



Research Article

Effect of Mother's Tongue on Secondary School Students' Achievement in Mathematics in Federal Capital Territory (FCT) Abuja

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Abstract

The study investigated the effect of mother's tongue (Yoruba Language) on the academic achievement of secondary school students in mathematics in Gwagwalada Area Council, Abuja. The study had four (4) research questions from which four (4) null hypotheses were formulated, which were tested at 95% level of confidence. The study employed survey and experimental research designs. The target population comprises all secondary school students who speak Yoruba as their first language. Out of the 356 students involved in the study, one hundred and fifty-four (154) students were purposefully selected as experimental group. The instrument for data collection was Mother Tongue Mathematics Achievement Test (MTMAT). The instrument had been validated by experts and professional mathematics educators, from which a reliability coefficient of 0.867 was obtained. Data collected were analyzed using mean, standard deviation and t-test statistic. The results of the findings showed that mother tongue had a significant effect on the achievement of both junior and senior secondary school students taught mathematics but no level of significance was recorded based on the students' gender. It was therefore recommended that Yoruba language be used in teaching mathematics at the secondary school level to Yoruba speaking students, and by implication, teachers and parents should encourage the children to put more focus in the learning of their mother tongue.

Keywords: Mother tongue, Mathematics achievement, Yoruba Language.

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Introduction

All students deserve to become mathematically literate regardless of gender, socio-economic background, language, cultural background, learning ability or previous mathematics experiences (Njagi, 2015). Equity in education has become a common concern with a focus on positive attempts to achieve equity in different educational systems. Equity in education can be achieved by teaching students corresponding to their level of readiness, their interests and learning style, maximizing their opportunities for personal learning and growth. Thus equity in education and social justice can only be met if teachers find the way to correspond to various learning situations by modeling teaching.

The development and growth of the society largely depend on the language which links the people together (Abubakari, 2015). Boris, Stefan, Sherry, Ashok and Michael (2009) defined language as a vehicle for conveying the culture and traditions of the people that own it. This implies that language must be the pivot on to which the appreciation of culture revolves. In other words, people's culture cannot be fully appreciated without the use of language which conveys such culture. Therefore people that lose its language will be people without a culture and once people have no culture they cannot be identified as people; it becomes people without a future and identity. Language education is the most important of a people's culture; it is the most distinctive of all the traits that separates human being conceivable. In other words, it is that tool that differentiates the human from animals. Language forms the basis for translating thought, discoveries and inventions into reality from one generation to another (Adefugbo, 1980).

The general usage of the term "mother tongue" denotes not only the language one learns from one's mother, but also the speaker's dominant and home language, that is, not only the first language according to the time of acquisition, but the first with regard to its importance and the speaker's ability to master its linguistic and communicative aspects (Richard, 2019)

Mathematics is called the language of science. "The universe cannot be read until we have learnt the language and become familiar with the characters in which it is written. It is written in mathematical language, and the letters are triangles, circles and other geometrical figures, without which means it is humanly impossible to comprehend a single word" (Anne, 2019). Students' performances in mathematics at the senior secondary school level have been the major concern of researchers. Having read that mathematics is a language on its own, it is important to also note that there is another

language with which the mathematical language is communicated to the students. English language is one of the languages with which the mathematical language is communicated to the students yet there are still records of poor achievements in the subject. It is for this reason that the researcher carries out a study to investigate the effects of mother's tongue (Yoruba Language) on the mathematics achievement of senior secondary school students.

Mathematical Language and Mother Tongue

The vocabulary of mathematics draws from many different alphabets and includes symbols unique to math. A mathematical equation may be stated in words form a sentence that has a noun and a verb, just like a sentence in a spoken language. If one tries to perform a sentence diagram on a mathematical sentence, one will find infinitives, conjunctions, adjectives, etc. Mathematics grammar and syntax, like vocabulary, are international. No matter what one's country is, or what language one speaks, the structure of the mathematical language is the same.

