

IMPACT OF LOGIC ERROR COMMITTED BY MATHEMATICS TEACHERS IN SOLVING PROBLEMS INVOLVING LONGITUDE AND LATITUDE IN THE KOGI CENTRAL EDUCATIONAL ZONE

BY

ARIVI SADIQ SALIU

Department of Science Education,
Prince Abubakar Audu University,
Anyigba, Nigeria.

Corresponding Author: arivi.ss@ksu.edu.ng

Abstract

The study examined the type of errors made by mathematics teachers in solving longitude and latitude in the Kogi central educational zone. A sample of 30 subjects was sampled out of the total population of mathematics teachers in the zone. This study employed the use of a quasi-experimental design. One research question and two research hypotheses were answered and tested in this study with mean, standard deviation and inferential statistics of t-test for significance at 0.05 Margin of error respectively. The reliability coefficient of the mathematics achievement test instrument was 0.82 using Pearson product-moment correlation. The results showed that male and female differences were significant in the logic error committed by mathematics teachers. Based on the findings, it is recommended that mathematics teachers should teach latitude and longitude to avoid logic errors.

Keywords: Logic Errors, Achievement, Longitude, Latitude Geometry.

Introduction

Mathematics is an area of knowledge that includes topics as numbers, formulae and related structures, shapes and the space in which they are contained, and quantities and their changes (Bell, 2012). Mathematics is essential in natural and social sciences, engineering, medicine, finance, computer science and social sciences (Restivo, 2013). Logic error is a bug in a program that causes it to operate incorrectly, but not to terminate abnormally or crash, logic errors are difficult to catch by the programmer because the programming language interpreter does not identify this error as a problem. To identify this errors a person who is knowledgeable about the expected results should review the outcome and operation of that program (Woodruff, 2023)

Empirical research on identifying and classifying student error has focused primarily on the performance in Earth geometry to be achieved (FRN, 2012) and its attendant on solving problems involving longitude and latitude as an effective teaching to mathematics teachers. There have been a consistent poor performance in mathematics both at secondary and tertiary level of education in Nigeria (Salami, 2019). This problem of student's poor performance in

secondary schools mathematics has remained a source of concern to all stakeholders in mathematics educators. John (2015) recently advances in solving problems involving longitude and latitude geometry to help students have a strategy for solving questions involving problems of distance from one place to another. William (2016) lament the poor performance of students and achievement in solving problems involving longitude and latitude. Nigeria depended to a large extent on the product of mathematics knowledge both in application and theory with that uses of such as area free from logic error, conceptual, logic and draw translation and applied errors.

Other research has now included other investigations on the logic error mathematics teacher committed and these include taxonomizing error and their causes. Attles, Luxton-Reilly and Denny (2018) found improper casting not storing the result.

From a call to a non-void method and flow reaching the end of a non-void method were among the most commonly made logic error in longitude and latitude. Improvement in mathematics instruction still indicates gross logic errors committed by mathematics teachers most especially on longitude and latitude (Earth geometry) while solving mathematics problems and these constituted mathematics teacher lack of readiness for further mathematics learning. Attles, Luxton-Reilly and Denny (2018), reported that the more mathematics teachers understand the nature of these errors and how mathematics teachers respond to them, the more effective teaching can therefore be, the word iteration means continually trying solutions to improve classroom management and content delivery experience for mathematics teachers and mathematics errors. One important word to support the student in understanding this phenomenon may be in the method used by mathematics teachers in solving problems that are free from logical errors and works perfectly.

In computation, it becomes necessary to investigate the student's specific area of weakness as indicated by the logical errors they committed. Process skills are thought processes that are related to cognitive development. They are commonly brought into use while performing mathematical calculations, the error resulting from violation or wrong use of this logic or skills is referred to as logic error (Bringula & Torres, 2012).

Statement of the Problem

Mathematics teachers' needs competencies which are required in finding a solution to mathematics instruction most especially using inference solution strategy and languages to solve some mathematical problems on longitude and latitude (Earth geometry). Errors made by teachers in solving problems involving longitude and latitude have created a huge gap in the academic performance of students and it is in line with this problem that this present study seeks to find out the logical error committed among mathematics teachers in solving problems involving longitude and latitude.

Objectives of the Study

The following objectives were formulated:

1. determine the level of logic errors made on by male and female mathematics teachers on longitude and latitude.
2. examine the highly and lowly logic errors mathematics teachers commit in solving mathematics problems involving longitude and latitude (Earth geometry).

Research Question

- 1 What is the level of logic error made on achievement by male and female mathematics teachers?

Research hypotheses

In this study, two null hypotheses were tested for significance level at 0.5 margins of error which are as follows:

HO₁: There is no significant difference in the logical error committed on academic achievement of male and female mathematics teachers.

HO₂: There is no significant difference in the logical errors committed in the achievement of highly and lowly mathematics teachers.

