII students are preparing for their O' level examinations

Instrumentation

Two instruments that were used for data collection from the field include the following: Test of logical thinking (TOLT) and Geography achievement test. (GAT).The test of logical thinking (TOLT)

developed by Tobin and Capie (1981) was used to measure the cognitive ability of students. The test consists of ten multiple choice items designed to measure students' five reasoning abilities namely, controlling variables (item3&4), proportional reasoning (item1&2), probabilistic reasoning (item5&6), correlational reasoning (items 7&8), and combinatorial reasoning (items 9&10). The total score of the test was ten (10). Students' ability in the test was grouped as: (5-10) high ability, (3-4) medium ability while (0-2) low ability. The validity of test of logical thinking (TOLT) has been established as it is widely adapted by researchers to measure individuals' ability to think, reason and solve problem. On the other hand, Cronbach's alpha reliability of test of logical reasoning thinking (TOLT) was found to be 0.81.

Geography Achievement Test (GAT) taken from WAEC and NECO past question paper based on the new content of senior secondary school Geography curriculum published by (NERDC) was used to explore the impact of the ability levels, and location, on SSII students' cognitive achievement. It is a multiple choice question with 30 items and each item carries a maximum of 2.5 marks making the total of 75 marks. The topics in the SSII Geography curriculum were used to develop the test items. The GAT is divided into two sections A and B. Section A provided information on the gender, and location of students' taking the test while section B measures the academic achievement of students in Geography. The items covered the lower and higher levels of cognitive objectives. The cognitive analysis indicates that 60% of the items challenged the students at low levels while 40% at high cognitive levels. The Geography achievement test (GAT) was subjected to face validation and content validation.

The instrument was given to three experts for face validation, two lecturers from measurement and evaluation, department of science education Abia state University Uturu and one from Educational Research Centre NERDC. Their corrections and suggestions helped in modifying the items to suit the purpose of the study. The reliability of the GAT was determined using kuder-Richardson 20 formula. GAT was administered to twenty five (25)

students outside the ones selected for the study. The outcome of the analysis shows the reliability coefficient to be 0.81

Results and Discussion

The analyses of the data are presented below:

Ho₁: There is no significant difference of cognitive ability on student's academic achievement in senior secondary school Geography.

Table1: Analysis of variance of the influence of cognitive ability on students' academic achievement in Geography.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig
Corrected Model	33928.909 ^a	2	16964.454	252.063	.000
Intercept	375294.565	1	375294.565	5576.234	.000
Cognitive ability	33928.909	2	16964.454	252.063	.000
Error	18912.007	281	67.303		
Total	631366.000	284			
Corrected Total	52840.915	283			

R Squared = .642 (Adjusted R Squared = .640)

Table 1 shows that there was a significant difference in the mean score of high, medium and low ability students in Geography, $F(2, 281) = 252.063, P < .05$, hence the hypothesis 1 is rejected and the researcher concludes that cognitive ability is a significant factor on student's

academic achievement in senior secondary school Geography.

Ho₂: There is no significant difference in the urban and rural students' academic achievement in senior secondary school Geography.

Table2: Analysis of variance of the influence of location on students' academic performance in Geography.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig
Corrected Model	221.691 ^a	1	221.691	1.188	.227
Intercept	357321.072	1	357321.072	1914.976	.000
Location	221.691	1	221.691	1.188	.277
Error	52619.224	282	186.593		
Total	631366.000	284			
Corrected Total	52840.915	283			

R Squared = .004 (Adjusted R Squared = .001)

The summary of result in table 3 shows that $F(1, 282) = 221.691$, $P = .277$, since the probability value is greater than the level of significance set at .05 the null hypothesis is accepted and the study concludes that, there is no significant difference in the achievement mean score

of rural and urban students' academic performance in Geography.

H_{03} There is no significant interaction effect of school location and cognitive ability on student's academic achievement in senior secondary Geography.

