



Gender and Location as Correlates of Achievement in Number and Numeration Using Ethno Mathematics Approach in the Junior Secondary Schools in Benue State

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ABSTRACT

This study investigated gender and location as correlates of academic achievement in number and numeration using ethno mathematics approach in Junior secondary schools in Benue State, Nigeria. This study therefore, sought to establish relationship between achievement and gender, then location and achievement using ethno mathematics approach in Obi and Oju Local Government Area of Benue State. The sample was 175 Junior Secondary two (Js2) students. The design of the study was quasi-experimental. It is pre-test post test control group design. Intact classes were used both for the experimental and control groups. The instrument for data collection was Mathematics Achievement Test in Number and Numeration (MATN). Data collected were analyzed using mean and standard deviation to answer the Research Questions, the Analysis of Covariance (ANCOVA) to test the Null Hypotheses. The findings of this research showed that there is no significant effect of gender on students' achievement in Number and Numeration when taught using Ethno mathematics approach. Secondly, location i.e. rural and urban setting affect significantly i.e. academic achievement of Junior Secondary School students when ethno mathematics approach was used. The researcher therefore concluded that ethno mathematics teaching approach has great effect towards enhancing achievement in mathematics. Based on the findings of this study, the researcher recommended that teachers of mathematics should recognize the special role ethno mathematics play in aiding students to understand the subject. Secondly, students should be made to relate the school Mathematics with home activities.

INTRODUCTION

Mathematics is the universal language of Science, Technology and Engineering. Unfortunately, the reception of mathematics by students and some teachers alike can best be described as apprehensive, cold and with rebuff. If this trend is allowed to continue, Mathematics will become an engendered specie with resultant decay in Science, Technology and Engineering.

The researcher here thinks of an intervention through the use of ethno mathematics teaching approach. Mathematics is one of the most poorly taught, widely hated and abysmally understood subject in the Nigeria school system. Many secondary school students particularly girls run away from mathematics.

Ethno Mathematics was coined in 1985 by Brazilian educator D'Ambrosio. It has its roots in the idea and philosophy of the late Paulo Freire. Ethno refers to "cultural context" mathema referred to as "to explain" "to know" or "to understand". "tics" come from "techne" which is the same root as art and techniques. Thus we can say that ethno mathematics is the art or technique of explaining, knowing and understanding diverse cultural context. (Davidson, 2000). The father of Ethno Mathematics, D'Ambrosio (1999) further defined Ethno Mathematics as the mathematics of the identifiable cultural group, derived from quantitative and qualitative practices such as accounting, weighing, sorting, measuring and comparing. It is a way of doing mathematics in response and recognition of the different cultures. Ethno Mathematics teaching approach focuses on the use of materials within a given cultural setting. Ethno Mathematics is an approach to curriculum adaptation in mathematics, which builds in the student's previous knowledge, background, the role his environment plays in terms of content and method and his past and present experience of his immediate environment (Enukoha, 1995 & D' Ambrosio, 2001).

Abiem and Odok (2006) stated that one variable that has attracted significant attention from researchers in mathematics education is gender.

Okwu and Aligba (2004) carried out a study to assess the effect of gender on mathematics achievement of secondary school students as well as identify the influence of location on mathematics achievement of secondary school students. A sample of 160 female students and 160 male students from both rural and urban area in Katsina-Ala Local Government Area of Benue State were used. JSS III and SS III classes were used. A 20 item multiple choice senior mathematics achievement Test was administered in six secondary schools in the area. A t-test statistic was used to test the Null Hypotheses. The findings show that there was no significant difference between the performance of boys and girls in the mathematical test. However, location had a significant effect on mathematics achievement of students.

Abiem and Odok (2006), conducted a study in an attempt to determine whether gender of students contribute to different mean scores in each branch of mathematics. Subjects for the study were 100 students randomly drawn from the senior secondary one (SS 1) classes of five randomly selected schools in Ikom local government area of Cross River state.

The researchers used the stratified random sampling technique based on gender. 49 males and 51 females from SS1 classes of the five schools were used for the study. A 50 item multiple choice Mathematics Achievement Test (MAT) was constructed and validated with 0.81 reliability coefficient. The items were drawn to proportionately cover the five branches of mathematics. Two research questions and one hypothesis were formulated respectively to guide the study. Chi-square statistic was used to test the null hypothesis. The result indicate that no significant relationship between gender and achievement in number and numeration, algebraic processes and statistics. However, there exist a significant relationship between gender and achievement in mathematics even though the degree of relationship was weak. A study conducted by Abiem and Odok (2006), revealed that girls achieved better than boys in number and numeration, while boys outperformed the girls in all the branches such as trigonometry, geometry.

One question is important; in this study, is whether location of schools (urban or rural), has any influence on students' achievement when Ethno mathematics approach is used in teaching number and numeration at the junior secondary schools.