Methodology

The research design adopted for this study was a quasi-experimental design using the pretest-posttest non-equivalent control group design. The population of this study comprised all mathematics teachers in the Kogi Central education zone of Nigeria. The study's participants were 30 mathematics teachers drawn from 10 schools in Kogi central educational zone. Their age ranged from 35-55 years with a mean of 26.5 years and a standard deviation of 6.5. The study includes male and female teachers. Another variable considered in the study is the extent of logical errors committed at two levels that is highly committed and less committed teachers.

The instrument used for this study is the Mathematics Achievement Test (MAT), which was used to gather data on the study. Items in the instrument were adopted from the mathematics achievement test by Bakare (2012). The instrument was divided into two parts. The first part requires the participant's demographic information like sex, age, class, and name of the school, while the second part contains 50 items on longitude and latitude. The reliability coefficient of the instrument yielded $r = 0.85$ through Pearson product-moment correlation (PPMC).

Results

Data collected in the study were analyzed using t-test inferential statistics. The study analyzed two research hypotheses and they were presented below with a tested significance level of 0.05 margin of error.

Hypothesis 1: there is no significant difference in the logical error committed on academic achievement of male and female mathematics teachers.

Research Question One: What is the difference in the level of logic error made on achievement by male and female mathematics teachers?

Table 1

Descriptive statistics on difference in the mean score of male and female mathematics logic error committed

Gender	N	X	SD	Mean Difference	Remark
Male	20	18.3	12.2	9.2	Male mean score is higher than female mean score
Female	10	09.1	8.0		

The descriptive statistics in table 1 showed that difference exist in the mean score of male and female mathematics teacher in logic error committed. The computed Mean achievement of male and female teacher are 18.3 and 9.1 respectively with a mean difference of 9.2.

Hypothesis One: There is no significant difference in the logical error committed on academic achievement of male and female mathematics teachers.

Table 2:

T-test showing the Mean Difference in the Effect of Logical Errors Committed by Achievement of Male and Female Teachers.

Gender	N	X	SD	DF	t-cal	t-crit	Decision
Male	20	18.3	12.2	28			
Female	10	09.1	8.0		2.20	1.50	S*

S* Significance at 0.05 significance level.

Table 2 shows the result of the analysis conducted on the effect of logical errors committed on mathematics teachers' achievement based on gender in longitude and latitude. The computed Mean achievement of male and female teacher are 18.3 and 9.1 respectively with a mean difference of 9.2. The result revealed that a significant difference exists in the achievement of male and female in longitude and latitude 2.05 and 1.50 which mean the hypothesis (HO₁) is rejected.

Hypothesis Two: There is no significant difference in the logical errors committed in the achievement of highly and lowly mathematics teachers.

Table 3:

T-test Showing Mean Difference Achievement of Highly Committed Logic Error and Lowly Committed Logical Errors by Mathematics Teachers in Longitude and Latitude.

Variable		N	X	SD	DF	t-cal	t-crit	Decision
Highly committed mathematics teacher		18	12.3	15.3	28			
Lowly committed mathematics teacher		12	5.1	2.3		1.05	0.04	S*

S* Significance at 0.05 significance level.

Table 3 shows academic achievement measured alongside the extent of logical errors committed. The result reveals that there is a significant difference in the academic achievement of highly committed logical errors in longitude and latitude with (t cal= 1.05 and 0.04 and at 0.05 level). Their computed mean scores are 12.3 and 5.1 with a mean difference of 7.2.

Discussion of Findings

The result of hypothesis one which compares the effect of logic error committed on the achievement of mathematics teachers found to be significant. The finding shows that logic errors committed shows to affect the academic achievement of mathematics teachers concerning gender. The finding is in disagreement with Attles, Luxton-Reilly and Denny (2018). The variation in the result of the study and that of John (2015) may be connected with the issues of the environment.

The result of hypothesis 2 showed that mathematics teachers significantly committed high error in their academic achievement. Concerning the position of Bringula and Torres (2012) that academic mathematics teachers express a lack of interest in the subject, it affects the way to convince and understand mathematics in longitude and latitude. It can be said

therefore that interest and attitude toward mathematics because these two constructs according to the researchers, mathematics serve as encouragement even to teachers. And these can help mathematics teachers a lot to disseminate their teaching to the best of their ability and knowledge making use of all available resources rather than reasoning to the use of memorization.

Conclusion

In conclusion, logic error committed by teachers in teaching and learning of latitude and longitude cannot be over emphasized as results of this findings have shown that teachers' logic error in latitude and longitude is very high and thus affect the mean achievement score. Based on the findings of this study, it was also concluded that the logic error committed by the male mathematics teachers outweighs that of the female mathematics teachers.

Recommendations

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

1. Based on the findings, it is recommended that mathematics teachers should teach latitude and longitude to avoid logic errors.
2. Based on the findings, it is recommended that mathematics teachers should try as much as possible to use the appropriate method of teaching.

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