Mathematics is the same all over the world; it can act as a universal language (Sunday, Olaoye. and Hauwa, 2021). A phrase or formula has the same meaning, regardless of another language that accompanies it. In this way, mathematics helps people learn and communicate, even if other communication barriers exist. Not everyone agrees that mathematics is a language. Some definitions of language describe it as a spoken form of communication. Mathematics is a written form of communication. While it may be easy to read a simple addition statement aloud, it's much harder to read other equations aloud. Also, the spoken statements would be rendered in the speaker's native language, not a universal tongue. However, sign language would also be disqualified based on this criterion. Most linguists accept sign language as a true language. There are a handful of dead languages that no one alive knows how to pronounce or even read anymore. A strong case for mathematics as a language is that modern elementary-high school curricula use techniques from language education for teaching mathematics. Educational psychologist and colleagues wrote that students learning mathematics require "a robust vocabulary knowledge base; flexibility; fluency and proficiency with numbers, symbols, words, and diagrams; and comprehension skills" (Anne, 2009). According to Richard (2019), the term "mother tongue" refers to a person's native language; that is, a language learned from birth. It is also called a first language, dominant language, home language, and native tongue. It is the language a person has been exposed to from birth or within the critical period.

Role of Language in Mathematics

Use of English in teaching and learning mathematics involves ordinary English and mathematical English (where words and phrases have specific meanings in mathematics). The latter is what has been referred to as the mathematics register. The mathematics register includes words from ordinary English but having a specialized mathematics meaning; for example: set, power, similar, difference, polygon, isosceles, and quadrilateral, which is borrowed from other languages.

Studies that have investigated learners' understanding of a variety of mathematics words, have demonstrated that some learners do not understand many of the words that are commonly used in mathematics classrooms. In particular, learners have problems with words that have one meaning in mathematics and another in ordinary English. However, some researchers have found that although some of the words can be explained in terms of their roots and origins, the words still cause problems because often learners do not remember the meanings (Kazima, 2008).

Abubakari (2015) carried out a study to determine the effect of language on junior secondary school students' academic performance in mathematics. Participants were 120 students, purposefully sampled among junior secondary school one (JSS 1) students of Government Science Secondary School, Dutsin-Ma, Katsina in Nigeria. Data collected occurred before and after proper teaching (in Hausa) for 12 weeks. Two research questions were formulated to guide the study. The statistical analysis showed there was a significant difference before and after the teaching in Hausa on students' performance in mathematics ($p \leq 0.05$).

Oluwole (2008) conducted a study to examine the influence of mother tongue on students' performances in English language in Junior School Certificate Examination (JSCE). The study investigated if mother tongue is solely the cause of the students' woeful performance in English Language in JSCE or if there are other completing factors. The subjects for the study were one hundred male and female SS1 students drawn from various government schools in western Nigeria. Using simple percentage descriptive statistic, the research question were analyzed. The findings reveal that mother tongue influences the students' poor performance in English language.

Statement of the Problem

Students are taught mathematics with English language yet there are many students coming from different language backgrounds. There is a decline in the academic performance of students in mathematics despite the fact that they are being taught with English language. A lot of mathematics teachers cannot teach mathematics effectively with English language without a reflection of the mother's tongue intonation. Students who are not fluent in speaking English are not willing to express themselves in their mothers' tongues because of the fear of the other students. There is barely few or no formal school setting as far as Nigeria is concerned that permits students to be taught mathematics in their mothers' tongues.

Purpose of the Study

The purpose of the study is to investigate the effects of mother's tongue (Yoruba Language) on the mathematics achievement of secondary school students in Gwagwalada Area Council. To achieve this purpose, the study has specific objectives as it investigates if there is:

1. difference in the mean achievement of junior secondary school students taught mathematics with Yoruba language and junior secondary school students taught with English language;
2. difference in the mean achievement of junior secondary school students taught mathematics with Yoruba language and senior secondary school students taught with Yoruba language;
3. gender difference in the mean achievement of male and female junior secondary school students taught mathematics with Yoruba language;
4. gender difference in the mean achievement of male and female senior secondary school students taught mathematics with Yoruba language.

Research Questions

1. Is there any difference in the mean achievement of junior secondary school students taught mathematics with Yoruba language and junior secondary school students taught mathematics with English language?
2. Is there any difference in the mean achievement of senior secondary school students taught mathematics with Yoruba language and senior secondary school students taught mathematics with English language?
3. Is there any gender difference in the mean achievement of male and female junior secondary school students taught mathematics with Yoruba language?
4. Is there any gender difference in the mean achievement of male and female senior secondary school students taught mathematics with Yoruba language?