Table3: Analysis of variance of interaction influence of school location and cognitive ability on achievement of students in Geography.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig
Corrected Model	34105.356 ^a	5	6821.071	101.212	.000
Intercept	94768.692	1	94768.692	1406.187	.000
Location* cognitive ability	34105.356	5	6821.071	101.212	.000
Error	18735.559	278	67.394		
Total	631366.000	284			
Corrected Total	52840.915	283			

R Squared = .645 (Adjusted R Squared = .639)

Table 3 reveals the interaction influence of school location and cognitive ability on student's academic achievement in senior secondary Geography, $F(5,278) = 6821.071$, $P < .05$. There was significant interaction effect of school location and cognitive ability on student's academic achievement in senior secondary Geography. Hypothesis 3 is rejected.

Discussion

Hypothesis 1: There is no significant difference of cognitive ability on student's academic achievement in senior secondary school Geography.

The findings of this study in table 1 revealed that achievements mean scores of high cognitive ability students is higher than the achievement mean scores of medium and low ability students. This achievement mean difference was investigated by the analysis of variance in table (1) which showed that cognitive ability is a significant factor on students' achievement. This finding is in agreement

with the findings of Mankilik and Umaru (2011) who reported significant difference in the achievement mean scores of students due to their ability levels when exposed to concept mapping and expository strategies. Also in line with study of Aiyedun (2010) who showed that academic ability influences mathematics achievement in favour of high academic ability students. On the contrary, Adesoji (2008) shows no significant difference in the performance of students in the different ability levels (high, medium and low ability levels) after the treatment method of instruction was found to influence academic achievement of low achievers. This current study has been able to show that cognitive ability is a significant factor with respect to students' achievement in senior secondary school Geography.

Hypothesis 2: There is no significant difference in the urban and rural students' academic achievement in senior secondary school Geography.

The finding of this study in table 2 indicates that the achievement mean score of students in rural schools is higher than their counterparts from the urban schools. This was proven to be due to a chance factor when analysis of variance of table two (2) reveals no significant difference in the achievement mean scores of urban and rural students in Geography. The outcome of the result was surprise because, as noted by Abidogun (2006) rural areas have greater challenges concerning educational development than the urban centres, due to the peculiar socio-economic and instructional structures of the rural areas. This finding of no difference in the achievement mean score due to location could be as a result of student study habit and self-efficacy. The results of this study supports Uzoegwu (2004) and Bosede (2010) who shows that location is not a significant factor in students' achievement in their subject areas while inconsistent with the findings of Onah (2011), who in his study found out a significant difference in the achievement of students in urban and rural areas in their subject areas.

Hypothesis 3: There is no significant interaction effect of school location and cognitive ability on student's academic achievement in senior secondary Geography.

The findings of the study in table 3 shows that rural students of high ability had a higher achievement mean score than the medium and low ability students. On the other hand, low and medium ability students achieve lower than the high ability students in the urban areas. The analysis shows that there is significant

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interaction between school location and students' cognitive ability. This result is in disagreement with the findings of Mankilik and Umaru (2011) who reported no significant interaction effect of method and ability on the achievement of students in physics. Therefore this present study has proven that school location and cognitive ability interact to explain student achievement in financial accounting.

Recommendations

Nigerian government should ensure that learning facilities, human and materials, teaching and non-teaching staff should be equal in schools located in the urban and rural areas, there should be equal exposure in terms of quality of instruction and moulding of students irrespective of the location.

Teachers should accommodate individual differences in the teaching and learning process by using variety of learning experience to carry different ability levels along in learning process. This measure will increase student achievement irrespective of cognitive ability. Was there evidence in your results that teachers ignore individual differences?

Teacher should encourage peer teaching by allowing the high ability student to teach the medium and low ability students. This will foster cooperation among students and enhance socialization of students. Geography teacher should pay attention to the issues of gender differences in classroom instruction. They should as much as possible eliminate content instructional technique, instructional materials and activities that will bring about gender differences in their classrooms.

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