Bush (2005) in his work, "improving research on Mathematics learning and teaching in rural context" and among other things that the social norms of the rural areas value, place, community and family over other more distinct national priorities. Rural families tend to adopt more traditional value like hard work, discipline and relationships. There is then the likelihood that Ethno mathematics in such a rural community has higher mean score than their counterparts in the urban areas.

A lot of researches have been carried out in respect to school location and academic performance of students. Examples include Reeves (2005), Williams, (2005). Hopkins (2004.), Howley (2002), Lee and Michtire (2000).

According to Seah and Bishop (2000), culture and values are loosely related in the nature of any given value in the Mathematics classroom is relative to the socio-cultural setting. Values are part of the culture of a community and help to guide the actions of its members towards each other and the community as a whole.

Popular culture views rural education as a deficit model and some researchers indicate that there are deficit areas present in rural education. Other researchers find no differences in the achievement of rural and non rural students as stated in the Hopkins 2004. Lee and Michtire 2000, found that rural school achievement varies across states and so no definite study can apply to all rural areas. There is then the need

to find if this rural education has any influence on the Ethno mathematical approach since Ethno mathematics is described as rural mathematics (Enukoha, 1995).

Purpose of Study

The purpose of this study is to investigate the influence of gender and location on junior secondary school students' achievement in number and numeration in Benue State.

Specifically, the study sought to;

- i. Determine if gender affects the students' achievement in number and numeration when taught using Ethno mathematics approach
- ii. Determine if location affects students' achievement in number and numeration when taught using Ethno mathematics approach.

Research Questions

The following research questions were used to guide the study.

1. To what extent does gender influence students' achievement in number and numeration when taught using Ethno mathematics approach?
2. To what extent does location affect students' achievement in number and numeration when taught using Ethno mathematics approach?

Hypotheses: The following Null Hypothesis were formulated and tested at 0.05 level of significance

Ho₁, there is no significant effect of gender on students' achievement in number and numeration when taught using Ethno mathematics approach.

Ho₂, there is no significant effect of location on students' achievement in number and numeration when taught using Ethno mathematics approach.

METHODOLOGY

The methods and procedures that were used in carrying out this research are described under the design, population, sample and sampling, instrumentation, procedure for data collection and analysis. The design of this study was Quasi-Experimental design. This study sought to establish causes and effect relationship between Ethno-Mathematics approach achievement and gendered, achievement and location of schools. Ali (2006) had pointed out that any research which seeks to establish cause effect relationships in which the design has a pretest and selecting subjects and not be a true experiment but a quasi-experiment. Specially the design

of the study was non randomized, pretest – posttest control group design. There was no randomization of subjects to prevent disruption of school organization. Hence infact, classes were randomly assigned to the experimental and control groups. Both the experimental and control groups were given the same pretest before the experimental post test after the experiment. The experimental group was taught number and numeration topics using the ethno-mathematics approach while the control group was taught the same topics using the conventional approach.

Area of the Study

The study was carried out among the Junior Secondary School two students in Obi and Oju Local Government Areas of Benue State Nigeria. The choice of these two local governments is justified considering that no study identical to this present one and known to the researchers has been carried out in these areas before now. These two Local Government Areas share boundaries with Gwer and Konshisha to the North, Yala Local Government Area of Cross Rivers State to the South, Otukpo Local Government Area to the East and Ebonyi state to the South East. The people of these two local governments are known for farming, particularly yams and cassava in large quantities.

Population

The population of this study consisted of all Junior Secondary Two students in Obi and Oju Local Government Areas of Benue State. The estimated population of Junior Secondary Two Students is 340 as at the time of this study, courtesy Benue State Teaching Service Board (TSB, 2009).

Sample and Sampling

A sample size of 175 students were selected from the two local government areas of Obi and Oju Local the sample size is an agreement with the principle governing the selection of sample size provided by Emaikwu (2006) that sample size must be representative of population from which it is selected and that there should be no significant difference between the sample and population on any important characteristics. Furthermore, the sample represent about 80% of the accessible population of 340 Junior Secondary Two Students.

The sampling technique used in this study were the simple random sampling techniques of proportionate, stratified and purposive sampling technique. The researcher selected 6 schools out of 18 state government controlled secondary school in Obi and Oju Local Government Areas.

Instrumentation

The instrument of data collection was the mathematics achievement test in number and numeration (MATN). The MATN has 30 multiple choice test items. These were drawn from the junior secondary two syllabus or curriculum taking careful note of those number and numeration concepts only. The curriculum taxonomy was used to determine the appropriate proportion of question in the different cognitive development levels. This guided the researchers in determining the marks assigned to each cognitive level. The test items were scored personally by the researchers and item analysis carried out to establish the item difficulty and discriminator indices.

Validation of Instrument

The instrument, MATN Mathematics Achievement Test in Number and Numeration validated by experts in mathematics education, test and measurement and psychology. They were requested to check for the appropriateness of the items, structure of the questions and good reflection of the contents and objectives of the curriculum. The experts expressed satisfaction in the test items with respect to the face and content validity. A pilot study was carried to establish the reliability coefficient of the instrument. The reliability coefficient of

the instrument was 0.82 using Kuder-Richardson 21 formula.