Hypotheses

The following hypotheses were formulated in line with the research questions

Ho₁: There is no significant difference in the mean achievement of junior secondary school students taught mathematics with Yoruba language and junior secondary school students taught mathematics with English language.

Ho₂: There is no significant difference in the mean achievement of senior secondary school students taught mathematics with Yoruba language and senior secondary school students taught mathematics with English language.

Ho₃: There is no significant gender difference in the mean achievement of male and female junior secondary school students taught mathematics with Yoruba language.

Ho₄: There is no significant gender difference in the mean achievement of male and female senior secondary school students taught mathematics with Yoruba language.

METHODOLOGY

The population of the students is the total number of student in secondary schools in Gwagwalada Area Council as at the time of this research. The students were sampled from three different government secondary schools in Gwagwalada Area Council, Abuja, who speaks Yoruba as their first language. The sample for the study that was purposefully selected from the study population comprised 356 students (170 junior students and 186 senior students). Fifty-six (56) JSS1 students (31 male and 25 female) are fluent Yoruba language speakers as mother tongue while 85 SSS1 students (48 male and 37 female) are fluent Yoruba language speakers as mother tongue. It is summarized in Table 1.

Table 1: Sample for the Study

JSS1 Students			SSS1 Students		
Yoruba Speakers	Non-Yoruba Speakers	Total	Yoruba Speakers	Non-Yoruba Speakers	Total
56 (31 Male 25 Female)	114	170	85 (48 Male 37 Female)	101	186

The instrument for data collection was the Mother Tongue Mathematics Achievement Test (MTMAT), which consists of two (2) sections; the first section contains three (3) essay questions for the junior students and the second section contains five (5) essay questions for the senior students. The test questions were standardized questions selected from Basic Education Certificate Examination (BECE) and West African Examination Council (WAEC) past questions, having been validated by the examination bodies, based on mathematics taught during the experimental design of the study. Carrying out the reliability test, the researchers found reliability co-efficient of 0.867, which according to Kothari and Gaurav (2016) indicates that the instrument is reliable for data collection.

The researchers who are also fluent in speaking and teaching mathematics with Yoruba and English languages, taught the students mathematics topics for six (6) weeks; after which the questions were administered and marks were assigned based on the students' performance. The data collected were analyzed using simple arithmetic mean, standard deviation, and t-test statistic.

Data Analysis and Results

The null hypothesis is accepted if the p-value is greater than the level of significance, and rejected if the p-value is less than level of significance at 5% level of significance.

Research Question 1: Is there any difference in the mean achievement of junior secondary school students taught mathematics with Yoruba language and junior secondary school students taught mathematics with English language?

H₀₁: There is no significant difference in the mean achievement of junior secondary school students taught mathematics with Yoruba language and junior secondary school students taught mathematics with English language.

Table 2: t-test Analysis of Junior Secondary School Students taught with Yoruba and English Languages

Language	N	Mean	SD	Df	t	Sig@0.05	Decision
Yoruba	56	67.8	4.76	168	31.01	0.000	Significant
English	114	45.2	4.31				

Table 2 shows that the mean difference between the achievement of junior secondary school students taught mathematics with Yoruba language and junior secondary school students taught mathematics with English language is 22.6 in favour of Yoruba language. Also, the Table revealed that the difference is significant as p-value of 0.000 is less than 0.05 level of significance. Therefore, H₀₁ is rejected because junior secondary school

taught mathematics with Yoruba language achieved significantly higher than their counterpart taught mathematics with English language.

Research Question 2: Is there any difference in the mean achievement of senior secondary school students taught mathematics with Yoruba language and senior secondary school students taught mathematics with English language?

H₀₂: There is no significant difference in the mean achievement of senior secondary school students taught mathematics with Yoruba language and senior secondary school students taught mathematics with English language.

Table 3: t-test Analysis of Senior Secondary School Students taught with Yoruba and English Languages

Language	N	Mean	SD	Df	t	Sig@0.05	Decision
Yoruba	85	68.7	4.07	184	3.221	0.002	significant
English	101	66.5	4.99				

Table 3 shows that the mean difference between the achievement of senior secondary school students taught mathematics with Yoruba language and senior secondary school students taught mathematics with English language is 2.2 in favour of Yoruba language. Table 3 also revealed that the difference is significant as p-value of 0.002 is less than 0.050 level of significance. Therefore, **H₀₂** is rejected because senior secondary school taught mathematics with Yoruba language achieved significantly higher than their counterpart taught mathematics with English language.

Research Question 3: What is the difference in the mean achievement of male junior secondary school students taught mathematics with Yoruba language and female junior secondary school students taught mathematics with Yoruba language?

H₀₃: There is no significant difference in the mean achievement of male junior secondary school students taught mathematics with Yoruba language and female junior secondary school students taught mathematics with Yoruba language.

Table 4: t-test Analysis of Male and Female Junior Secondary School Students taught Mathematics with Yoruba Language

Yoruba	N	Mean	SD	Df	t	Sig@0.05	Decision
Jnr. Male	31	68.2	4.49	54	0.623	0.536	Not significant
Jnr. Female	25	67.4	5.12				

Jnr. – Junior

Table 4 shows that the mean difference between the achievement of male and female junior secondary school students taught mathematics with Yoruba language is 0.80 in favour of male students. Table 3 also revealed that the difference is not significant as p-value of 0.536 is greater than 0.05 level of significance. Therefore, H_{03} is accepted because male and female junior secondary school taught mathematics with Yoruba language achieved insignificantly higher than each other.

Research Question 4: Is there any gender difference in the mean achievement of male and female senior secondary school students taught mathematics with Yoruba language?

H_{04} : There is no significant gender difference in the mean achievement of male and female senior secondary school students taught mathematics with Yoruba language.

Table 5: t-test Analysis of Male and Female Senior Secondary School Students taught Mathematics with Yoruba Language

Yoruba	N	Mean	SD	Df	t	Sig@0.05	Decision
Snr. Male	48	68.5	4.46	83	0.415	0.679	Not significant
Snr. Female	37	68.9	3.55				

Snr. - Senior

Table 5 shows that the mean difference between the achievement of male and female senior secondary school students taught mathematics with Yoruba language is 0.40 in favour of female students. Table 3 also revealed that the difference is not significant as p-value of 0.536 is greater than 0.05 level of significance. Therefore, H_{04} is accepted because male and female junior secondary school taught mathematics with Yoruba language achieved insignificantly higher than each other.

Discussion of Findings

The t-test analysis of junior secondary school students taught mathematics with Yoruba and English languages reveals a wide gap of 22.6 (mean difference) improvement in the performances of those taught with Yoruba language over those taught with English Language, there is a level of significant difference in their performances. By this, it means that junior secondary school students performed better in mathematics when taught in Yoruba language than when taught in English language. This is in agreement with the findings of Akpabio (2013).

The t-test analysis of senior secondary school students taught mathematics with Yoruba and English languages reveals a narrow gap of 2.2 (mean difference), improvement in the mean performances of those taught with Yoruba language over those taught with English Language, that despite the narrow gap, there is there is a level of significant difference in their performances. By this, it means that senior secondary school students performed better in mathematics when taught in Yoruba language than when taught in English language.

The t-test analysis of male and female junior secondary school students taught mathematics with Yoruba language shows that apart from the improvement in the mean achievement of male students over female students, there is no level of significant difference in their performances when taught with Yoruba language. By this, it means that gender has no impact on the students' ability to learn his or her mother tongue although female students stay more often at home than the male students. It is also in line with the findings of Anne (2019).

The t-test analysis of male and female senior secondary school students taught mathematics with Yoruba language shows that despite the fact that there is an improvement in the mean achievement of female students over male students, there is no level of significant difference in their performances when taught with Yoruba language. By this, it means that gender has no impact on the students' ability to learn his or her mother tongue although female students stay more often at home than the male students.

Recommendations

Based on the findings, the following recommendations were made:

1. The States Ministry of Education with the help of the Federal Government should allow students to be taught mathematics in Yoruba language especially in States where the language is dominant.
2. The students should be allowed to express themselves in Yoruba language during the mathematics instructional process.
3. Parents who dwell at other places where the people speak different language or dialect should not allow their own dialect to go into extinction. They should always use it as a medium of interaction or communication with their children and should not stop them from speaking it.
4. Parents who restrict their children to speaking English language only should desist from such act. Children should rather be encouraged to learn their mother

tongue before English language. This will help them to acquire the basic linguistic skills that will prepare them to learn, speak and understand English better.

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