Method of Data Collection

The students were subjected to six weeks of teaching period before and after the experiment pretest and post test were administered to the students respectively. The researcher afterwards took possession of the answer scripts for marking, recording and analysis.

Method of Data Analysis

The data for the study were gathered through the administration and scoring of the instrument MATN. Mean and standard deviation were used to answer the Research Questions. Analysis of covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significance.

Results discussed in tables are presented below:

Research Question 1:

To what extent does gender influence the mean achievement scores of students taught number and numeration using Ethno mathematics?

Table 1: Achievement scores of student taught number and numeration using Ethno mathematics approach based on gender

Teaching Approach	No of Students	Sex	Mean scores		SD	Mean Gain
			Pre test	Post test		
Ethno mathematics	117 58	Male	8.20	10.82	4.47	2.62
		Female	5.80	10.36	3.99	4.56
Mean difference			2.40	0.46		1.94
Total	175					

This table shown that the mean gain in the achievement of male students taught using Ethno mathematics approach was 2.62 and that of females was 4.56 the mean difference 1.94 in favour of the females. This means that female students achieved higher than male

students when they were taught number and numeration using Ethno mathematics approach.

Research question 2: To what extent will the Ethno mathematics approach influence the mean achievement scores of students both in the rural and urban areas?

Table 2: Rural and urban differentials using Ethno mathematics approach

Teaching Strategy	No of Students	Sex	Mean scores		SD	Mean Gain
			Pre test	Post test		
Ethno-mathematics approach	87	Urban	4.42	10.86	3.80	6.44
	88	Rural	10.23	10.33	4.83	0.1
Mean difference			5.81	0.53		6.34
Total	175					

From Table 2 The mean gain of urban student taught using Ethno mathematics approach was 6.44 while that of rural students was 0.1 the overall mean difference was 6.34 in favour of the urban students. This implies that urban students achieved higher than rural students when taught number numeration using Ethno mathematics approach.

Hypothesis one: There is no significant difference in the mean achievement scores of the significant $F(1.83) = 0.324, p > 0.570$. Therefore, we do not reject the null hypothesis. This implies that there is no significant difference in the mean achievement scores of male and female students taught using Ethno mathematics approach

Hypotheses I:

Table 3: ANCOVA on achievement of male and female students taught using ethno mathematics approach.

Source	Type III Sum of Square	df	Mean Square	F	Sig
Corrected model	11.522	2	5761	.302	0.740
Intercept	4320.693	1	4320.693	226.796	0.000
preMAT	6.954	1	6.954	0.365	0.547
Gender	6.210	1	6.210	0.326	0.570
Error	1581.234	173			
Total	11243.000	175			
Corrected total	1592.756	174			

R squared = 0.007 (Adjusted R squared = 0.017)

Hypothesis II:

There is no significant difference in the mean achievement scores of students from urban and rural

areas that were taught number and numeration using Ethno mathematics approach. The ANCOVA was not significant $F(1.83) = 0.133, p > 0.05$ therefore, the null hypothesis is not rejected.

Table 4: ANCOVA on achievement of urban and rural students taught using ethno mathematics approach.

Source	Type III sum of square	df	Mean square	F	Sig
Corrected model	7.861	2	3.930	.206	0.814
Intercept	3673.620	1	3673.620	192.385	0.000
PreMAT	1.710	1	1.710	0.090	0.766
Location	2.549	1	2.549	.133	0.716
Error	1554.895	173			
Total	11243.3000	175		19.095	
Corrected total	1592.756	174			

R squared = 0.005 (Adjusted R squared = 0.0.019)

DISCUSSION OF FINDINGS

It was found that there was no significant difference in the mean achievement scores of male and female students taught using ethno mathematics approach. This finding differs from that of Ogunkule (2007), who found gender disparity in students achievement in mathematics in Rivers state. In Ogunkule's study, male students performed better than female in mathematics. From the findings of this study, such disparity could be erased in mathematics if Ethno-mathematics approach is used. Another finding revealed that there was no significant difference in the male achievement scores of students from urban and rural area that were taught number and numeration using ethno mathematics approach.

It was also found that students from urban and rural areas who were taught number and numeration using Ethno-mathematics approach and conventional approach did not differ because of the interest generated by this ethno mathematics approach.

Hypothesis two sought to determine whether there is a significant influence of school location on students' achievement in number and numeration using ethno mathematics approach. The finding of this hypothesis was not significant. Location (urban or rural) of school was found not to influence ethno mathematics approach. This is not coming as a surprise because a teacher is expected to be effective, innovative, despite the location of the school. The students should be ready to embrace new ideas, techniques, methods and seek improvement at all times. This finding disagreed with Seah and Bishop (2000), since ethno mathematics is the study of mathematics in the cultural milieu of the learner and culture had relationship with values which guided actions in the community. So the location of school (urban or rural) affects the ethno mathematical approach. This study therefore puts it that location of school influence ethno mathematics approach.

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